TEXIO
Test and Measurement Solutions

INSTRUCTION MANUAL

DIGITAL MULTIMETER

DL-2141 DL-2142 DL-2142G

B71-0420-11

■ **About a trademark, a registered trademark**

A company name and the brand name mentioned in this instruction manual are the trademark or the registered trademark of each company or group in each country and region.

■ **About this instruction manual**

In addition, the specifications of the product and the contents of this instruction manual are subject to change without notice for improvement. Please check to our website for the latest version.

Table of Contents

USING THE PRODUCT SAFELY

■ Preface

To use the product safely, read this instruction manual to the end.
Before using this product, understand how to correctly use it.

If you read this manual but you do not understand how to use it, please ask us or your local dealer. After you read this manual, save it so that you can read it, anytime as required.

■ Pictorial indication

This instruction manual and product show the warning and caution items required to safely use the product. The following pictorial indication and warning character indication are provided.

<Pictorial indication>	
	Some part of this product or the instruction manual may show this pictorial indication. In this case, if the product is incorrectly used in that part, a serious danger may be brought about on the user's body or the product. To use the part with this pictorial indication, be sure to refer to this instruction manual.
 	If you use the product, ignoring this indication, you may get killed or seriously injured. This indication shows that the warning item to avoid the danger is provided. If you incorrectly use the product, ignoring this indication, you may get slightly injured or the product may be damaged. This indication shows that the caution item to avoid the danger is provided.

Please be informed that we are not responsible for any damages to the user or to the third person, arising from malfunctions or other failures due to wrong use of the product or incorrect operation, except such responsibility for damages as required by law.

USING THE PRODUCT SAFELY

- **Do not remove the product's covers and panels**
  Never remove the product's covers and panels for any purpose. Otherwise, the user's electric shock or fire may be incurred.
- **Warning on using the product**
  Warning items given below are to avoid danger to user's body and life and avoid the damage or deterioration of the product.
  Use the product, observing the following warning and caution items.
- **Warning items on power supply**
  - Power supply voltage
    The rated power supply voltages of the product are 100, 120, 220 and 240VAC. The rated power supply voltage for each product should be confirmed by reading the label attached on the back of the product or by the "rated" column shown in this instruction manual.
    The specification of power cord attached to the products is rated to 125VAC for all products which are designed to be used in the areas where commercial power supply voltage is not higher than 125VAC. Accordingly, you must change the power cord if you want to use the product at the power supply voltage higher than 125VAC. If you use the product without changing power cord to 250VAC rated one, electric shock or fire may be caused.
    When you used the product equipped with power supply voltage switching system, please refer to the corresponding chapter in the instruction manuals of each product.

  - Power cord
    (Important) The attached power cord set can be used for this device only.
    If the attached power cord is damaged, stop using the product and call us or your local dealer. If the power cord is used without the damage being removed, an electric shock or fire may be caused.

  - Protective fuse
    If an input protective fuse is blown, the product does not operate. For a product with external fuse holder, the fuse may be replaced. As for how to replace the fuse, refer to the corresponding chapter in this instruction manual.
    If no fuse replacement procedures are indicated, the user is not permitted to replace it. In such case, keep the case closed and consult us or your local dealer. If the fuse is incorrectly replaced, a fire may occur.

USING THE PRODUCT SAFELY

■ Warning item on Grounding

If the product has the GND terminal on the front or rear panel surface, be sure to ground the product to safely use it.

■ Warnings on Installation environment

- Operating temperature and humidity

  Use the product within the operating temperature indicated in the “rating” temperature column. If the product is used with the vents of the product blocked or in high ambient temperatures, a fire may occur.

  Use the product within the operating humidity indicated in the “rating” humidity column. Watch out for condensation by a sharp humidity change such as transfer to a room with a different humidity. Also, do not operate the product with wet hands. Otherwise, an electric shock or fire may occur.

- Use in gas

  Use in and around a place where an inflammable or explosive gas or steam is generated or stored may result in an explosion and fire. Do not operate the product in such an environment.

  Also, use in and around a place where a corrosive gas is generated or spreading causes a serious damage to the product. Do not operate the product in such an environment.

- Installation place

  Avoid installing the product on inclined places or on places subject to vibration. Otherwise, the product may slip or fall down to cause damages or injury accidents.

■ Do not let foreign matter in

Do not insert metal and inflammable materials into the product from its vent and spill water on it. Otherwise, electric shock or fire may occur.

■ Warning item on abnormality while in use

In abnormal situations, such as “smoke”, “fire”, “abnormal smell” or “irregular noise” occur from the product while in use, stop using the product, turn off the switch, and remove the power cord plug from the outlet. After confirming that no other devices catch fire, ask us or your local dealer.

USING THE PRODUCT SAFELY

■ **Input / Output terminals**

Maximum input to terminal is specified to prevent the product from being damaged. Do not supply input, exceeding the specifications that are indicated in the "Rating" column in the instruction manual of the product.

Also, do not supply power to the output terminals from the outside. Otherwise, a product failure is caused.

■ **Calibration**

Although the performance and specifications of the product are checked under strict quality control during shipment from the factory, they may be deviated more or less by deterioration of parts due to their aging or others. It is recommended to periodically calibrate the product so that it is used with its performance and specifications stable.

For consultation about the product calibration, ask us or your local dealer.

■ **Daily Maintenance**

When you clean off the dirt of the product covers, panels, and knobs, avoid solvents such as thinner and benzene. Otherwise, the paint may peel off or resin surface may be affected.

To wipe off the covers, panels, and knobs, use a soft cloth with neutral detergent in it. During cleaning, be careful that water, detergent, or other foreign matters do not get into the product.

If a liquid or metal gets into the product, an electric shock and fire are caused. During cleaning, remove the power cord plug from the outlet.

Use the product correctly and safely, observing the above warning and caution items. Because the instruction manual indicates caution items even in individual items, observe those caution items to correctly use the product.

If you have questions or comments about the instruction manual, ask us or E-Mail us.

1. **GETTING STARTED**

This chapter describes the DL-2140 Series in a nutshell, including its main features, package contents, and front / rear / display panel introduction. After going through the overview, follow the Power-up sequence and Functionality check section to properly setup the DL-2140 Series.

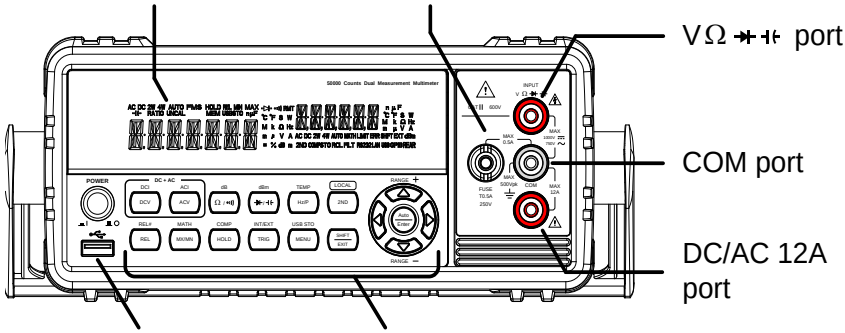
Feature	MODEL		
	DL-2142	DL-2142G	DL-2141
Temperature	Yes	Yes	-
USB Logging	Yes	Yes	-
GP-IB	-	Yes	-

1-1. Characteristics

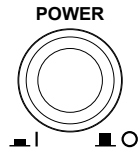
The DL-2140 Series are portable, dual-display digital multimeters suitable for a wide range of applications, such as production testing, research, and field verification.

Performance	• DCV accuracy: 0.02% • High current range: 10A • High Voltage range: 1000V • High ACV frequency response: 100kHz
Features	• 50000 count display • Multi functions: ACV, DCV, ACI, DCI, R, C, Hz, Temp*, Continuity, Diode test, MAX/MIN, REL, dBm, Hold, MX+B, 1/X, REF%, dB, Compare. • Manual or Auto ranging • AC true RMS • Data Logging to USB*
Interface	• Voltage/Resistance/Diode/Capacitance/ Temperature* input • Current input • USB device port as standard for remote control • USB host* for data logging • GP-IB (DL-2142G only) • Calibration port (for service operators only)
	* These features are available on the DL-2142

1-2. Front Panel

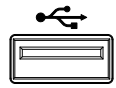


Power Switch



Turns On ▟ or Off ▙ the main power. For the power up sequence, see page 9.

USB Host Port



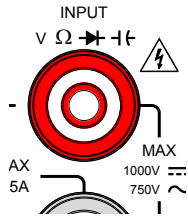
The Host port is a type A USB port for logging data. See the USB Store chapter for more details, page 45.

⚠ Note: For DL-2142 /DL-2142G

Main Display

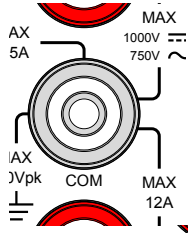
Shows measurement results and parameters. For display configuration details, see page 41 (light setting).
For an overview of the main display, see page 6.

V Ω ⇥ ⊣⊢ Input Port



This port is used for all measurements except for DC/AC current measurements.

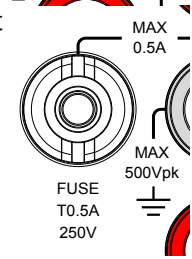
COM Port



Accepts ground (COM) line in all measurements.
The maximum withstand voltage between this terminal and earth is 500Vpk.

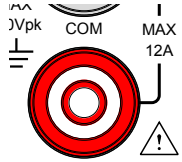
DC/AC 0.5A Port

AMPS Fuse Holder



Low current measurement port. Accepts DC/AC Current input. For details see page 16.
DC: 500μA~0.5A
AC: 500μA~0.5A
As a fuse, protects the instrument from over-current. Rating: T0.5A, 250V.(This terminal accepts DC/AC current input)
For the fuse replacement procedure, see page 84.

DC/AC 12A Port



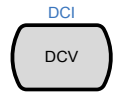
High range current measurement port. Accepts DC/AC Current input. For DCI or ACI details, see page 16.

Measurement Keys

The top row of measurement keys are used for basic DMM measurements such as voltage, current, resistance, capacitance and frequency. The bottom row of measurement functions are used for more advanced functions.
Each key has a primary and secondary function. The secondary function is accessed in conjunction with the SHIFT key.

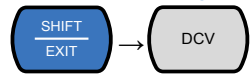
Upper Measurement keys

DCV



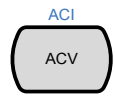
Measures DC Voltage (page 13).

DCI (SHIFT→DCV)

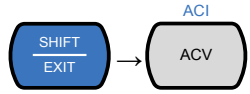
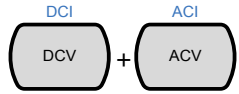
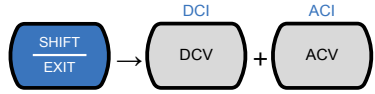
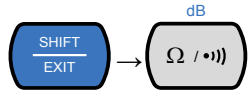
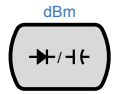
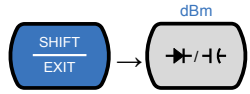
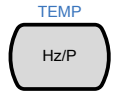
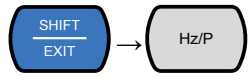


Measures DC Current (page 16).

ACV



Measures AC Voltage (page 13).

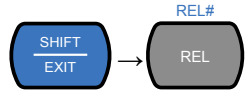
ACI (SHIFT→ACV)		Measures AC Current (page 16).
DCV + ACV		Measures DC + AC voltage (page 13).
DCI+ACI		Measures DC + AC current (page 16).
Resistance/ Continuity)		Measures resistance or continuity, depending on the selected mode. See page 19 and22, respectively.
dB (SHIFT→ Ω/•))		Measures dB. See page 34.
Diode/ Capacitance		Tests diodes or measures capacitance, depending on the selected mode. See page 20 and 21, respectively.
dBm (SHIFT → ⊣⊢/⊣⊢)		Measures dBm. See page 33
Hz/P		Measures the frequency or period of a signal, depending on the selected mode. See page 24.
TEMP (SHIFT → Hz/P)		Measures temperature. See page 26.
2ND		As the 2nd key, selects the measurement item on the 2nd display (page 28). Pressing and holding for more than 1 second turns off the 2nd display. As the Local key, releases the remote control and returns the instrument to local panel operation (page 59).

Lower Measurement keys

REL

Measures the Relative value (page 35).

REL#
(SHIFT→REL)

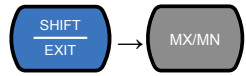


Manually sets the reference value for the Relative value measurement.

MX/MN

Measures the Maximum or the Minimum value (page 34).

MATH
(SHIFT→
MX/MN)

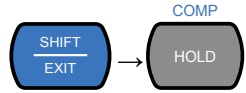


Enters the Math measurement mode. The supported math functions include MX+B, REF% and 1/X. See page 38 for details.

HOLD

Activates the Hold function (page 36).

COMP
(SHIFT→HOLD)

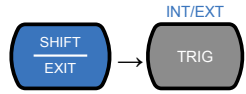


Activates the compare measurement function. See page 37.

TRIG

Triggers sample acquisition manually when the trigger is set to external triggering. See page 12. (Note: Not supported for capacitance measurement)

INT/EXT
(SHIFT→TRIG)

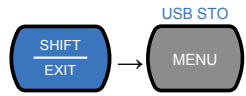


Toggles the trigger source as either internal or external (manual trigger).

MENU

Enters the configuration menu for System Settings, Measurement Settings, Temperature measurement settings, I/O settings and USB storage settings. See page 41 for the system menu.

USB STO
(SHIFT→MENU)



Logs measurement data to a USB drive. This function is available for the DL-2142. See page 45.

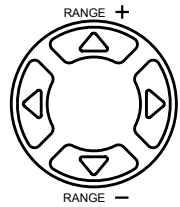
SHIFT/EXIT

When used as a SHIFT key, it is used to access the secondary functions associated with the measurement keys.
When used as an EXIT key, it will exit out of menu systems.

AUTO/ENTER

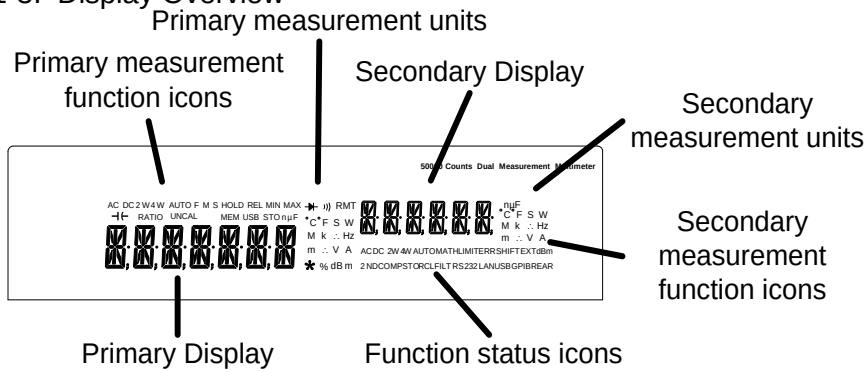
When used as an AUTO key, it will set the range of the selected function to autorange.
When used as an ENTER key, it will confirm the entered value or menu item.

Arrow Keys



The arrow keys are used to navigate the menu system and edit values.
The Up and Down arrow keys will also manually set the range for the voltage and current measurements.
The Left and Right arrow keys will also toggle the refresh rate between the fast, medium and slow rates.

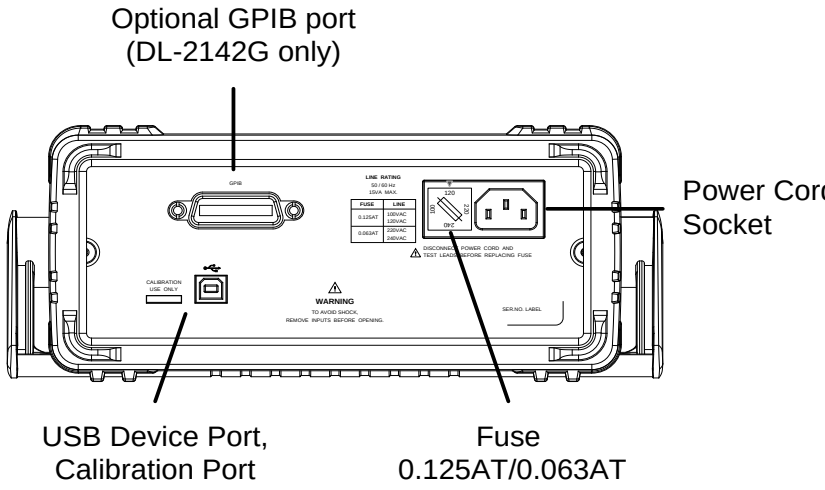
1-3. Display Overview

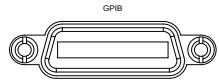
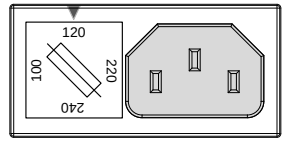
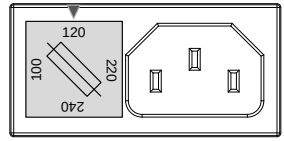


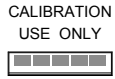
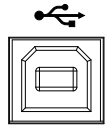
Primary Measurement Function Icons	Displays the primary measurement function.
Primary Measurement Units	Displays the units for the primary measurement function.
Secondary Display	Displays the results of the secondary measurement.
Secondary Measurement Units	Displays the units for the secondary measurement function.

Secondary Measurement function icons	Displays the secondary measurement function.
Function Status Icons	Display status icons for operations/functions that are not linked to the primary or secondary functions.
Primary Display	Displays the results of the primary measurement.

1-4. Rear Panel



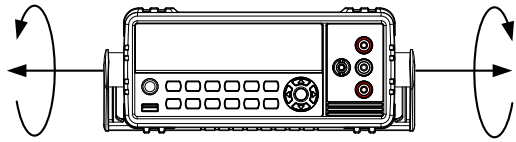
GP-IB Port		The GP-IB port can be used for remote control. (DL-2142G only)
Power Cord Socket		Accepts the power cord. AC 100/120/220/240V ±10%, 50/60Hz For power on sequence, see page 9.
Fuse Socket		Holds the main fuse: 100/120 VAC: T 0.125A 220/240 VAC: T 0.063A For fuse replacement details, see page 82.

Calibration Port		Reserved for calibration purposes. For service technicians only.
USB Device		Type B USB port. This port is used for remote control.

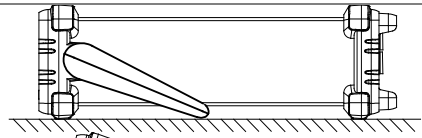
1-5. Set Up

1-5-1. Tilting the Stand

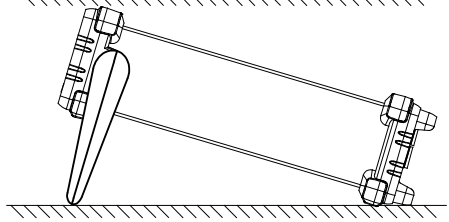
From the base of the handle, gently pull the handle out sideways and then rotate it to one of the following positions.



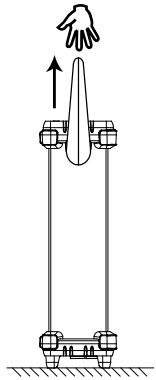
Horizontal position



Tilt stand position



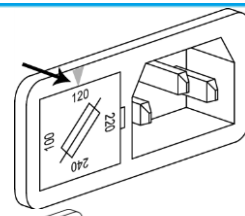
Carry position



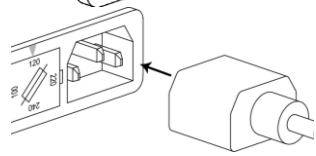
1-5-2. Power Up

Steps

1. Ensure the correct line voltage is lined up with the arrow on the fuse holder. If not, see page 82 to set the line voltage and fuse.



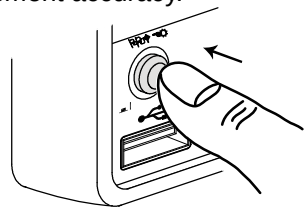
2. Connect the power cord to the AC voltage input.



Note

Make sure the ground connector on the power cord is connected to a safety ground. This will influence the measurement accuracy.

3. Push to turn on the main power switch on the front panel.

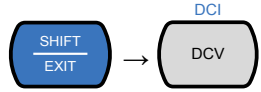


4. The display turns on and shows the last function that was used before the power was reset.

1-5-3. How to Use the Instrument

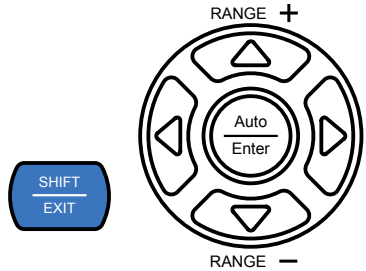
Background	The following section will introduce to you how to access the basic functions on the DMM as well as how to navigate the menu system and edit the parameter values.
Using the Function keys	Any of the primary functions can be used by simply pressing the desired function key. For example: To activate the DCV function, press the DCV key.

To activate a secondary function, first press the SHIFT key followed by the function key for the secondary function.
For example: To activate DCI measurement, first press the SHIFT key. SHIFT will be highlighted on the display. Next, press the DCV function key. This will activate the DCI mode.



Navigating the Menu System

The menu system is navigated with the Up, Down, Left and Right arrow keys, the Auto/Enter key and the SHIFT/EXIT key.

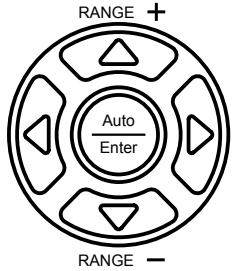


To enter the menu system, press the MENU key.
See page 82 for the System Menu tree.

- Pressing the Left and Right arrow keys will navigate to each of the menu items on the current menu level.
- Pressing the Down key will go down to the next level of the menu tree.
- Conversely pressing the Up key will allow you to go back to the previous menu level.
- Pressing Down or Enter on the last item in a menu tree will allow you to edit the settings or parameters for that particular item or setting.
- Pressing the Exit key will allow you to exit from the current settings and return to the previous menu tree level.

Editing a Setting or Parameter

When you access a menu or parameter setting, the Up, Down, Left and Right keys can be used again to edit the parameter as well.



- If a setting or parameter is flashing, it indicates that that particular parameter can be edited.
- Pressing the Left or Right arrow key will allow you to select a digit or character to edit.
- Pressing the Up or Down keys will allow you to edit the selected character.

2. **OPERATION**

2-1. Basic Measurement Overview

2-1-1. Refresh Rate

Background

The refresh rate defines how frequently the DMM captures and updates measurement data. A faster refresh rate yields a lower accuracy. A slower refresh rate yields a higher accuracy. Consider these tradeoffs when selecting the refresh rate.
For further details, please see the specifications.

Refresh rate (Reading/S)

Function	S	M	F
Continuity / Diode	10	20	40
DCV/DCI/R	5	10	40
ACV/ACI	5	10	40
Frequency / Period	1	10	76
Capacitance	2	2	2

Steps

1. Press the left or right arrow keys to change the refresh rate.
2. The refresh rate will be shown at the top of the display. F ↔ M ↔ S

Note

The refresh rate cannot be set for capacitance measurement.

2-1-2. Reading Indicator

Overview

1. The reading indicator * next to the 1st display flashes according to the refresh rate setting.

2-1-3. Automatic/Manual Triggering

Overview

2. By default, the DL-2140 Series automatically triggers according to the refresh rate. See the previous page for refresh rate setting details. The TRIG key is used to manually trigger acquisition when the trigger mode is set to EXT.

Manual Trigger

1. Press SHIFT+TRIG to toggle the trigger mode to EXT.
2. Press the TRIG key to manually trigger each measurement when in EXT trigger mode.

Note

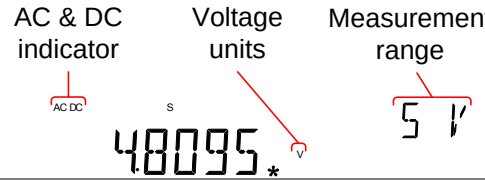
Manual triggering is not supported for capacitance measurements.

2-2. AC/DC Voltage Measurement

The DL-2140 Series can measure from 0 to 750VAC or 0 to 1000VDC, however the CATII measurement is only rated up to 600V.

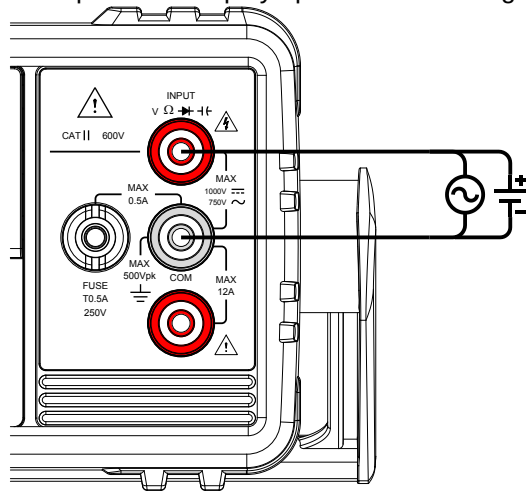
Set to ACV/DCV Measurement

1. Press the DCV or ACV key to measure DC or AC voltage.
   For AC + DC voltage, press the ACV and DCV keys at the same time.
2. The mode will switch to AC, DC or AC+DC mode immediately, as shown below.



Connection

Connect the test lead between the V and the COM port. The display updates the reading.



2-2-1. Select the Voltage Range

The voltage range can be set automatically or manually.

Auto Range

1. To turn the automatic range selection On/Off, press the AUTO key.

Manual Range

2. Press the Up or the Down key to select the range. The AUTO indicator turns Off automatically. If the appropriate range is unknown, select the highest range.

Selectable Voltage Ranges

Range	Resolution	Full scale
500mV	10uV	510.00mV
5V	0.1mV	5.1000V
50V	1mV	51.000V
500V	10mV	510.00V
750V (AC)	100mV	765.0V
1000V (DC)	100mV	1020.0V

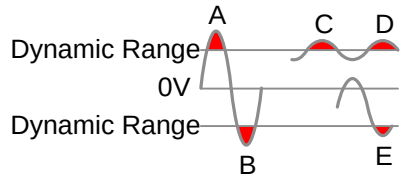
Note

For further details, please see the specifications on page 86.

Note

DC voltages with AC components cannot be accurately measured if the DC+AC component exceeds the dynamic range for the selected DC range. Any voltage exceeding the dynamic range will be clipped at the upper/lower range limit. Under these conditions the range that is chosen with the Auto range function may be too small.

For example:



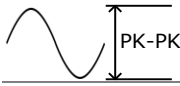
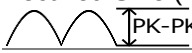
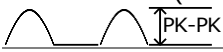
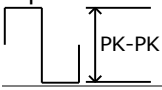
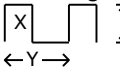
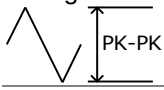
A,B: Input exceeds the dynamic range.
C,D: The DCV offset causes the input to exceed the upper dynamic range.
E: The DCV offset causes the input to exceed the lower dynamic range.
The DC voltage range should be manually selected when all of the following conditions are true:

- When DCV measurement is used.
- When the signals being measured contain both DC and AC components.
- When the amplitude of the AC component in the measured signal is higher or lower than the dynamic range of the range being currently selected by the auto-range function.

	Selected DCV Range	Dynamic Range
Maximum DCV Dynamic Range	DC 500mV	±600mV max
	DC 5V	±6V max
	DC 50V	±60V max
	DC 500V	±600V max
	DC 1000V	±1000V max

2-2-2. Voltage Conversion Table

This table shows the relationship between an AC and DC reading for various waveforms.

Waveform	Peak to Peak	AC (True RMS)	DC
Sine 	2.828	1.000	0.000
Rectified Sine (full wave) 	1.414	0.435	0.900
Rectified Sine (half wave) 	2.000	0.771	0.636
Square 	2.000	1.000	0.000
Rectified Square 	1.414	0.707	0.707
Rectangular Pulse 	2.000	2K K= $\sqrt{(D-D^{2)}}$ D=X/Y	2D D=X/Y
Triangle Sawtooth 	3.464	1.000	0.000

2-2-3. Crest Factor Table

Background

1. Crest factor is the ratio of the peak signal amplitude to the RMS value of the signal. It determines the accuracy of AC measurement. If the crest factor is less than 3.0, voltage measurement will not result in error due to dynamic range limitations at full scale. If the crest factor is more than 3.0, it usually indicates an abnormal waveform as seen from the below table.

Crest Factor Table

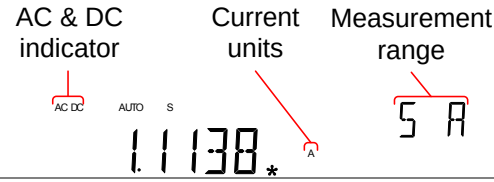
Waveform	Shape	Crest factor
Square wave		1.0
Sine wave		1.414
Triangle sawtooth		1.732
Mixed frequencies		1.414 ~ 2.0
SCR output 100% ~ 10%		1.414 ~ 3.0
White noise		3.0 ~ 4.0
AC Coupled pulse train		>3.0
Spike		>9.0

2-3. AC/DC Current Measurement

The DL-214X Series DMMs have two input ports for current measurement. A 0.5A terminal for current less than 0.5A and a 10A port for measurements up to 12A.
The units can measure 0 ~ 10A for both AC and DC current.

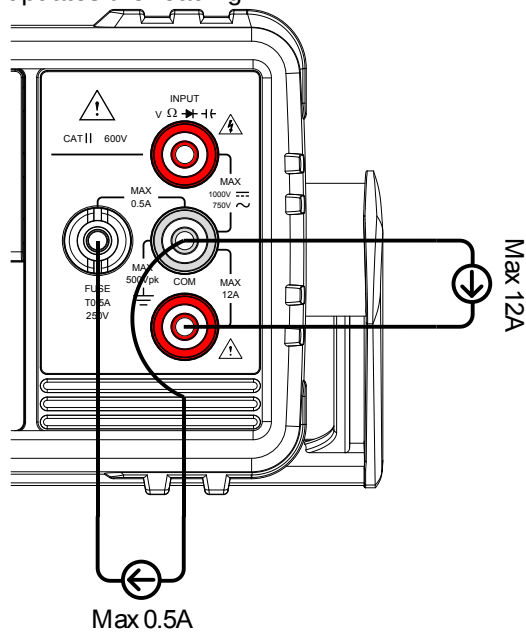
Set to ACI/DCI Measurement

1. Press SHIFT → DCV or SHIFT → ACV to measure DC or AC current, respectively.
2. For AC+DC current, press SHIFT followed by both the DCV and ACV key at the same time.
3. The mode will switch to AC, DC or AC+DC mode immediately, as shown below.



Connection

Connect the test lead between the 10A terminal and the COM port or DC/AC 0.5A port and the COM port, depending on the input current. For current ≤ 0.5A use the 0.5A port; For current up to 12A use the 10A port. The display updates the reading.



2-3-1. Select the Current Range

The current range can be set automatically or manually.

Auto Range

To turn the automatic range selection On/Off, press the AUTO key. The most appropriate range for the currently used input jack will be automatically selected. The DMM is able to do this by remembering the last manually selected range and using that information to determine the smallest current range that the auto-range

function will switch to.
When the current input is switched to another terminal, the range must be manually set.

Manual Range

Press the Up or the Down key to select the range. The AUTO indicator turns Off automatically. If the appropriate range is unknown, select the highest range.

Selectable Current Ranges

Range	Resolution	Full scale	INJACK
500µA	10nA	510.00µA	500mA
5mA	100nA	5.1000mA	500mA
50mA	1µA	51.000mA	500mA
500mA	10µA	510.00mA	500mA
5A	100µA	5.1000A	12A
10A	1mA	12.000A	12A

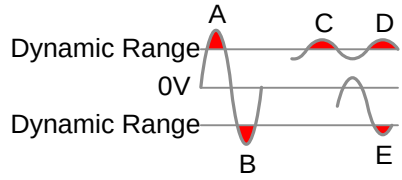
Note

For further details, please see the specifications on page 86.

Note

DC currents with AC components cannot be accurately measured if the DC+AC component exceed the dynamic range for the selected DC range. Any current exceeding the dynamic range will be clipped at the upper/lower range limit. Under these conditions the range that is chosen with the Auto range function may be too small.

For example:



A,B: Input exceeds the dynamic range.
C,D: The DCI offset causes the input to exceed the upper dynamic range.
E: The DCI offset causes the input to exceed the lower dynamic range.

The DC current range should be manually selected when all of the following conditions are true:

- When DCI measurement is used.
- When the signals being measured contain both DC and AC components.

- When the amplitude of the AC component in the measured signal is higher or lower than the dynamic range of the range being currently selected by the auto-range function.

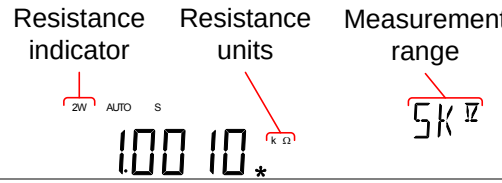
Maximum DCI Dynamic Range	Selected DCI Range	Dynamic Range
	DC 500µA	±600µA max
	DC 5mA	±6mA max
	DC 50mA	±60mA max
	DC 500mA	±600mA max
	DC 5A	±6A max
	DC 10A	±12A max

2-4. Resistance Measurement

Set to Ω Measurement

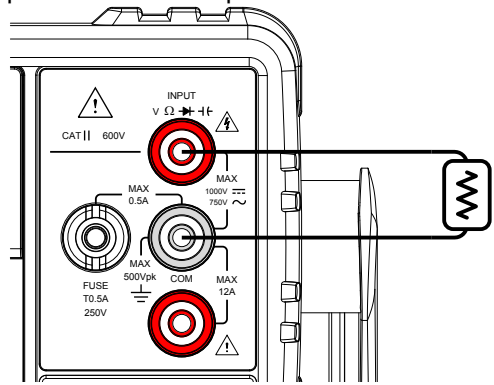
1. Press the Ω/•)) key to activate resistance measurement.
   Note: pressing the Ω/•)) key twice will activate continuity measurement instead.
2. The mode will switch to resistance mode immediately, as shown below.

Display



Connection

The DL-2140 Series uses 2-wire resistance measurement.
Connect the test leads between the VΩ⇥⊣⊢ port and the COM port.



2-4-1. Select the Resistance Range

The resistance range can be set automatically or manually.

Auto Range

1. To turn the automatic range selection On/Off, press the AUTO key.

Manual Range

2. Press the Up or the Down key to select the range. The AUTO indicator turns Off automatically. If the appropriate range is unknown, select the highest range.

Selectable Resistance Ranges

Range	Resolution	Full scale
500Ω	10mΩ	510.00Ω
5kΩ	100mΩ	5.1000kΩ
50kΩ	1Ω	51.000kΩ
500kΩ	10Ω	510.00kΩ
5MΩ	100Ω	5.1000MΩ
50MΩ	1kΩ	51.000MΩ

Note

For further details, please see the specifications on page 88.

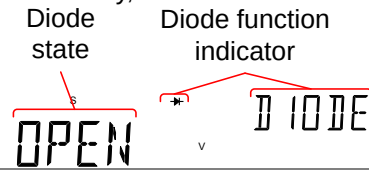
2-5. Diode Test

The diode test checks the forward bias characteristics of a diode by running a constant forward bias current of approximately 0.83mA through the DUT.

Set to Diode Measurement

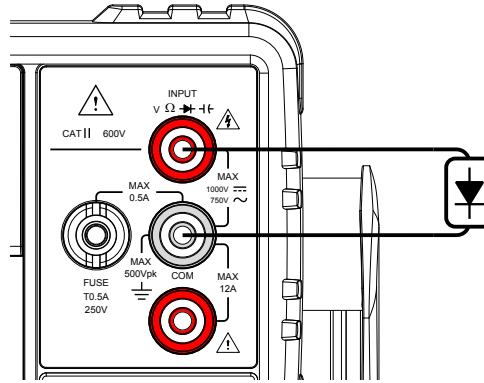
1. Press the ⊣◀/⊣◀ key once to activate diode measurement.
   Note: pressing the ⊣◀/⊣◀ key twice will activate the capacitance measurement instead.
2. The mode will switch to Diode mode immediately, as shown below.

Display



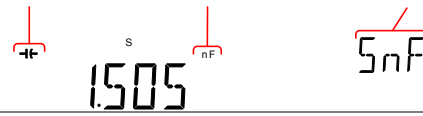
Connection

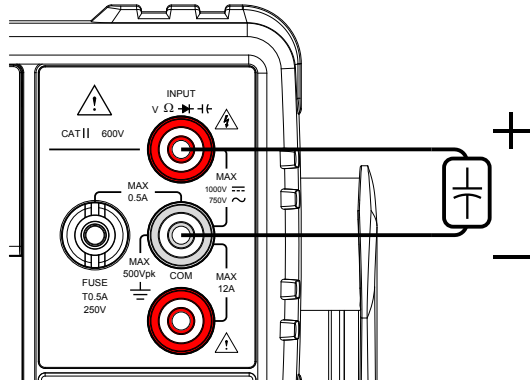
Connect the test lead between the VΩ⊣◀ port and COM port; Anode-V, Cathode-COM. The display updates the reading.



2-6. Capacitance Measurement

The capacitance measurement function checks the capacitance of a component.

Set to Capacitance Measurement	1. Press the ⊣/⊣ key twice to activate capacitance measurement. Note: pressing the ⊣/⊣ key once will activate the diode measurement instead. 2. The mode will switch to capacitance mode immediately, as shown below.
Display	Capacitance indicator / Capacitance units / Measurement range 
Connection	Connect the test lead between the VΩ⊣ port and COM port; Positive-V, Negative-COM. The display updates the reading.



2-6-1. Select the Capacitance Range

The capacitance range can be set automatically or manually.

Auto Range

1. To turn the automatic range selection On/Off, press the AUTO key.

Manual Range

2. Press the Up or the Down key to select the range. The AUTO indicator turns Off automatically. If the appropriate range is unknown, select the highest range.

Selectable Capacitance Ranges

Range	Resolution	Full scale
5nF	1pF	5.100nF
50nF	10pF	51.00nF
500nF	100pF	510.0nF
5μF	1nF	5.100μF
50μF	10nF	51.00μF

Note

For further details, please see the specifications on page 88.

Note

The refresh rate settings and the EXT trigger cannot be used in the capacitance mode.

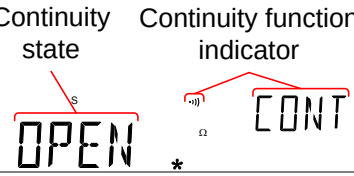
2-7. Continuity Test

The continuity test checks that the resistance in the DUT is low enough to be considered continuous (of a conductive nature).

Procedure

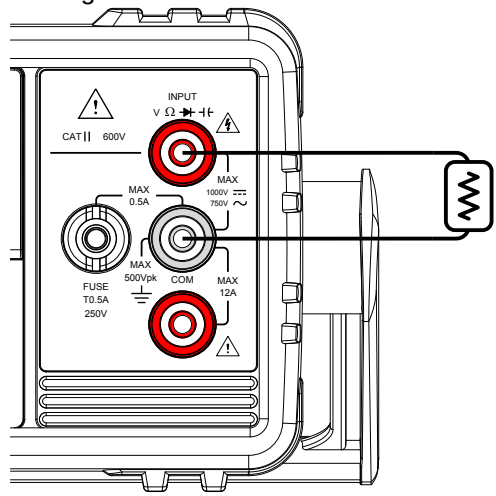
1. Press the Ω/•)) key *twice* to activate continuity testing.
2. The mode will switch to continuity testing immediately, as shown below.

Display



Connection

Connect the test lead between the VΩ⊣◀ port and COM port. The display updates the reading.



2-7-1. Set Continuity Threshold

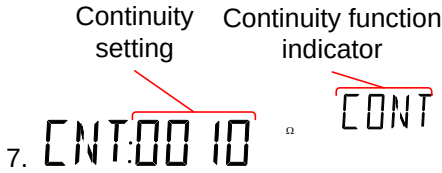
The continuity threshold defines the maximum resistance allowed in the DUT when testing the continuity.

Range	Threshold	0 to 1000Ω (Default:10 Ω)
	Resolution	1Ω

Procedure

1. Press MENU.
2. Go to the MEAS menu on level 1
3. Go to the CONT menu on level 2
4. Set the continuity threshold level.
5. Press the Enter key to confirm the continuity settings.
6. Press EXIT to exit the CONT setting menu.

Display



2-7-2. Continuity Beeper Settings

The beeper setting defines how the DL-2140 Series notifies the continuity test result to the user.

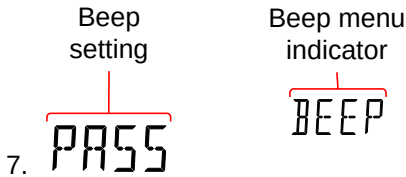
Note: When the Beeper setting is off it will also turn off the keypad tones as well as any error or warning tones.

Settings	PASS	Beeps when the continuity passes.
	FAIL	Beeps when the continuity fails.
	OFF	Beeper is turned off.

Procedure

1. Press MENU.
2. Go to the SYSTEM menu on level 1
3. Go to the BEEP menu on level 2
4. Set the BEEP setting to PASS, FAIL or OFF.
5. Press the AUTO/ENTER key to confirm the beeper settings.
6. Press EXIT to exit the BEEP setting menu.

Display



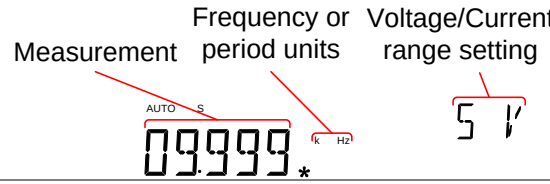
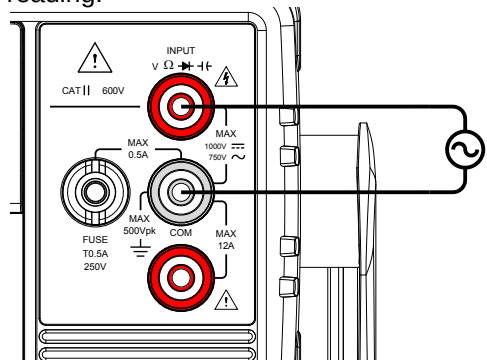
2-8. Frequency/Period Measurement

The DL-2140 Series can be used to measure the frequency or period of a signal.

Range	Frequency	10Hz~1MHz
	Period	1.0μs ~100ms

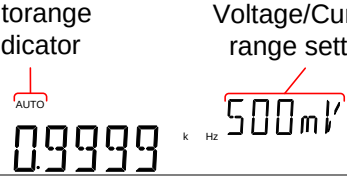
Procedure

1. To measure frequency, press the Hz/P key once. FREQ will be displayed on the secondary display.
   To measure the period, press the Hz/P key twice. PERIOD will be displayed on the secondary display.

Display	
Connection	Connect the test lead between the VΩ⊣◀ port and the COM port. The display updates the reading. 

2-8-1. Frequency/Period Settings

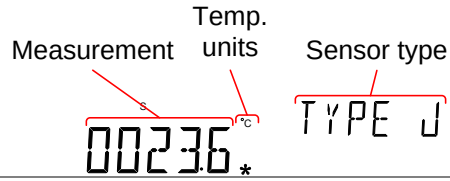
The input voltage range for frequency/period measurements can be set to Auto range or to manual. By default, the voltage/current range is set to Auto for both the period and frequency.

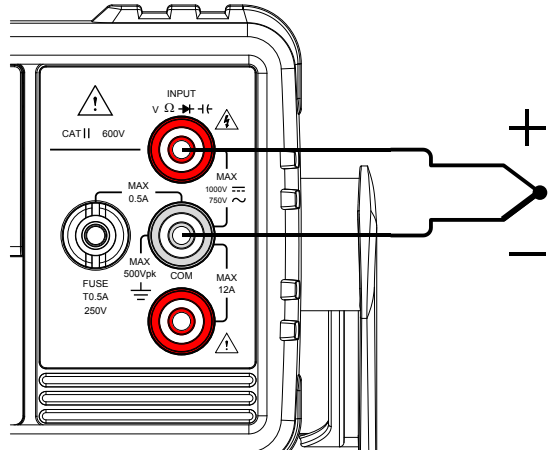
Range	Voltage 500mV, 5V, 50V, 500V, 750V Current 500µA, 5mA, 50mA, 500mA, 5A, 10A
Manual Range	1. Set the range with the Up and Down keys. The AUTO indicator will turn off when a new range is selected.
Autorange	1. Press the Auto/Enter key. 2. AUTO will be displayed on the screen again.
Display	

Note	The 2nd key can be used to toggle the view of the second display between the voltage/current range and the menu function (FREQ or PERIOD). Note that the voltage/current range can actually still be set even when the secondary display has been toggled to show the menu function.

2-9. Temperature Measurement

The DL-2142 can measure temperature using a thermocouple. To measure temperature, the DMM accepts a thermocouple input and calculates the temperature from the voltage fluctuation. The thermocouple type and reference junction temperature are also considered. Temperature measurement is only supported on the DL-2142.

Range	Thermocouple: -200°C ~ +300°C
Procedure	To make temperature measurements, press SHIFT → Hz/P (TEMP). The temperature mode appears showing the temperature on the primary display and the type of sensor on the secondary display.
Display	
Connection	Connect the sensor lead between the VΩ⊣⊢ port and the COM port. The display updates the reading.



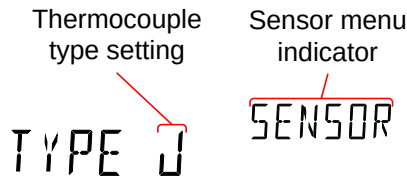
2-9-1. Set the Temperature Units

Range	Units ˚C, ˚F
Procedure	1. Press the MENU key. 2. Go to TEMP on level 1. 3. Go to UNIT on level 2. 4. Select either C (Celsius) or F (Farenheit). 5. Press the Enter key to confirm. 6. Press the EXIT key to exit from the temperature menu.
Display	Temperature unit setting Unit menu indicator 7. UNIT: F UNIT

2-9-2. Select Thermocouple Type

The DL-2142 accepts thermocouple inputs and calculates the temperature from the voltage difference of two dissimilar metals. Thermocouple type and reference junction temperature are also considered.

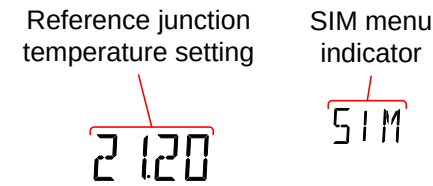
	Type	Measurement Range	Resolution
Thermocouple type and range	J	-200 to +300˚C	0.1 °C
	K	-200 to +300˚C	0.1 °C
	T	-200 to +300˚C	0.1 °C

Procedure	1. Press the MENU key. 2. Go to TEMP on level 1. 3. Go to SENSOR on level 2. 4. Select the thermocouple type (J, K, T). 5. Press the Enter key to confirm. 6. Press the EXIT key to exit from the temperature menu.
Display	

2-9-3. Set the Reference Junction Temperature

When a thermocouple is connected to the DMM, the temperature difference between the thermocouple lead and the DMM input terminal should be taken into account and be cancelled out; otherwise an erroneous temperature might be added. The value of the reference junction temperature should be determined by the user.

Range	SIM	0 ~ 50˚C (default: 23.00˚C)
	Resolution	0.01˚C

Procedure	1. Press the MENU key. 2. Go to TEMP on level 1. 3. Go to SIM on level 2. 4. Set the SIM (simulated) reference junction temperature. 5. Press the Enter key to confirm. 6. Press the EXIT key to exit from the temperature menu.
Display	

2-10. Dual Measurement Overview

The dual measurement mode allows you to use the 2nd display to show another item, thus viewing two different measurement results at once.

When the multimeter is used in dual measurement mode, both displays are updated from either a single measurement or from two

separate measurements. If the primary and secondary measurement modes have the same range, rate and rely on the same fundamental measurement, then a single measurement is taken for both displays; such as ACV and frequency/period measurements. If the primary and secondary displays use different measurement functions, ranges or rates, then separate measurements will be taken for each display. For example, ACV and DCV measurements.

Most of the basic measurement functions, except for resistance/continuity can be used in the dual measurement mode.

2-10-1. Supported dual measurement modes

The following table lists all the measurement functions that are supported with the dual measurement function.

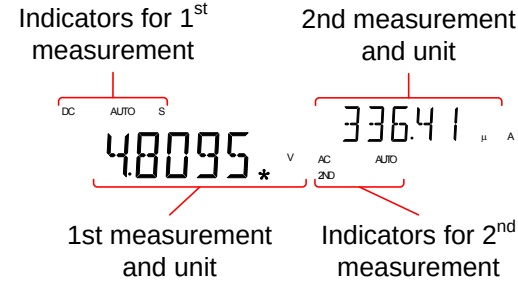
Supported Dual Measurement modes	Primary Display	Secondary Display					
		ACV	DCV	ACI	DCI	Hz/P	Ω
	ACV	●	●	●	●	●	X
	DCV	●	●	●	●	X	X
	ACI	●	●	●	●	●	X
	DCI	●	●	●	●	X	X
	Hz/P	●	X	●	X	●	X
	Ω	X	X	X	X	X	●

2-10-2. Using Dual Measurement Mode

Procedure

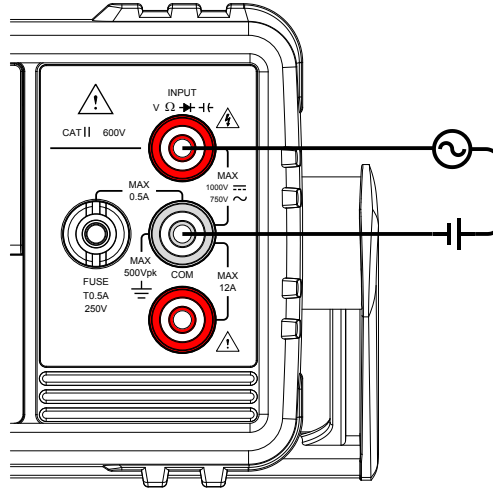
1. Choose one of the basic measurement functions from the table above to set the measurement mode for the primary display.
2. For example, press DCV to set the first display to DCV measurement.
3. To set a measurement mode for the second display, press the 2ND key and then select the second measurement mode.
4. For example, press 2ND, SHIFT, ACV to select ACI measurement for the second display.

Display

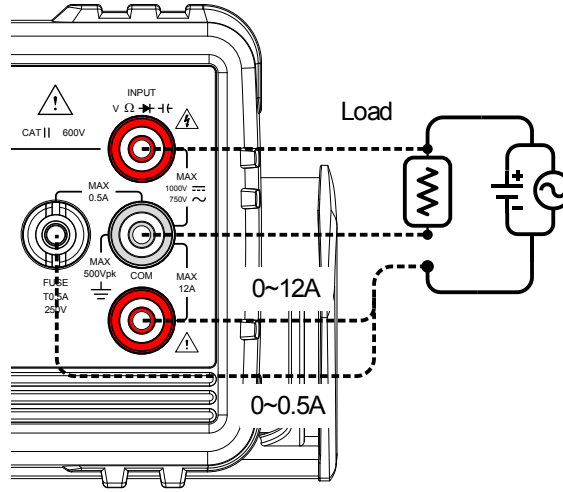


Editing the Measurement Parameters	5. After the secondary measurement function has been activated, the rate, range and measurement item can be edited for either the primary or secondary display. Note however, it is more practical to configure the first or second measurement items before activating dual measurement mode. 6. To edit measurement parameters in dual measurement mode, you must first set which display is the *active* display. The 2ND icon under the secondary display determines which display is the active display.
Procedure ⚠ Note	1. Toggle whether the primary or secondary display is the active display by pressing the 2ND key: 2. Primary display is the active display: 2ND *is not* visible on the display. 3. Secondary display is the active display: 2ND *is* visible on the display. Do not hold the 2ND key. This will turn the dual measurement mode off. 4. Edit the range, rate or measurement item for the active display in the same way as for single measurement operation. See the Basic Measurement chapter for details (page 12).
Turn Off 2nd Measurement	5. To turn Off the 2nd measurement, press and hold the 2nd key for more than 1 second.
Connection	6. The diagrams below describe how to connect the DMM to measure a number of common dual measurement items. Note: DC Current measurements will be displayed as a negative value as the polarity of the current leads has been reversed. Please take into account the resistance of the test leads and internal resistance of the current connection as it is in Series with the test circuit. The above measuring configuration is used to measure the voltage present on the resistance under test and the current through the resistance under test when using the DCI/DCV or ACI/ACV dual measurement function.

Voltage and Frequency/Period measurement



Voltage/Frequency/Period and Current Measurement



3. **Advanced Measurement Overview**

Advanced measurement mainly refers to the type of measurement which uses the result obtained by one of the basic measurements: ACV, DCV, ACI, DCI, Resistance, Diode/Continuity, Frequency/Period, and Temperature*.

3-1. Supported Advanced Measurement Functions

The following table lists all the advanced measurement functions and which of the basic measurement functions that they support.

	Basic Measurement						
Advanced Meas.	ACV/ DCV	ACI/ DCI	Ω	Hz/P	TEMP*	DIODE	CAP
dB	●	X	X	X	X	X	X
dBm	●	X	X	X	X	X	X
Max/Min	●	●	●	●	●	X	●
Relative	●	●	●	●	●	X	●
Hold	●	●	●	●	●	X	X
Compare	●	●	●	●	●	X	●
Math	●	●	●	●	●	X	X

*Temperature measurement is not supported by the DL-2141.

3-2. dBm/dB/W Measurement

3-2-1. dBm/dB Calculation

Overview

Using the ACV or DCV measurement results, the DMM calculates the dB or dBm value based on a reference resistance value in the following way:

$dBm = 10 \times \log_{10} (1000 \times Vreading^2 / Rref)$

$dB = dBm - dBmref$

$W = Vreading^2/Ref$

Where:

Vreading= Input Voltage, ACV or DCV;

Rref= Reference resistance simulating an output load;

dBmref= Reference dBm value

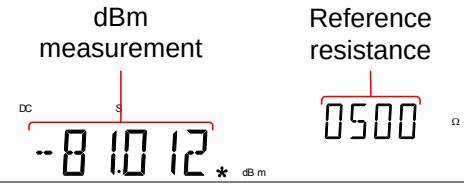
3-2-2. Measuring dBm/W

Procedure

1. Select ACV or DCV measurement. See page 13.
2. To measure dBm, press SHIFT → ⊣⊢.
3. The primary display will show the dBm measurement while the secondary display shows the reference resistance.

Display

4.



Setting the Reference Resistance

5. To set the reference resistance, use the Up and Down arrow keys.
6. The selectable reference resistances are shown below.

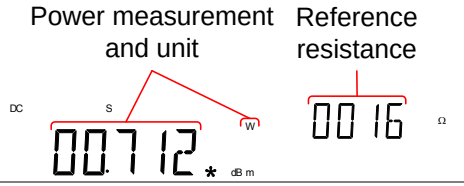
Selectable reference resistances						
2	4	8	16	50	75	93
110	124	125	135	150	250	300
500	600	800	900	1000	1200	8000

View the result in Watts

7. When the reference resistance is less than 50Ω, it is possible to calculate the power (in watts). If the reference resistance is equal to or greater than 50Ω then this step can be ignored.
8. Press SHIFT → ⊣⊢ again to view the result in watts.

Display

9.

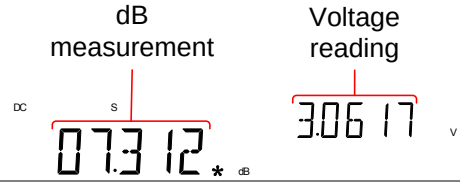


Exit dBm Measurement

10. Press SHIFT → ⊣⊢ again to exit the dBm measurement, or simply activate another measurement function.

3-2-3. Measure dB

dB is defined as [dBm−dBmref]. When the dB measurement is activated, the DMM calculates the dBm using the reading at the first moment and stores it as dBmref.

Procedure	1. Select ACV or DCV measurement. See page 13. 2. Press SHIFT → Ω/•)) key to activate the dB measurement mode. 3. The 1st display shows the dB reading the second display shows the voltage reading.
Display	
View the dBm Reference Value	4. To view the dBm reference value, press the 2ND key. 5. The Up and Down arrow keys can also be used to change the voltage range or the reading.
Exit dB Measurement	6. Press the SHIFT → Ω/•)) key again to exit the dB measurement, or simply activate another measurement function.

3-3. Max/Min Measurement

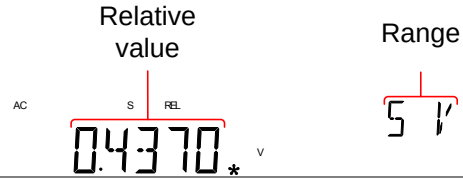
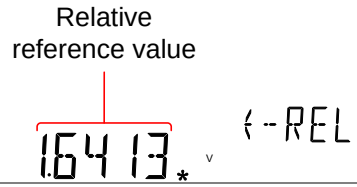
Maximum and Minimum measurement function stores the highest (maximum) or lowest (minimum) reading and shows it on the 1st display when the 2nd key is pressed.

Applicable measurements	The Max/Min function can be used with the following basic measurement functions: ACV, DCV, ACI, DCI, Ω, Hz/P, TEMP, ⊣⊢
Procedure	For Max measurement, press the MX/MN key once. For Min measurement, press the MX/MN key twice.
Display	

View Max/Min Value	Press the 2ND key to view the Max or Min value.
Display	
Deactivate Max/Min Measurement	Hold the MX/MN key for two seconds to deactivate, or simply activate another measurement function.

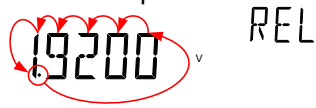
3-4. Relative Measurement

Relative measurement stores a value, typically the data at that instant, as the reference. The measurement following the reference is displayed as the delta between the reference. The reference value will be cleared upon exit.

Applicable measurements	The relative function can be used with the following basic measurement functions: ACV, DCV, ACI, DCI, Ω, Hz/P, TEMP, ⊣⊢
Procedure	1. Press the REL key. The measurement reading at that instant becomes the reference value.
Display	
View Relative Reference Value Display	2. Press the 2ND key to view the relative reference value at full scale. 
Manually Set the Relative Reference Value	1. To manually set the relative reference value, press SHIFT → REL. The REL value is displayed on the screen at full scale.

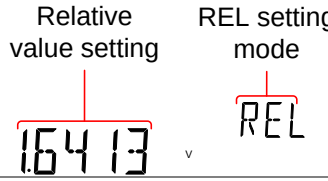
2. Use the Left and Right arrow keys to navigate to the digit to be edited or to select the decimal point.

   Use the Up and Down arrow keys to edit the selected digit or to place the position of the decimal point.



3. Press the Enter key to confirm, alternatively press Exit to cancel setting the relative reference value.

Display



Deactivate Relative Measurement

4. Press the REL key again to deactivate the Relative measurement mode, or simply activate another measurement function.

3-5. Hold Measurement

The Hold Measurement function retains the current measurement data and updates it only when it exceeds the set threshold (as a percentage of the retained value).

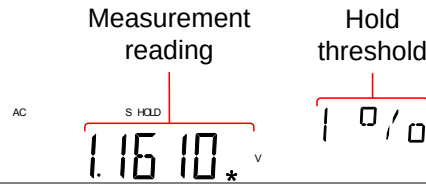
Applicable measurements

The hold function can be used with the following basic measurement functions: ACV, DCV, ACI, DCI, Ω, Hz/P, TEMP

Procedure

1. Press the HOLD key.
2. The measurement reading appears on the primary display and the hold threshold on the secondary display.

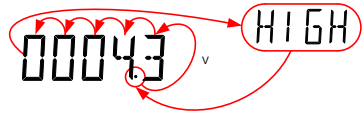
Display

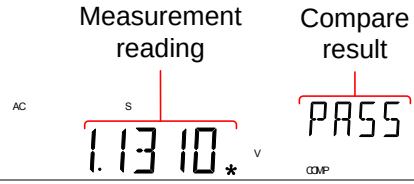


Set the Hold Threshold	3. Use the Up and Down arrow keys to select a hold threshold level, as a percentage. Range 0.01%, 0.1%, 1%, 10%
Deactivate Hold Measurement	4. Press the HOLD key for 2 seconds to deactivate the hold measurement, or simply activate another measurement function.

3-6. Compare Measurement

Compare measurement checks to see if the measurement data stays between a specified upper (high) and lower (low) limit.

Applicable measurements	The compare function can be used with the following basic measurement functions: ACV, DCV, ACI, DCI, Ω, Hz/P, TEMP, ⊣⊢
Procedure	1. Press SHIFT → HOLD. 2. The high limit setting appears. Use the Left and Right arrow keys to navigate to the digit to be edited, or to select the decimal point. Use the Up and Down arrow keys to edit the selected digit, or to place the position of the decimal point.  3. Press the Enter key to save the high limit setting and automatically go on to the low limit setting. 4. Enter the low limit setting in the same fashion as the high setting. 5. Press the Enter key to confirm the low limit settings. 6. The compare measurement results will appear immediately: 7. If the current measurement reading is between the high and low limits, PASS will be displayed on the secondary display, If the reading is below the low limit, LOW will be displayed. If the reading is above the high limit, HIGH will be displayed.

Display	
Deactivate Compare Measurement	8. Press SHIFT → HOLD to deactivate compare measurements, or simply activate another measurement function.

3-7. Math Measurement

3-7-1. Math Measurement Overview

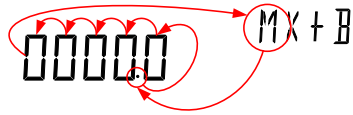
Math measurement runs three types of mathematical operations, MX+B, 1/X and Percentage based on the other measurement results.

Applicable Measurements	The math function can be used with the following basic measurement functions: ACV, DCV, ACI, DCI, Ω, Hz/P, TEMP	
Overview of Math Functions	MX+B	Multiplies the reading (X) by the factor (M) and adds/subtracts offset (B).
	1/X	Inverse. Divides 1 by the reading (X).
	Percentage	Runs the following equation: $\frac{(\text{Reading X} - \text{Reference})}{\text{Reference}} x\,100\%$

3-7-2. Measure MX+B

Procedure

1. Press SHIFT → MX/MN to enter the MATH menu.
2. The MX+B setting appears. The M factor will be flashing, indicating that the M factor is to be set.
3. Use the Left and Right arrow keys to navigate to the digit to be edited or to select the decimal point.
4. Use the Up and Down arrow keys to edit the selected digit or to place the position of the decimal point.

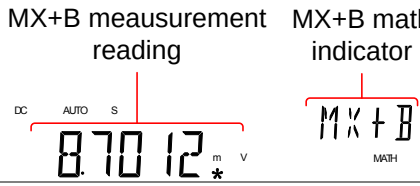


5. Press Enter to confirm the M factor settings and

to automatically move onto the B offset setting.

6. Edit the B offset in the same fashion as the M factor was edited.
7. Press Enter to confirm the B offset setting and to begin the MX+B measurement.

Display



Deactivate Math Measurement

8. Press SHIFT → MX/MN to deactivate the MATH function, or simply activate another measurement function.

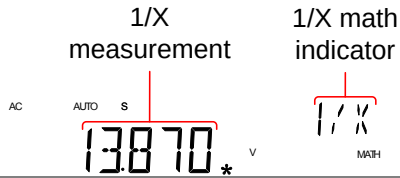
3-7-3. Measure 1/X

Procedure

1. Press SHIFT → MX/MN to enter the MATH menu.
2. The MX+B setting appears.
3. Press the Down key twice to skip past MX+B settings and go to the 1/X settings.
4. 1/X will be flashing in the secondary display.

5. Press Enter to activate the 1/X math function. The results begin immediately.

Display



Deactivate Math Measurement

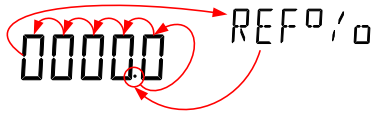
6. Press the SHIFT → MX/MN to deactivate the MATH function, or simply activate another measurement function.

3-7-4. Measure Percentage

Procedure

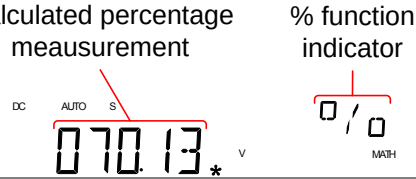
1. Press SHIFT → MX/MN to enter the MATH menu.
2. The MX+B setting appears. Press the Up key to skip past MX+B settings and go to the REF% settings.

3. REF% will be flashing in the secondary display.
4. Use the Left and Right arrow keys to navigate to the digit to be edited or to select the decimal point.
5. Use the Up and Down arrow keys to edit the selected digit or to place the position of the decimal point.



6. Press Enter to confirm the REF% setting and to begin the Percentage measurement.

Display



Deactivate Math Measurement

7. Press SHIFT → MX/MN to deactivate the MATH function, or simply activate another measurement function.

4. **SYSTEM/DISPLAY CONFIGURATION**

4-1. View Serial Number

Procedure

1. Press the MENU key.
2. Go to SYSTEM on level 1.
3. Go to S/N on level 2.
4. The serial number will be displayed across both the primary and secondary display.

Display

Exit

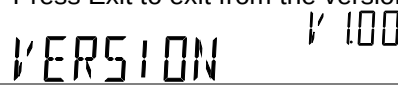
5. Press the EXIT key twice to go back to the measurement screen.

4-2. View Version Number

Procedure

1. Press the MENU key.
2. Go to SYSTEM on level 1.
3. Go to VER on level 2.
4. The firmware version number will be displayed in the secondary display.
5. Press Exit to exit from the version menu.

Display



⚠ Note

Firmware updates can only be performed by our service technician. For details, please contact the our Service Center or visit our website at www.texio.co.jp

4-3. Brightness Settings

The display has 5 settable brightness levels.

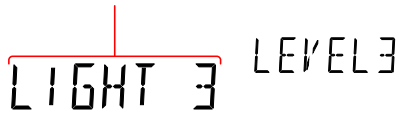
Range Brightness 1 (dim) ~ 5 (bright)

Procedure

1. Press the MENU key.
2. Go to SYSTEM on level 1.
3. Go to LIGHT on level 2.
4. Set the light setting between 1 (dim) and 5 (bright).
5. Press the Enter key to confirm.
6. Press the EXIT key to exit from the brightness settings.

Display

Brightness setting



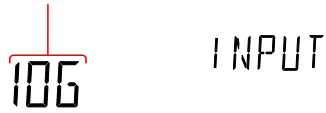
4-4. Input Resistance Settings

The 500mV and 5V DC voltage ranges can be set to an input resistance of 10MΩ or 10GΩ. This setting is only applicable for DC voltage.

Range	Input resistance	10MΩ, 10GΩ
	Default	10MΩ
Procedure	1. Press the MENU key. 2. Go to MEAS on level 1. 3. Go to INPUT R on level 2. 4. Set the input resistance to 10MΩ or 10GΩ 5. Press the Enter key to confirm. 6. Press the EXIT key to exit from the input resistance menu.	

Display

Input resistance setting



4-5. Frequency/Period Input Jack Settings

The INJACK settings set which input port is used for frequency or period measurements.

Range	Injack	VOLT, 500mA, 10A
	Default	VOLT
Procedure	1. Press the MENU key. 2. Go to MEAS on level 1. 3. Go to INJACK on level 2. 4. Set the INJACK setting to either VOLT, 500mA or 10A. 5. Press the Enter key to confirm. 6. Press the EXIT key to exit from the INJACK menu.	

Display INJACK setting

4-6. Compatibility Settings

The DL-2140 Series can be set to a special compatibility mode that will allow the unit to emulate the SCPI command syntax of the GDM-8246 when in remote control mode. For example, this feature can allow programs that were originally written for the GDM-8246 to run on the DL-2140 Series with little modification.

Range	LANG	NORM, COMP

Procedure

1. Press the MENU key.
2. Go to SYSTEM on level 1.
3. Go to LANG on level 2.
4. Set the LANG setting to either NORM (normal mode) or COMP (compatibility mode).
5. Press the Enter key to confirm.
6. Press the EXIT key to exit from the LANG menu.

Display LANG setting

4-7. Restore Factory Default Settings

The factory default settings can be restored at any time from the System menu. Please see the Appendix on page 83 for a list of the factory default settings.

Range	Factory DEF YES, NO
Procedure	1. Press the MENU key. 2. Go to SYSTEM on level 1. 3. Go to FACTORY on level 2. 4. Set the (FACTORY) DEF setting to YES or NO. Choosing YES will restore the factory default settings. 5. Press the Enter key to confirm and to restore the factory default settings immediately.
Display	Factory default setting

5. **USB STORE**

The DL-2142 is able to save/log measurement results to a USB stick. Please note that this function is not available for the DL-2141.

5-1. USB Store Overview

The DL-2142 is able to store measurement results to a USB stick. The USB storage function also has comprehensive save options that allow you to create a save file name, allow you to save up to a specified number of reading counts as well as the option to continue saving to a previously stored file instead of saving to a new file.

Supported USB Sticks:

USB Disk Type: Flash Disk Only
FAT Format: FAT16 or FAT32 (Recommended)
Max memory size: 32GB
Max record count in a recording: 5,000,000 records.
Interval: The same as the refresh rate

⚠ Note	Flash disks which need to use card adaptors are not recommended to be used in this application.
⚠ Note	The interval will increase at the long record mode ,ACV + DCV mode , ACI + DCI mode and dual measurement mode and Auto-Range.

5-1-1. CSV Format

Overview	The DL-2142 saves readings as a CSV file (comma separated values) that can be easily read using spreadsheet programs such as Microsoft Excel. Each CSV file saves the following information.	
Parameters	Time (dd)	The elapsed number of days since the start of the readings.
	Time (hh:mm:ss)	The elapsed time since the start of the readings, in hours:minutes:seconds formatting.
	1st Value	The reading on the primary display.
	1st Unit	The units for the reading on the primary display.
	2nd Value	The reading on the secondary display.
	2nd Unit	The units for the reading on the secondary display.

Count	Counts the number of readings each time the measurement is started. The count is restarted each time measurement is restarted. When a measurement is started/restarted, the first count is marked as #START#, the last as #END#.
Note	Records the accumulative number of readings that are recorded in that file,up to the maximum of 50,000.

Example:

Time(dd)	Time (hh:mm:ss)	1st Value	1st Unit	2nd Value	2nd Unit	Count	Note
0	0:00:05	0.00E+00	V DC	--	--	#START#	00001#
0	0:00:06	0.00E+00	V DC	--	--	2	00002#
0	0:00:06	0.00E+00	V DC	--	--	#END#	00003#

5-1-2. Filename/Folder Format

Overview

When files are saved to USB they are saved as a number starting from DM000\DM000-XX.CSV and are automatically incremented for each new CSV file*. For example: the first file will be named, DM\000\DM000-XX.CSV, the next DM000\DM001-XX.CSV and so on.

Note that the suffix, XX, represents a number from 00 to 99. Each time the system logs more than 50000 readings in total*, a new file is generated and the suffix is incremented. For example, if 102000 counts are logged, 3 files will be created: DM000-00.CSV (counts 1~50000), DM000-01.CSV (counts 50001~100000), and DM000-02.CSV (counts 100001 ~ 102000).

Note

*Please note that automatic file name generation only occurs if the FILE setting is set to NEW FILE. See page 51 for details.

**Please note that the suffix will only be incremented if the total number of readings exceeds 50000. To be able to exceed 50000 readings, either the FILE setting should be set to CONTINU (continuous) or the Count setting should be set to CONTINU (continuous). See page 51 for details.

5-1-3. Operator Mode

Overview	In the operator mode, you can choose to operate in Simple mode or in Advance mode, where various parameters can be designated by the user.
Simple Mode	This mode is the easiest operation mode and is almost setting free. It is the default operating mode. After entering this mode, the system will set the 'Existing File' setting to 'New File,' 'Count' to 'Continu,' and 'Time Mode' to 'Restart' by default. The system will then start to seek for the first available file name (e.g. The first file name will usually start from DM000, if DM000 doesn't already exist). If DM000 and DM001 exist already, then DM002 would be the next available filename.
Advance Mode	Users can make detailed settings by themselves in this mode. Advance mode is more flexible, so it is comparatively more complex and only recommended for advanced users. The following settings are available in this mode: "Existing File", "File Name", "Count", "Time Mode", "Time Setup" and "Date Setup." Note that the settings that are available for the Advance mode are automatically available when you activate the USB Store function in the Advance mode. See page 54.
Procedure	1. Press the MENU key. 2. Go to USBSTO on level 1. 3. Go to MODE on level 2. 4. Set MODE to SIMPLE or ADVANCE. 5. Press the Enter key to confirm. 6. Press the EXIT key to exit from the MODE menu.
Display	Operator mode setting Operator mode menu indicator 

5-1-4. Long Record Mode

Overview	If users need long-term data records, the Long Record Mode can be used to log test data for a long period of time. In this mode, the Rate is set by the system to the slow rate and the refresh rate is set to 1 data refresh per second (excluding dual measurement, ACI+DCI and ACV+DCV modes).
Normal	The Normal setting is the regular record mode. The longest recordable time depends on the refresh rate that is chosen; the longest recordable time (in seconds) equals 5,000,000/refresh rate.
Long	In the long record mode, a fixed record speed of one record per second will be logged into the log file; the longest recordable time is 5,000,000 seconds.
Procedure	1. Press the MENU key. 2. Go to USBSTO on level 1. 3. Go to RECORD on level 2. 4. Set RECORD to NORMAL or LONG. 5. Press the Enter key to confirm. 6. Press the EXIT key to exit from the MODE menu.
Display	Operator mode setting  Operator mode menu indicator 

5-2. View the Store Function Status

Overview	The USB Status menu can be used to check the status of the USB Store function. This function will allow you to see if the save operation has completed or check the elapsed time or the current reading count.	
USB Store Status Items	ELTIME	Displays the elapsed time from when the USB store function was started. (Format: HHH:MM:SS)
	COUNT	Displays the number of readings that have been logged for the current operation.
	STATUS	Displays the USB Store function status.

These statuses include:
1. START indicates that the function has been started
2. STOP indicates that the function has been stopped.
3. F-FULL indicates that the current log file is full.
4. D-FULL indicates that the USB disk currently being used is full.
5. ERROR indicates errors for unknown reasons.

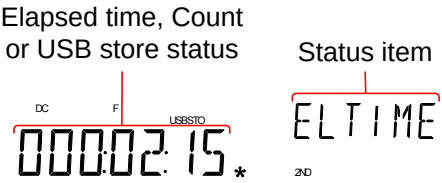
S-FILE — Shows the filename of the first log file of the present record.

E-FILE — Shows the filename of the last log file of the present record.

Procedure

1. Insert a USB stick and start the USB Store function as described on page 53 or 54.
2. To check the status of a save operation press SHIFT → 2ND.
3. The USB Status menu will appear on the display. The elapsed time will be displayed when you enter this menu.
4. Press the Left or Right arrow keys to switch between the ELTIME, COUNT, STATUS, S-FILE and E_FILE displays.
5. Press SHIFT → 2ND again to exit from the USB status menu.

Display



5-3. Set the Starting File Name (Advance Mode only)

Overview

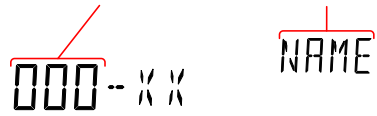
The DL-2142 will allow you to set the value of the starting file name instead of the default DM000-XX.CSV.
Note that the suffix, XX, cannot be edited.
This setting will appear automatically after the USB Store function has been started in Advance mode, see page 54 for details.

	Range	DM000-XX.CSV to DM999-XX.CSV

Display

File name number setting

Name menu indicator



5-4. Save Count (Advance Mode only)

Range	Count	CONTINU, 00002~50000
	Default	10

Overview

The COUNT function sets how many readings to perform each time the USB STO function is used. By default the COUNT setting is set to 10. When this function is used, the DMM will automatically return to the ready status when the specified number of readings have been logged. Note, however that the CONTINU (continuous) setting will continuously log data until the USB store function is turned off.

This setting will appear automatically after the USB Store function has been started in Advance mode, see page 54 for details.

Note

When set to CONTINU, the actual number of reading counts cannot exceed 5000000 (50000 readings X100).

Display

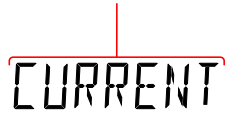
Count setting

Count menu indicator

5-5. Save to an Existing File (Advance Mode only)

Range	FILE:	CONTINU, NEWFILE
	Default	NEWFILE
Overview	By default a new file is created each time the USB STO function is used. The FILE menu gives you the option to continue saving to the previous file rather than creating a new file each time the USB STO function is used. This setting will appear automatically after the USB Store function has been started in Advance mode, see page 54 for details.	
Display	File menu setting 	File menu indicator 

5-6. Time Mode (Advance Mode only)

Range	TIME	CURRENT, RESTART
	Default	RESTART
Overview	The Time Mode setting designates how the readings are time-stamped when saved to a CSV file. The CURRENT setting time stamps each reading from the time when the DMM was first turned on. The RESTART setting restarts the time stamp time to 0 each time the USB STO function is used. This setting will appear automatically after the USB Store function has been started in Advance mode, see page 54 for details.	
Display	Tmode menu setting 	Tmode menu indicator 

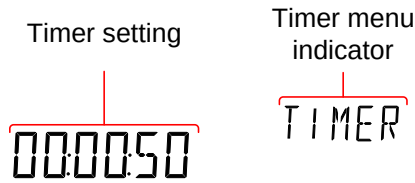
5-7. Timer

Range	TIMER	00:00:00 ~ 23:59:59 (hours:minutes:seconds)
	Default	Elapsed time from when the unit was switched on.
Accuracy	40ppm plus an annual drift of 5ppm/per year.	
Overview	The timer setting sets the “current” timer time that is used to time stamp readings when saving to USB. By default the timer time is the elapsed time from when the unit was turned on. If the timer time ticks over 23:59:59, the timer will revert back to 00:00:00 and the time stamp will include a “day” count for each time this occurs. Note, however, the “day” count cannot be set in the timer settings.	
⚠ Note	The DL-214X uses volatile RAM and does not have a CMOS backup battery to save the TIMER settings when the power is turned off. When the power is reset, the TIMER setting will be reset to 00:00:00.	

Procedure

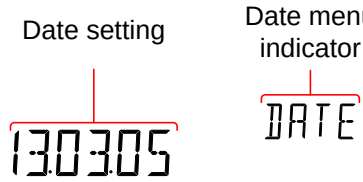
1. Press the MENU key.
2. Go to USBSTO on level 1.
3. Go to TIMER on level 2.
4. Set TIMER time between 00:00:00 and 23:59:59.
5. Press the Enter key to confirm.
6. Press the EXIT key to exit from the TIMER menu.

Display



5-8. Date

Range	Date	13.03.01 ~ 99:12:31 (Year:Month:Day)
	Default	13.03.01
Overview	The date setting sets the date-stamp for any CSV files that are saved.	

Note	The DL-2142 has flash memory to store the date settings. The date that is set by the user will be restored each time the power is turned on. The DL-2142 will not update the date setting automatically, this must be done manually by the user.
Procedure	1. Press the MENU key. 2. Go to USBSTO on level 1. 3. Go to DATE on level 2. 4. Set the DATE. The format for the date is Year:Month:Day. 5. Press the Enter key to confirm. 6. Press the EXIT key to exit from the DATE menu.
Display	Date setting Date menu indicator 

5-9. Save to USB

Overview	The USB STO option allows the DL-2142 to store each measurement reading to a USB stick. The USB Store function varies according to whether the operator mode is set to Simple or Advance.
Note	When the DL-2142 starts to save records to USB, all buttons except for the SHIFT, MENU, 2ND and left and right arrow keys will be locked and disabled. Remote control will also be disabled; the DL-2142 will stop receiving or transmitting any commands after it starts to save records to USB.

5-9-1. Save to USB (Simple Mode)

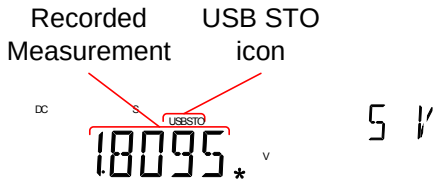
Overview	The procedure below describes the save operation when the Mode is set to Simple.
Procedure	1. Insert a USB stick into the USB Host port on the front panel. 2. If the USB stick is recognized by the DMM, the USB STO icon will be lit. This indicates that the DMM is ready to save files to the USB stick. 3. Press SHIFT → MENU. The USB STO icon will flash slowly, indicating the

DMM is saving to USB.

4. To stop saving to USB, press SHIFT → MENU again.
   When the save operation has stopped, the USB STO icon will stop flashing and will remain lit.
5. The USB stick can now be removed or another save operation can be performed.

⚠ WARNING	Do not remove the USB stick while the DMM is saving to the USB drive.
⚠ Note	The USB STO icon will flash at a faster rate (~5 times/second) if there is no more space left on the USB stick or if the automatically-incremented filename suffix, XX, has reached its maximum value, 99, and cannot be increased further.

Display



5-9-2. Save to USB (Advance Mode)

Overview

The procedure below describes the save operation when the Mode is set to Advance.

Procedure

1. Insert a USB stick into the USB Host port on the front panel.
2. If the USB stick is recognized by the DMM, the USB STO icon will be lit. This indicates that the DMM is ready to save files to the USB stick.
3. Press SHIFT → MENU.
4. Each Advance mode setting will now appear one after the other. Set each option and press the Enter key to continue to the next option.
   The following options will appear in order:
   FILE (Existing File, see page 51)
   NAME (File Name, see page 49)
   COUNT (Count, see page 50)
   TMODE (Time Mode, see page 51)
   TIMER (Time Setup, see page 52)
   DATE (Date Setup, see page 52)
5. After the DATE option is set, the DMM will begin logging data.
   The USB STO icon will flash slowly, indicating the

	DMM is saving to USB. 6. To stop saving to USB, press SHIFT → MENU again. When the save operation has stopped, the USB STO icon will stop flashing and will remain lit. 7. The USB stick can now be removed or another save option can be performed.
⚠ WARNING	Do not remove the USB stick while the DMM is saving to the USB drive.
⚠ Note	The USB STO icon will flash at a faster rate (~5 times/second) if there is no more space left on the USB stick or if the automatically-incremented filename suffix, XX, has reached its maximum value, 99, and cannot be increased further.
Display	Recorded Measurement USB STO icon 

5-9-3. Deleting Files or Directories

Note	If you find the need to delete files or directories that have already been saved to the USB stick, please adhere to the following suggestions to prevent unexpected results when logging data.
Overview	As the system will look for the last DMXXX directory and last log file (DMXXX-XX.CSV) in that directory when saving log files, it is imperative that the file directory structure and the files within the directories remain continuous or files may be stored to the wrong directory or data may be added to the wrong log file.
Suggestions When Deleting Directories or Log Files	1. Only delete the last directories, do not delete directories before the last remaining directory. For example the following directories are on the USB stick: DM000, DM001, DM002, DM003, DM004, DM005 Recommended: Delete the last directories: DM000, DM001, DM002, ~~DM003, DM004, DM005~~ Not recommended: Deleting any directories before the last directory: DM000, ~~DM001, DM002, DM003~~, DM004, DM005

2. Only delete the last log files, do not delete any log files before the last remaining log file.
   For example the following log files are in a directory: DM000-00.CSV, DM000-01.CSV, DM000-02.CSV
   Recommended: Deleting only the last files or all the files from a directory:
   DM000-00.CSV, ~~DM000-01.CSV, DM000-02.CSV~~
   OR
   ~~DM000-00.CSV, DM000-01.CSV, DM000-02.CSV~~
   Not recommended: Deleting any file before the last file.
   DM000-00.CSV, ~~DM000-01.CSV~~, DM000-02.CSV

6. **REMOTE CONTROL**

This chapter describes basic configuration of IEEE488.2 based remote control. For a command list, refer to the Command Overview chapter on page 60.

6-1. Configure Remote Control Interface

6-1-1. USB Interface

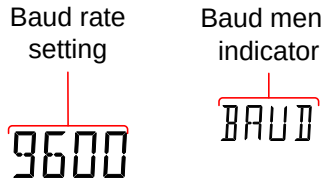
The USB device port on the rear panel is used for remote control. The USB port on the DMM will appear as a virtual COM port to a connected PC. Any terminal program that can communicate via a serial port can be used for remote control. Before the DMM can be used for remote control the USB driver included on the User Manual CD, must first be installed.

USB configuration	PC side connector	Type A, host
	DMM side connector	Rear panel Type B, slave
	Revision	1.1/2.0
	Class	Virtual COM Port (CP210x:Silicon Laboratories)
	baud rate	9600, 19200, 38400, 57600, 115200
	Parity	None
	flow control	Off
	Data Bits	8
	Stop bit	1

Steps

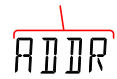
1. Connect the USB cable to the rear panel type B USB port.
2. Press MENU.
3. Go to I/O on level 1.
4. Go to USB on level 2.
5. Set the baud rate to an applicable rate.
6. Press Enter to confirm the baud rate settings.
7. Press EXIT to exit from the USB menu.
8. Please install the VCP driver using Windows Device manager and the setup file from the VCP folder of the accessory CD.

Display



6-1-2. GP-IB Interface

GP-IB port on the rear panel can be used for remote control. (DL-2142G only)

GP-IB configuration	GP-IB Address Range 0~30
Steps	1. Connect the GP-IB cable to the rear panel GP-IB port. 2. Press MENU. 3. Go to I/O on level 1. 4. Go to GPIB on level 2. 5. Turn GPIB ON and press Enter to Confirm. 6. The GP-IB address settings will automatically appear after turning GPIB on. Set the GP-IB address. 7. Press Enter to confirm the GP-IB address setting. 8. Press EXIT to exit from the System menu.
Display	GPIB address setting  GPIB menu indicator 
Note	GP-IB Constraints • Maximum 15 devices together, at least 2/3 of all devices turned on. Cable length should be less than 20m with a maximum of 2m between each device. • Unique address assigned to each device • No loop or parallel connections

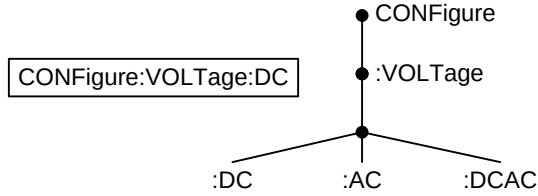
6-2. Return to Local Control

Background	When the unit is in remote control mode, the RMT icon above the main display can be seen. When this icon is not displayed, it indicates that the unit is in local control mode.
Procedure	1. Press the LOCAL/2ND key when in remote mode. 2. The unit will go back into local mode and the RMT icon will turn off.
Display	Remote control indicator 3. 

7. **COMMAND OVERVIEW**

The Command overview chapter lists all programming commands in functional order as well as alphabetical order. The command syntax section shows you the basic syntax rules you have to apply when using commands.

7-1. Command Syntax

Compatible Standard	IEEE488.2	Partial compatibility
	SCPI, 1994	Partial compatibility
Command Structure	SCPI (Standard Commands for Programmable Instruments) commands follow a tree-like structure, organized into nodes. Each level of the command tree is a node. Each keyword in a SCPI command represents each node in the command tree. Each keyword (node) of a SCPI command is separated by a colon (:). For example, the diagram below shows an SCPI sub-structure and a command example.  	
Command types	There are a number of different instrument commands and queries. A command sends instructions or data to the unit and a query receives data or status information from the unit.	

Command types

Simple	A single command with/without a parameter
Example	CONFigure:VOLTage:DC
Query	A query is a simple or compound command followed by a question mark (?). A parameter (data) is returned.
Example	CONFigure:RANGe?

Command Forms

Commands and queries have two different forms, long and short. The command syntax is written with the short form of the command in capitals and the remainder (long form) in lower case.

The commands can be written either in capitals or lower-case, just so long as the short or long forms are complete. An incomplete command will not be recognized.

Below are examples of correctly written commands.

Long form	CONFigure:DIODe CONFIGURE:DIODE Configure:diode
Short form	CONF:DIOD conf:diod

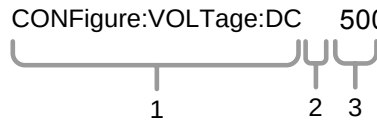
Square Brackets

Commands that contain square brackets indicate that the contents are optional. The function of the command is the same with or without the square bracketed items, as shown below. For example, for the query:

[SENSe:]UNIT?

Both [SENSe:]UNIT? and UNIT? are both valid forms.

Command Format



1. Command header
2. Space
3. Parameter 1

Common Input Parameters

Type	Description	Example
<Boolean>	boolean logic	0, 1
<NR1>	integers	0, 1, 2, 3
<NR2>	decimal numbers	0.1, 3.14, 8.5
<NR3>	floating point with exponent	4.5e-1, 8.25e+1
<NRf>	any of NR1, 2, 3	1, 1.5, 4.5e-1

	[MIN] (Optional parameter)	For commands, this will set the setting to the lowest value. This parameter can be used in place of any numerical parameter where indicated. For queries, it will return the lowest possible value allowed for the particular setting.	
	[MAX] (Optional parameter)	For commands, this will set the setting to the highest value. This parameter can be used in place of any numerical parameter where indicated. For queries, it will return the highest possible value allowed for the particular setting.	
Automatic parameter range selection	The DL-2140 Series automatically sets the command parameter to the next available value.		
	Example	conf:volt:dc 1 This will set the measurement item to DC Voltage and the range to 5V. There is no 1V range so the DMM selects the next available range, 5V.	
Message Terminator (EOL)	Remote Command	Marks the end of a command line. The following messages are in accordance with IEEE488.2 standard.	
		LF, CR, CR+LF	The most common EOL character is CR+LF
	Return Message	CR+ LF	
Message Separator	EOL or ; (semicolon)	Command Separator	

7-2. CONFigure Commands

7-2-1. CONFigure:VOLTage:DC

Sets measurement to DC Voltage on the first display and specifies the range.
Parameter: [None] | [Range(<NRf> | MIN | MAX | DEF)]
Example: CONF:VOLT:DC 5
Sets the voltage range to 5volt.

7-2-2. CONFigure:VOLTage:AC

Sets measurement to AC Voltage on the first display and specifies the range.
Parameter: [None] | [Range(<NRf> | MIN | MAX | DEF)]
Example: CONF:VOLT:AC
Sets the AC range to auto range.

7-2-3. CONFigure:VOLTage:DCAC

Sets measurement to DC+AC Voltage on the first display and specifies the range.
Parameter: [None] | [Range(<NRf> | MIN | MAX | DEF)]
Example: CONF:VOLT:DCAC
Sets the DC+AC voltage range to auto range.

7-2-4. CONFigure:CURRent:DC

Sets measurement to DC Current on the first display and specifies the range.
Parameter: [None] | [Range(<NRf> | MIN | MAX | DEF)]
Example: CONF:CURR:DC 50e-3
Sets the DC current range to 50mA.

7-2-5. CONFigure:CURRent:AC

Sets measurement to AC Current on the first display and specifies range.
Parameter: [None] | [Range(<NRf> | MIN | MAX | DEF)]
Example: CONF:CURR:AC 50e-2
Sets the measurement mode to ACI with a 500mA range.

7-2-6. CONFigure:CURRent:DCAC

Sets measurement to DC+AC Current on the first display and specifies range.
Parameter: [None] | [Range(<NRf> | MIN | MAX | DEF)]
Example: CONF:CURR:DCAC 50e-2
Sets the measurement mode to DC+AC Current with a 500mA range.

7-2-7. CONFigure:RESistance

Sets measurement to 2W Resistance on the first display and specifies range.
Parameter: [None] | [Range(<NRf> | MIN | MAX | DEF)]
Example: CONF:RES 50e3
Sets the range to 50kΩ.

7-2-8. CONFigure:FREQuency

Sets measurement to Frequency on the first display and specifies range.
Parameter: [None] | [Range(<NRf> | MIN | MAX | DEF)]
Example: CONF:FREQ MAX
Sets the frequency measurement range to max.

7-2-9. CONFigure:PERiod

Sets measurement to Period on the first display and specifies the range.
Parameter: [None] | [Range(<NRf> | MIN | MAX | DEF)]
Example: CONF:PER
Sets the DMM to period measurement using the previous range.

7-2-10. CONFigure:CONTinuity

Sets measurement to Continuity on the first display.
Parameter: None

7-2-11. CONFigure:DIODe

Sets measurement to Diode on the first display.
Parameter: None

7-2-12. CONFigure:TEMPerature:TCOuple

Sets measurement to Temperature thermocouple (T-CUP) on the first display.
Parameter: [None] | [Type(J | K | T)]
Example: CONF:TEMP:TCO J
Sets the measurement mode to TCO with a type J sensor.

7-2-13. CONFigure:CAPacitance

Sets measurement to Capacitance on the first display.
Parameter: [None] | [Range(<NRf> | MIN | MAX | DEF)]
Example: CONF:CAP 5E-5
Sets the measurement mode to Capacitance with a 50uF Range.

7-2-14. CONFigure:FUNCtion?

Returns the current function on the first display.
Return parameter: VOLT, VOLT:AC,VOLT:DCAC, CURR, CURR:AC,CURR:DCAC, RES, FREQ, PER, TEMP, DIOD, CONT, CAP

7-2-15. CONFigure:RANGe?

Returns the current range on the first display.
Return Parameter:
DCV: 0 .5(500mV), 5(5V), 50(50V), 500(500V), 1000(1000V)
ACV: 0.5(500mV), 5(5V), 50(50V), 500(500V), 750(750V)
ACI: 0.0005(500uA), 0.005 (5mA), 0.05(50mA), 0.5(500mA), 5(5A), 10(10A)
DCI: 0.0005(500μA), 0.005 (5mA), 0.05(50mA), 0.5(500mA), 5(5A), 10(10A)
RES: 50E+1(500Ω) 50E+2(5kΩ), 50E+3(50kΩ), 50E+4 (500kΩ), 50E+5(5MΩ), 50E+6(50MΩ)
CAP: 5E-9(5nF), 5E-8(50nF), 5E-7(500nF), 5E-6(5uF), 5E-5(50uF)

7-2-16. CONFigure:AUTO

Sets Auto-Range on or off on the first display.
Parameter: ON | OFF
Example: CONF:AUTO ON

7-2-17. CONFigure:AUTO?

Returns the Auto-Range status of the function on the 1st display.
Return Parameter: 0|1, 1=Auto range, 0=Manual range

7-3. Secondary Display: CONFigure2 Commands

7-3-1. CONFigure2:VOLTage:DC

Sets measurement to DC Voltage on the second display and specifies range.
Parameter: [None] | [Range(<NRf> | MIN | MAX | DEF)]
Example: CONF2:VOLT:DC 5
Sets the voltage range to 5volts.

7-3-2. CONFigure2:VOLTage:AC

Sets measurement to AC Voltage on the second display and specifies range.
Parameter: [None] | [Range(<NRf> | MIN | MAX | DEF)]
Example: CONF2:VOLT:AC
Sets the measurement mode to AC voltage.

7-3-3. CONFigure2:CURRent:DC

Sets measurement to DC Current on the second display and specifies range.
Parameter: [None] | [Range(<NRf> | MIN | MAX | DEF)]
Example: CONF2:CURR:DC 50e-3
Sets the DC current range to 50mA on the second display.

7-3-4. CONFigure2:CURRent:AC

Sets measurement to AC Current on the second display and specifies range.
Parameter: [None] | [Range(<NRf> | MIN | MAX | DEF)]
Example: CONF2:CURR:AC 50e-2
Sets the measurement mode to ACI with a 500mA range on the second display.

7-3-5. CONFigure2:RESistance

Sets measurement to 2W Resistance on the second display and specifies range.
Parameter: [None] | [Range(<NRf> | MIN | MAX | DEF)]
Example: CONF2:RES 50e3
Sets the range to 50kΩ on the second display.

7-3-6. CONFigure2:FREQuency

Sets measurement to Frequency on the second display and specifies range.
Parameter: [None] | [Range(<NRf> | MIN | MAX | DEF)]
Example: CONF2:FREQ MAX
Sets the frequency measurement range to max on the second display.

7-3-7. CONFigure2:PERiod

Sets measurement to Period on the second display and specifies the range.
Parameter: [None] | [Range(<NRf> | MIN | MAX | DEF)]
Example: CONF2:PER
Sets the DMM to period measurement using the previous range.

7-3-8. CONFigure2:OFF

Turns the second display function off.
Parameter: None.

7-3-9. CONFigure2:FUNCtion?

Returns the current function on the second display.
Return parameter: VOLT, VOLT:AC, CURR, CURR:AC, RES, FREQ, PER, NON

7-3-10. CONFigure2:RANGe?

Returns the range of the current function on the second display.
Return parameter:
DCV: 0 .5(500mV), 5(5V), 50(50V), 500(500V), 1000(1000V)
ACV: 0.5(500mV), 5(5V), 50(50V), 500(500V), 750(750V)
ACI: 0.0005(500uA), 0.005 (5mA), 0.05(50mA), 0.5(500mA), 5(5A), 10(10A)
DCI: 0.0005(500uA), 0.005 (5mA), 0.05(50mA), 0.5(500mA), 5(5A), 10(10A)
RES: 50E+1(500Ω) 50E+2(5kΩ), 50E+3(50kΩ), 50E+4 (500kΩ), 50E+5(5MΩ), 50E+6(50MΩ)

7-3-11. CONFigure2:AUTO

Sets Auto-Range on or off on the 2nd display.
Parameter: ON | OFF
Example: CONF2:AUTO ON

7-3-12. CONFigure2:AUTO?

Returns the Auto-Range status of the function on the 2nd display.
Return Parameter: 0|1, 1=Auto range, 0=Manual range

7-4. Measure Commands

7-4-1. MEASure:VOLTage:DC?

Returns the DC voltage measurement on the first display.
Parameter: [None] | [Range(<NRf> | MIN | MAX | DEF)]
Example: MEAS:VOLT:DC ?
>+0.488E-4
Returns the DC voltage measurement as 0.0488 mV.

7-4-2. MEASure:VOLTage:AC?

Returns the AC voltage measurement on the first display.
Parameter: [None] | [Range(<NRf> | MIN | MAX | DEF)]
Example: MEAS:VOLT:AC ?
>+0.511E-3
Returns the AC voltage measurement as 0.511 mV.

7-4-3. MEASure:VOLTage:DCAC?

Returns the DC+AC voltage measurement on the first display.
Parameter: [None] | [Range(<NRf> | MIN | MAX | DEF)]
Example: MEAS:VOLT:DCAC ?
>+0.326E-3
Returns the DC+AC voltage measurement as 0.326 mV.

7-4-4. MEASure:CURRent:DC?

Returns the DC current measurement on the first display.
Parameter: [None] | [Range(<NRf> | MIN | MAX | DEF)]
Example: MEAS:CURR:DC ?
>+0.234E-4
Returns the DC current measurement as 0.0234 mA.

7-4-5. MEASure:CURRent:AC?

Returns the AC current measurement on the first display.
Parameter: [None] | [Range(<NRf> | MIN | MAX | DEF)]
Example: MEAS:CURR:AC ?
> +0.387E-2
Returns the AC current measurement as 3.87mA.

7-4-6. MEASure:CURRent:DCAC?

Returns the DC+AC current measurement on the first display.
Parameter: [None] | [Range(<NRf> | MIN | MAX | DEF)]
Example: MEAS:CURR:DCAC ?
>+0.123E-4
Returns the DC+AC current measurement as 0.0123 mA.

7-4-7. MEASure:RESistance?

Returns the 2W resistance measurement on the first display.
Parameter: [None] | [Range(<NRf> | MIN | MAX | DEF)]
Example: MEAS:RES?
> +1.1937E+3
Returns the 2W measurement as 1.1937kΩ.

7-4-8. MEASure:FREQuency?

Returns the frequency measurement on the first display.
Parameter: [None] | [Range(<NRf> | MIN | MAX | DEF)]
Example: MEAS:FREQ?
> +2.3708E+2
Returns the frequency (237.08Hz).

7-4-9. MEASure:PERiod?

Returns the period measurement on the first display.
Parameter: [None] | [Range(<NRf> | MIN | MAX | DEF)]
Example: MEAS:PER? MAX
Returns the period at the maximum range.

7-4-10. MEASure:CONTinuity?

Returns the continuity measurement on the first display.
Example: MEAS:CONT?
Returns the continuity.

7-4-11. MEASure:DIODe?

Returns the diode measurement on the first display.
Example: MEAS:DIOD?
Returns the diode measurement.

7-4-12. MEASure:TEMPerature:TCOuple?

Returns the temperature for the selected thermocouple type on the first display.
Parameter:[NONE] | J | K | T
Example: MEAS:TEMP:TCO? J
> +2.50E+1
Returns the temperature.

7-4-13. MEASure2:VOLTage:DC?

Returns the DC voltage measurement on the second display.
Parameter: [None] | [Range(<NRf> | MIN | MAX | DEF)]
Example: MEAS2:VOLT:DC ?
>+0.488E-4
Returns the DC voltage measurement as 0.0488 mV.

7-4-14. MEASure2:VOLTage:AC?

Returns the AC voltage measurement on the second display.
Parameter: [None] | [Range(<NRf> | MIN | MAX | DEF)]
Example: MEAS2:VOLT:AC ?
>+0.511E-3
Returns the AC voltage measurement as 0.511 mV.

7-4-15. MEASure2:CURRent:DC?

Returns the DC current measurement on the second display.
Parameter: [None] | [Range(<NRf> | MIN | MAX | DEF)]
Example: MEAS2:CURR:DC ?
>+0.234E-4
Returns the DC current measurement as 0.0234 mA.

7-4-16. MEASure2:CURRent:AC?

Returns the AC current measurement on the second display.
Parameter: [None] | [Range(<NRf> | MIN | MAX | DEF)]
Example: MEAS2:CURR:AC ?
> +0.387E-2
Returns the AC current measurement.

7-4-17. MEASure2:RESistance?
Returns the 2W resistance measurement on the second display.
Parameter: [None] | [Range(<NRf> | MIN | MAX | DEF)]
Example: MEAS2:RES?
> +1.1912E+3
Returns the 2W measurement.

7-4-18. MEASure2:FREQuency?
Returns the frequency measurement on the second display.
Parameter: [None] | [Range(<NRf> | MIN | MAX | DEF),Resolution(<NRf>| MIN | MAX | DEF)]
Example: MEAS2:FREQ?
> +2.3712E+2
Returns the frequency (237.12Hz).

7-4-19. MEASure2:PERiod?
Returns the period measurement on the second display.
Parameter: [None] | [Range(<NRf> | MIN | MAX | DEF)]
Example: MEAS2:PER? MAX
Returns the period at the maximum range.

7-5. SENSe Commands

7-5-1. [SENSe:]TEMPerature:TCOuple:TYPE
Sets thermocouple type.
Parameter: Type(J | K | T)
Example: SENS:TEMP:TCO:TYPE J
Sets the thermocouple to type J.

7-5-2. [SENSe:]TEMPerature:TCOuple:TYPE?
Returns the thermocouple type.
Return parameter: J, K, T

7-5-3. [SENSe:]TEMPerature:RJUNction:SIMulated
Set temperature simulation value.
Parameter: <NRf>(0.00 ~ 50.00)
Example: SENS:TEMP:RJUN:SIM 25.00
Sets the thermocouple junction temperature to 25˚C.

7-5-4. [SENSe:]TEMPerature:RJUNction:SIMulated?
Returns temperature simulation value.
Return parameter: <NR1> (+0000~+5000) ,where +0000=0.00˚C, +5000=50.00˚C

7-5-5. [SENSe:]DETector:RATE
Sets the detection rate (sample rate)
Parameter: RATE(S | M | F)
Example: SENS:DET:RATE S
Sets the rate to slow (S).

7-5-6. [SENSe:]DETector:RATE?
Returns the sample rate.
Return parameter: SLOW, MID, FAST

7-5-7. [SENSe:]FREQuency:INPutjack
Assigns an input port for the frequency function.
Parameter: (0|1|2) 0=volt, 1=500mA, 2=10A
Example: SENS:FREQ:INP 0
Sets the input jack to the Volt input port.

7-5-8. [SENSe:]FREQuency:INPutjack?
Returns the assigned input port used for the frequency function.
Return Parameter: VOLT, 500mA, 10A

7-5-9. [SENSe:]PERiod:INPutjack
Assigns an input port for the period function.
Parameter: (0|1|2) 0=volt, 1=500mA, 2=10A
Example: SENS:PER:INP 0
Sets the input jack to the Volt input port.

7-5-10. [SENSe:]PERiod:INPutjack?
Returns the assigned input port used for the period function.
Return Parameter: VOLT, 500mA, 10A

7-5-11. [SENSe:]CONTinuity:THReshold
Sets the continuity threshold in ohms.
Parameter: <NRf> (0 ~ 1000)
Example: SENS:CONT:THR 500
Sets the continuity threshold to 500

7-5-12. [SENSe:]CONTinuity:THReshold?
Returns the continuity threshold.

7-5-13. [SENSe:]UNIT
Sets the temperature unit.
Parameter: C|F
Example: SENS:UNIT C
Sets the temperature unit to ˚C.

7-5-14. [SENSe:]UNIT?
Returns the temperature unit.

7-5-15. [SENSe:]FUNCtion[1/2]

Sets the function for the first or second display.
Parameter:
(display1):"VOLT[:DC]", "VOLT:AC", “VOLT:DCAC”, "CURR[:DC]", "CURR:AC", “CURR:DCAC”, "RES", "FREQ", "PER", "TEMP:TCO", "DIOD", "CONT", “CAP”
(display2): "VOLT[:DC]", "VOLT:AC", "CURR[:DC]", "CURR:AC", "RES", "FREQ", "PER", "NON"
Example: SENS:FUNC1 "VOLT:DC"
Sets the 1st display to the DCV function.

7-5-16. [SENSe:]FUNCtion[1/2]?

Returns the function displayed on the first or second display.
Return parameter:
(display 1): VOLT, VOLT:AC,VOLT:DCAC, CURR, CURR:AC,CURR:DCAC, RES, FREQ, PER, TEMP:TCO, DIOD, CONT, CAP
(display 2): VOLT, VOLT:AC, CURR, CURR:AC, RES, FREQ, PER, NON

7-6. CALCulate Commands

7-6-1. CALCulate:FUNCtion

Sets the Advanced function.
Parameter: OFF | MIN | MAX | HOLD | REL | COMP | DB | DBM | MXB | INV | REF
Example: CALC:FUNC REL
Sets the Advanced function to REL (relative)

7-6-2. CALCulate:FUNCtion?

Returns the current Advanced function.

7-6-3. CALCulate:STATe

Turns the Advanced function on/off.
Parameter: ON|OFF
Example: CALC:STAT OFF
Turns the Advanced function off.

7-6-4. CALCulate:STATe?

Returns the status of the Advanced function.
Return Parameter: 0 | 1, 1=ON, 0=OFF

7-6-5. CALCulate:MINimum?

Returns the minimum value from the Max/Min measurement.

7-6-6. CALCulate:MAXimum?
Returns the maximum value from the Max/Min measurement.

7-6-7. CALCulate:HOLD:REFerence
Sets the percentage threshold for the Hold function.
Parameter: <NRf> (0.01, 0.1, 1, 10)
Example: CALC:HOLD:REF 10
Sets the hold percentage to 10%.

7-6-8. CALCulate:HOLD:REFerence?
Returns the percentage threshold from the Hold function.

7-6-9. CALCulate:REL:REFerence
Sets the reference value for the relative function.
Parameter: <NRf> | MIN | MAX
Example: CALC:REL:REF MAX
Sets the reference value to the maximum allowed.

7-6-10. CALCulate:REL:REFerence?
Returns the reference value from the relative function.

7-6-11. CALCulate:LIMit:LOWer
Sets the lower limit of the compare function.
Para meter: <NRf> | MIN | MAX
Example: CALC:LIM:LOW 1.0
Sets the lower limit to 1.0

7-6-12. CALCulate:LIMit:LOWer?
Returns the lower limit of the compare function.

7-6-13. CALCulate:LIMit:UPPer
Sets the upper limit of the compare function.
Para meter: <NRf> | MIN | MAX
Example: CALC:LIM:UPP 1.0
Sets the upper limit to 1.0

7-6-14. CALCulate:LIMit:UPPer?
Returns the upper limit of the compare function.

7-6-15. CALCulate:DB:REFerence
Sets the reference value for the dB function.
Parameter: <NRf> | MIN | MAX
Example: CALC:DB:REF MAX
Sets the reference voltage for dB measurements to the maximum allowed.

7-6-16. CALCulate:DB:REFerence?
Returns the reference voltage from the dB function.

7-6-17. CALCulate:DBM:REFerence
Sets the resistance value for the dBm function.
Parameter: <NRf> | MIN | MAX
Example: CALC:DBM:REF MAX
Sets the resistance value for dBm measurements to the maximum allowed.

7-6-18. CALCulate:DBM:REFerence?
Returns the resistance value from the dBm function.

7-6-19. CALCulate:MATH:MMFactor
Sets the scale factor M for math measurements.
Parameter: <NRf> | MIN | MAX
Example: CALC:MATH:MMF MIN
Sets the scale factor M to the minimum allowed value.

7-6-20. CALCulate:MATH:MMFactor?
Returns the scale factor M used in the math measurement.

7-6-21. CALCulate:MATH:MBFactor
Sets the offset factor B for math measurements.
Parameter: <NRf> | MIN | MAX
Example: CALC:MATH:MBF MIN
Sets the offset factor B to the minimum allowed value.

7-6-22. CALCulate:MATH:MBFactor?
Returns the offset factor B used in the math measurement.

7-6-23. CALCulate:MATH:PERCent
Sets the reference value for the Percent function.
Parameter: <NRf> | MIN | MAX
Example: CALC:MATH:PERC MAX
Sets the reference value for the Percent function to the maximum.

7-6-24. CALCulate:MATH:PERCent?
Returns the reference value setting for the Percent function.

7-6-25. CALCulate:NULL:OFFSet
Sets the reference value for the relative function. This command is analogous to the CALCulate:REL:REFerence command.
Parameter: <NRf> | MIN | MAX
Example: CALC:NULL:OFFS MAX
Sets the reference value to the maximum allowed.

7-6-26. CALCulate:NULL:OFFSet?

Returns the reference value from the relative function. This query is analogous to the CALCulate:REL:REFerence? query.

7-7. TRIGger Commands

7-7-1. READ?

Returns 1st and 2nd display value.

7-7-2. VAL1?

Returns the 1st display reading

Example: SAMP:COUN 100

VAL1?

>+0.333E-4,V DC

>+0.389E-4,V DC

> etc, for 100 counts.

Queries 100 counts of stored samples from the 1st display.

7-7-3. VAL2?

Returns the 2nd display reading.

Example: SAMP:COUN 100

VAL2?

>+0.345E-4,V DC

>+0.391E-4,V DC

> etc, for 100 counts.

Queries 100 counts of stored samples from the 2nd display.

7-7-4. TRIGger:SOURce

Selects the trigger source.

Parameter: INT | EXT

Example: TRIG:SOUR INT

Sets the trigger source as internal.

7-7-5. TRIGger:SOURce?

Returns current trigger source.

7-7-6. TRIGger:AUTO

Turns Trigger Auto mode on/off.

Parameters: ON | OFF

Example: TRIG:AUTO OFF

Turns the Trigger Auto mode off.

7-7-7. TRIGger:AUTO?

Returns the Trigger Auto mode.

Return parameter: 0|1, 0=OFF, 1=ON

7-7-8. SAMPle:COUNt
Sets the number of samples.
Parameter: <NR1>(1 ~ 9999) | MIN | MAX
Example: SAMP:COUN 10
Sets the number of samples to 10.

7-7-9. SAMPle:COUNt?
Returns the number of samples.
Parameter: None | MIN | MAX

7-7-10. TRIGger:COUNt
Sets the number of trigger counts.
Parameter: <NR1>(1 ~ 9999) | MIN | MAX
Example: TRIG:COUN 10
Sets the number of trigger counts to 10.

7-7-11. TRIGger:COUNt?
Returns the number of trigger counts.
Parameter: None | MIN | MAX

7-8. SYSTem Related Commands

7-8-1. SYSTem:BEEPer:STATe
Selects the beeper mode; no beep, beep on fail and beep on pass.
Parameter: <NR1>(0 | 1 | 2) 0=no beep, 2=fail, 1=pass
Example: SYST:BEEP:STAT 0
Turns the beeper off.

7-8-2. SYSTem:BEEPer:STATe?
Returns the beeper mode.
Return parameter: Beep on Pass | Beep on Fail | No Beep

7-8-3. SYSTem:BEEPer:ERRor
Sets the beeper to sound on an SCPI error.
Parameter: ON | OFF
Example: SYST:BEEP:ERR ON
Allows the beeper to sound when an SCPI error occurs.

7-8-4. SYSTem:BEEPer:ERRor?
Returns the beeper error mode.
Return parameter: 0|1, 0=OFF, 1=ON

7-8-5. SYSTem:ERRor?
Returns the current system error, if any.

7-8-6. SYSTem:VERSion?
Returns system version.
Return Parameter: X.XX.

7-8-7. SYSTem:DISPlay
Turns the Display on/off.
Parameter: ON | OFF
Example: SYST:DISP ON
Turns the display on.

7-8-8. SYSTem:DISPlay?
Returns the status of the display
Return parameter: 0|1, 0=OFF, 1=ON

7-8-9. SYSTem:SERial?
Returns the serial number (eight characters/numbers)

7-8-10. SYSTem:SCPi:MODE
Sets the SCPI mode. Parameter: NOR | COMP (NOR=Normal, COMP= Compatible to GDM-8246)
Example: SYST:SCP:MODE NOR
Sets the SCPI mode to normal.

7-8-11. SYSTem:SCPi:MODE?
Returns the SCPI mode.
Return parameter: NORMAL | COMPATIBLE

7-8-12. INPut:IMPedance:AUTO
Sets the input impedance for DCV mode.
Parameter: ON(10G)|OFF(10M)
Example: INP:IMP:AUTO ON
Turns the Automatic input impedance on.

7-8-13. INPut:IMPedance:AUTO?
Returns the input impedance mode.
Return parameter: <Boolean>(0|1) (0=OFF(10M), 1=ON(10G))

7-9. STATus Report Commands

7-9-1. STATus:QUEStionable:ENABle
Set bits in the Questionable Data Enable register.

7-9-2. STATus:QUEStionable:ENABle?
Returns the contents of the Questionable Data Enable register.

7-9-3. STATus:QUEStionable:EVENt?

Returns the contents of the Questionable Data Event register.

7-9-4. STATus:PRESet

Clears the Questionable Data Enable register.
Example: STAT:PRES

7-10. Interface Commands

7-10-1. SYSTem:LOCal

Enables local control (front panel control) and disables remote control.

7-10-2. SYSTem:REMote

Enables remote control and disables local control (front panel control)

7-10-3. SYSTem:RWLock

Enables remote control and disables local control (front panel control). Once this command has been issued, pressing the 2ND or local buttons will not return the user to local control. The only way to return local mode is to issue the SYSTem:LOCal command.

7-11. IEEE 488.2 Common Commands

7-11-1. *CLS

Clears the Event Status register (Output Queue, Operation Event Status, Questionable Event Status, Standard Event Status)

7-11-2. *ESE?

Returns the ESER (Event Status Enable Register) contents.
Example: *ESE?
>130
Returns 130. ESER=10000010

7-11-3. *ESE

Sets the ESER contents.
Parameter: <NR1> (0~255)
Example: *ESE 65
Sets the ESER to 01000001

7-11-4. *ESR?

Returns SESR (Standard Event Status Register) contents.
Example: *ESR?
>198
Returns 198. SESR=11000110

7-11-5. *IDN?

Returns the manufacturer, model No., serial number and system version number.
Example: *IDN?
>TEXIO,DL-2142,00000000,1.0

7-11-6. *OPC?

“1” is placed in the output queue when all the pending operations are completed.

7-11-7. *OPC

Sets operation complete bit (bit0) in SERS (Standard Event Status Register) when all pending operations are completed.

7-11-8. *PSC?

Returns power On clear status.
Return parameter: <Boolean>(0|1) 0= don’t clear, 1=clear

7-11-9. *PSC

Clears power On status.
Parameter: <Boolean>(0|1) 0=don’t clear, 1= clear

7-11-10. *RST

Recalls default panel setup.

7-11-11. *SRE?

Returns the SRER (Service Request Enable Register) contents.

7-11-12. *SRE

Sets SRER contents.
Parameter: <NR1>(0~255)
Example: *SRE 7
Sets the SRER to 00000111.

7-11-13. *STB?

Returns the SBR (Status Byte Register) contents.
Example:*STB?
>81
Returns the contents of the SBR as 01010001.

7-11-14. *TRG

Manually triggers the DMM.

For the following command sets, please refer to the status system diagram on page 85.

STAT: QUES:EVEN?,STAT: QUES: ENAB,STAT: QUES: ENAB?

*ESR?,*ESE,*ESE?,*STB?,*SRE,*SRE?

8. **FAQ**

・The DMM performance doesn't match the specifications.

Make sure the device is powered On for at least 30 minutes, within 18~28˚C. This is necessary to stabilize the unit to match the specifications.

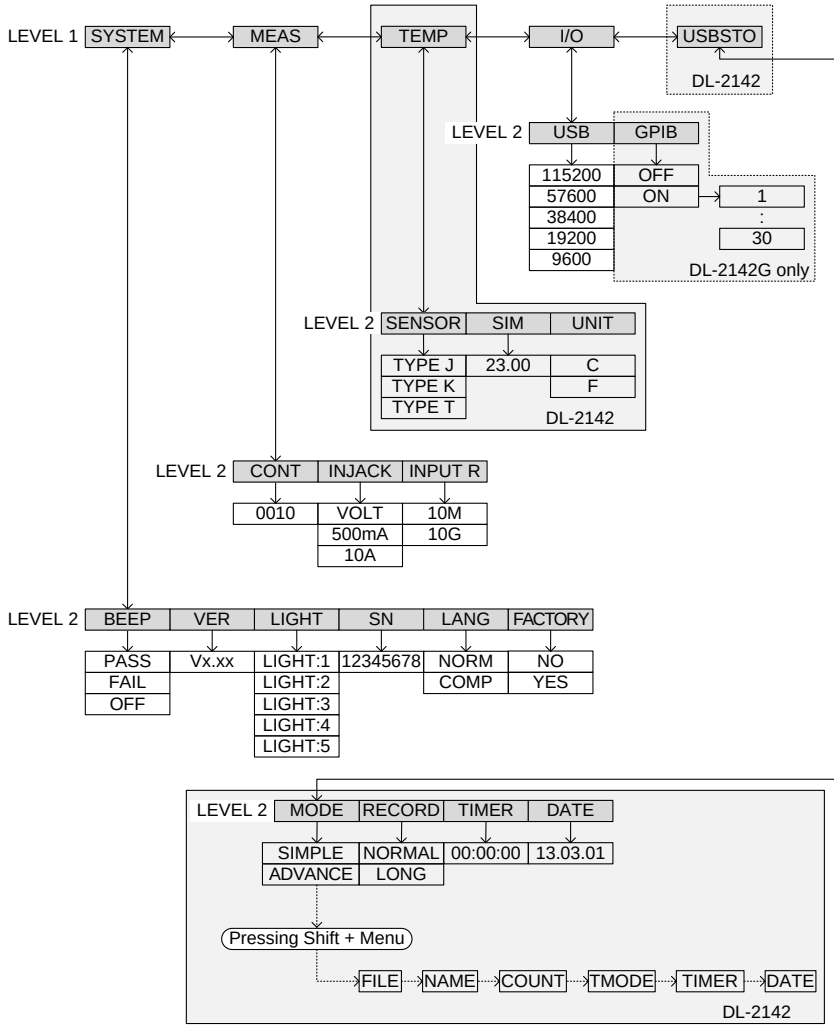
・The measured voltage does not match the expected value.

There are a number of reasons why the measured value may not match the expected values.

1. Ensure that all connections are connected securely and have a good contact at all times. Poor contacts could result in erroneous measurements.
2. Ensure that the appropriate input resistance has been set in the System menu. For 500mv and 5V ranges, the input resistance can be set to either 10MΩ or 10GΩ.
3. When measuring AC voltage or current, the RMS of the voltage peak is measured, not the voltage peak. See page 15 for details.
4. The measurement rate settings can have an effect on the accuracy of the measurement. Slow measurements are more accurate, while the fast rate is not as accurate.
5. Ensure that an appropriate range setting is used. If a too-large range is used, the resolution or the measurement may be affected.

9. **APPENDIX**

9-1. System Menu Tree



9-2. Factory Default Settings

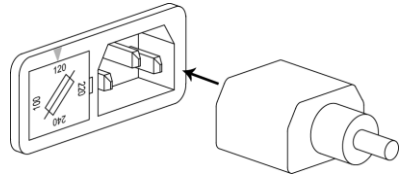
Measurement Item	DCV
Range	AUTO
Rate	s(slow)
SYSTEM Menu	BEEP: Pass, LIGHT: 3, LANG: NORM, FACTORY: NO
MEAS Menu	CONT: 0010Ω, INJACK: VOLT, INPUT R: 10M
(TEMP Menu)	SENSOR: TYPE J, SIM: 23.00, UNIT: C
I/O Menu	USB: BAUD: 115200, (GP-IB: OFF)
(USBSTO Menu)	MODE: SIMPLE, RECORD:NORMAL, TIMER: 00:00:00, DATE: 13.03.01

9-3. Replacing the AC Source Fuse

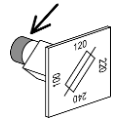
Fuse Ratings	Type	Rating
	0.125AT	100VAC, 120VAC, 5mm x 20mm
	0.063AT	220VAC, 240VAC, 5mm x 20mm
⚠ Note	Only replace the fuse with a fuse of the correct type and rating.	

Steps

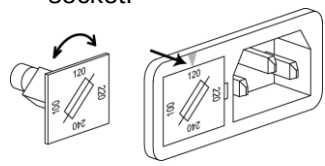
1. Turn the DMM off and take out the power cord.
2. Remove the fuse socket using a flathead screwdriver.



3. Remove the fuse in the holder and replace with the correct type and rating.



4. Ensure the correct line voltage is lined up with the arrow on the fuse holder. Insert the fuse socket.

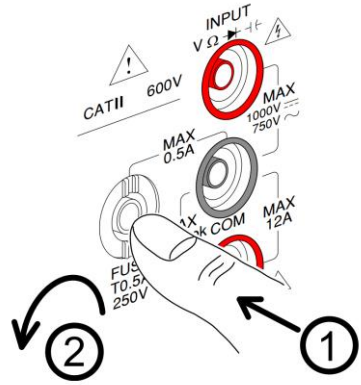


9-4. Replacing the Input Fuse

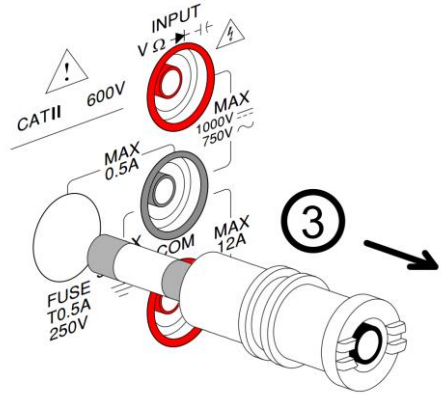
Fuse Rating	Type	Rating
	0.5AT	0.5A 250V, 6.3mm x 32mm
⚠ Note	Only replace the fuse with a fuse of the correct type and rating.	

Steps

1. Turn the DMM off.
2. Press the fuse holder with your finger and turn anticlockwise. This will release the fuse holder from the panel.



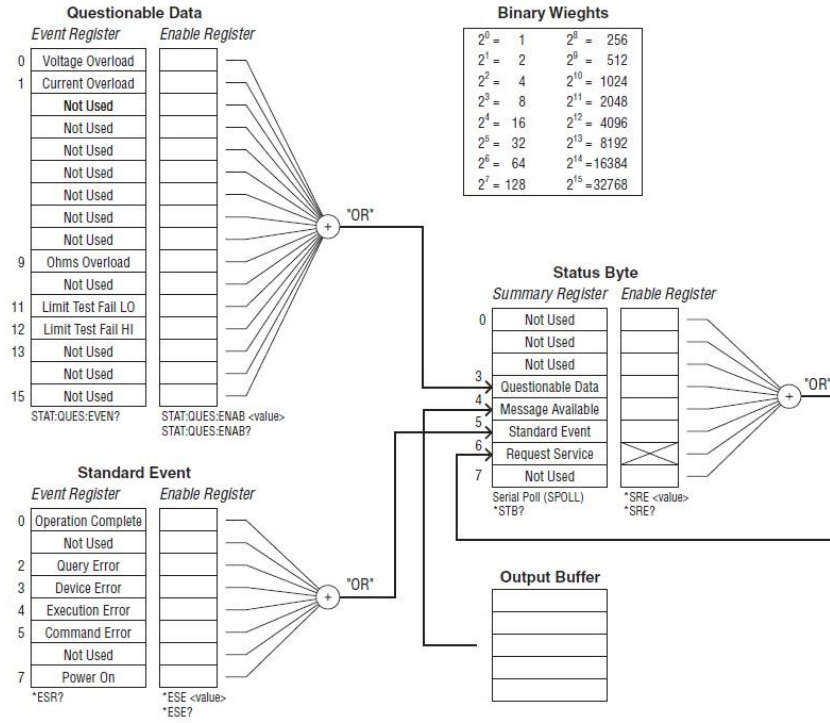
3. Replace the fuse at the end of the holder with the correct type and rating.



4. Push the fuse holder back into the panel and turn clockwise when the fuse holder is level with the front panel.

9-5. Status system

The diagram below is a description of the status system



For the following command sets, please refer to the diagram above.

STAT: QUES: EVEN?
STAT: QUES: ENAB
STAT: QUES: ENAB?
*ESR?
*ESE
*ESE?
*STB?
*SRE
*SRE?

9-6. Specifications

The specifications apply when the DMM is warmed up for at least 30 minutes and operates in slow rate. Below are the basic conditions required to operate the DMM within specifications:

- Calibration: Yearly
- Operating Temperature Specification: 18˚C ~28˚C (64.4˚F ~82.4˚F)
- Relative Humidity: 80% (Non condensing)
- Accuracy: ± (% of Reading + Digits)
- AC measurements are based on a 50% duty cycle.
- The power supply cable must be grounded to ensure accuracy.
- All specifications are applicable to the main (1st) display only.

9-6-1. General Specifications

Specification Conditions:

Temperature: 23˚C±5˚C

Humidity: <80%RH, 75%RH for resistance measurement readings greater than 10MΩ.

Operating Environment: (0~50˚C)

Temperature Range: 0~35˚C, Relative Humidity: <80%RH;
>35˚C, Relative Humidity: <70%RH

Indoor use only, Altitude: 2000 meters , Pollution degree 2

Storage Conditions (-10~70˚C)

Temperature Range: 0~35˚C, Relative Humidity: <90%RH;
>35˚C, Relative Humidity: <80%RH

General:

Power Consumption :Max 15VA AC100V – 240V ±10%,50/60Hz
Dimensions :265 mm (W) X 107 mm (H) X 302 mm (D)
Weight :Approximately 2.9 kg

9-6-2. DC Voltage

Range	Resolution	Full Scale	Accuracy (1 year 23˚C ±5˚C)	Input Resistance
500mV	10uV	510.00		10MΩ or >10GΩ
5 V	100uV	5.1000		10MΩ or >10GΩ
50 V	1mV	51.000	0.02%+4	11.1MΩ
500 V	10mV	510.00		10.1MΩ
1000 V	100mV	1020.0		10MΩ

* When the input value exceeds the full scale of the selected range, the display will show -OL- (over load) on the display.

* The specifications are guaranteed to an input voltage of 1000V. A beeping alarm will go off when the input voltage is higher than 1000V.

* 1000V protection of 1000V peak on all ranges.

** DC Common Mode Rejection Ratio
>90 dB at dc, 50 or 60Hz ± 0.1% (1kΩ unbalanced, slow rates)

9-6-3. DC Current

Range	Resolution	Full Scale	Accuracy (1 year 23˚C ±5˚C)	Shunt Resistance	Burden Voltage
500uA	10nA	510.00	0.05%+5	100Ω	0.06V max
5mA	100nA	5.1000	0.05%+4	100Ω	0.6V max
50mA	1uA	51.000	0.05%+4	1Ω	0.14V max
500mA	10uA	510.00	0.10%+4	1Ω	1.4V max
5 A	100uA	5.1000	0.25%+5	10mΩ	0.5V max
10 A	1mA	12.000	0.25%+5	10mΩ	0.8V max

* 500uA~500mA range has a 3.6V voltage limit protection and 0.5A fuse protection. And 10A range has a 12A fuse protection.

* When the input value exceeds the full scale of the selected range, the display will show -OL- (over load) on the display.

* The specifications are guaranteed to an input of 10A. A beeping alarm will go off when the input value is higher than 10A.

9-6-4. AC Voltage, ACV+DCV[3] (AC Coupled)

Range	Resolution	Full Scale	Accuracy (1 year 23˚C ±5˚C) [1] 30Hz-50Hz	50Hz-10kHz	10kHz-30kHz	30kHz-100kHz
500mV	10uV	510.00	1.00%+40	0.50%+40	2.00%+60	3.00%+120
5V	100uV	5.1000	1.00%+20	0.35%+15	1.00%+20	3.00%+50
50V	1mV	51.000	1.00%+20	0.35%+15	1.00%+20	3.00%+50
500V	10mV	510.00	x	0.5%+15	1.00%+20[2]	3.00%+50[2]
750V	100mV	765.0	x	0.5%+15	x	x

[1]Specifications are for sine wave inputs that are greater than 5% range.

[2]Input voltage <300Vrms.

[3]The accuracy of ACV+DCV is equal to ACV's with 10 more digits added.

* The specifications are guaranteed to an input of 750V. A beeping alarm will go off when the input value is higher than 750V.

* Input protection of 1000V peak on all ranges.

* AC-coupled true RMS – measures the AC component of the input with up to 400Vdc of bias on any range.

* AC Common Mode Rejection Ratio
>60 dB , 50 or 60Hz ± 0.1% (1kΩ unbalanced, slow rates)

*Input impedance 1MΩ±2% in parallel with 100pF

9-6-5. AC Current, ACI+DCI[3] (AC Coupled)

Range	Resolu-tion	Full Scale	Accuracy (1 year 23˚C ±5˚C) [1] 30Hz-50Hz	50Hz-2kHz	2kHz-5kHz	5kHz-20kHz	Burden Voltage
500uA	10nA	510.00	1.50%+50	0.50%+40	1.50%+50	3.00%+75	0.06V max
5mA	100nA	5.1000	1.50%+40	0.50%+20	1.50%+40	3.00%+60	0.6V max
50mA	1uA	51.000	1.50%+40	0.50%+20	1.50%+40	3.00%+60	0.14V max
500mA	10uA	510.00	1.50%+40	0.50%+20	1.50%+40	3.00%+60[2]	1.4V max
5A	100uA	5.1000	2.0%+40	0.50%+30	x	x	0.5V max
10A	1mA	12.000	2.0%+40	0.50%+30	x	x	0.8V max

[1] The 500uA range requires an input of >35uA to meet specifications. The 5mA~10A ranges need more than 5% of full scale range to meet specifications.

[2] Input current (5kHz ~ 20kHz)<330mArms.

[3] The accuracy of ACI+DCI is equal to ACI's with 10 more digits added.

* The specifications are guaranteed to 10A. A beeping alarm will go off when the input current being measured is higher than 10A.

9-6-6. Resistance

Resistance	Resolution	Full Scale	Test Current	Accuracy (1 year 23˚C ±5˚C)[2]
500Ω	10mΩ	510.00	0.83mA	0.1%+5 [1]
5kΩ	100mΩ	5.1000	0.83mA	0.1%+3 [1]
50kΩ	1Ω	51.000	83uA	0.1%+3
500kΩ	10Ω	510.00	8.3uA	0.1%+3
5MΩ	100Ω	5.1000	830nA	0.1%+3
50MΩ	1KΩ	51.000	560nA//10MΩ	0.3%+3

[1] Using the REL function. If you don't use the REL function then increase the error by 0.2Ω.

[2] When measuring resistances greater than 500kΩ, please use shielded test leads to eliminate the noise interference that may be induced by standard test leads.

* Open circuit voltage approximates 6V max on 500Ω~5MΩ range, approximates 5.5V max on 50MΩ range.

* Input protection of 500Vpeak on all ranges.

9-6-7. Diode

Range	Resolution	Full Scale	Test Current	Accuracy (1 year 23˚C ±5˚C)
5V	100uV	5.1000	0.83mA	0.05%+5

* Input protection of 500V peak. *Open circuit voltage approximates 6V.

9-6-8. Continuity

Range	Resolution	Full Scale	Test Current	Accuracy (1 year 23˚C ±5˚C)
5000.0Ω	100mΩ	5100.0	0.83mA	0.1%+5

* Input protection of 500V peak. *Open circuit voltage approximates 6V.

9-6-9. Capacitance

Range	Resolution	Full Scale	Test Current	Accuracy [1] (1 year 23˚C ±5˚C)
5nF: 0.5nF ~ 1nF[2]	0.001nF	5.100	8.3uA	2.0%+20
5nF: 1nF ~ 5nF[2]				2.0%+10
50nF: 5nF ~10nF[2]	0.01nF	51.00	8.3uA	2.0%+30
50nF: 10nF ~50nF[2]				2.0%+10
500nF	0.1nF	510.0	83uA	
5uF	1nF	5.100	0.56mA	2.0%+4
50uF	10nF	51.00	0.83mA	

[1] For the 5nF ~ 50uF range make sure that the input is greater than 10% of the range.

[2] Need to use the REL function.

* Input protection of 500V peak on all ranges.

9-6-10. Frequency

Measurement Range	Accuracy (1 year 23˚C ±5˚C)
10Hz ~ 500Hz	0.01%+5
500Hz ~ 500KHz	0.01%+3
500KHz ~ 1MHz	0.01%+5

* AC + DC measurements do not allow frequency measurements.

* Input protection of 1000V peak on all ranges.

Voltage Measurement Sensitivity

	Minimum Sensitivity (RMS sine wave)		
Range	10Hz~100kHz	100kHz~500kHz	500kHz ~ 1MHz
500 mV	35 mV	200 mV	500mV
5 V	0.25 V	0.5 V	1V
50 V	2.5 V	5 V	5V
500 V	25 V	uncal	uncal
750 V	50 V	uncal	uncal

Current Measurement Sensitivity

Range	Minimum Sensitivity (RMS sine wave) 30Hz~20KHz
500uA	35uA
5mA	0.25mA
50mA	2.5mA
500mA	25mA
5 A	0.25A(<2kHz)
10 A	2.5A(<2kHz)

9-6-11. Temperature

Sensor	Type	Measurement Range	Resolution	Accuracy (1 year 23˚C ±5˚C)
Thermocouple	J,K,T	-200 ~ +300°C	0.1°C	2 °C

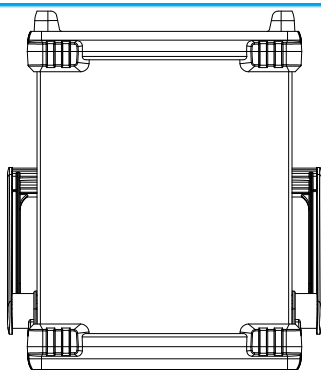
* Note: The temperature specifications do not include sensor error.
DL-2142 only

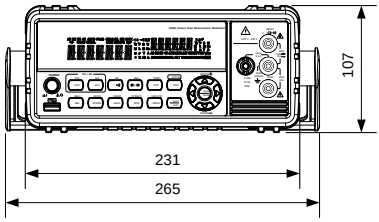
9-6-12. Accessories

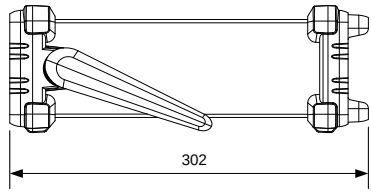
Description	Number	
Accessories CD-ROM	1 pc	
Test leads	1 pair	GTL-207
Power cord	1 pc	(region dependent)

For more information, contact your local dealer or TEXIO TECHNOLOGY at www.texio.co.jp / info@texio.co.jp.

9-7. Dimensions







TEXIO TECHNOLOGY CORPORATION
7F Towa Fudosan Shin Yokohama Bldg., 2-18-13, Shin Yokohama, Kohoku-ku,
Yokohama, Kanagawa, 222-0033, Japan.
http://www.texio.co.jp/