



# Model DMM7510 7½ Digit Graphical Multimeter

## Version 1.0.0h Firmware Release Notes

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### Contents

General Information .....	2
Supported models.....	2
Firmware Upgrade/Downgrade Instructions .....	2
Upgrade considerations for the Model DMM7510.....	2
Version 1.0.0h Release .....	3
Overview .....	3
Compatibility concerns.....	3
Critical Fixes .....	3
Enhancements.....	3
Noncritical Fixes .....	4
Known issues.....	5

## General Information

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### Supported models

This firmware is intended for use on the following Keithley Instruments product models:

DMM7510, DMM7510-NFP, DMM7510-RACK, DMM7510-NFP-RACK

### Firmware Upgrade/Downgrade Instructions

*NOTE: Do not turn off power or remove the USB flash drive until the upgrade process is complete.*

#### **From the front panel:**

1. Copy the firmware upgrade file to a USB flash drive. The file is: `ki_DMM7510_v1_0_0h.upg`.
2. Verify that the upgrade file is in the root subdirectory of the flash drive and that it is the only firmware file in that location. Model DMM7510 firmware files end with the file extension `.upg`.  
(example: `H:\ki_DMM7510_v1_0_0h.upg`)
3. Disconnect any input and output terminals that are attached to the instrument.
4. Turn on instrument power.
5. Insert the flash drive into the USB port on the front panel of the instrument.
6. From the instrument front panel, press the **MENU** key.
7. Under System, select **Info/Manage**.
8. Select the type of upgrade you want to do:
  - To upgrade to a newer version of firmware: Select **Upgrade to New**.
  - To force downgrading to an older version of firmware: Select **Downgrade to Older**.
9. If the instrument is controlled remotely, a message is displayed. Select **Yes** to continue.
10. When the upgrade is complete, reboot the instrument.

*NOTE: A message is displayed while the upgrade is in progress. Do not remove power until the upgrade message shows complete (it should take less than 15 minutes).*

For additional information about upgrading the firmware, refer to the “How do I upgrade firmware?” topic in the “Frequently Asked Questions (FAQs)” section of the *Model DMM7510 7 ½ Digit Graphical Sampling Multimeter Reference Manual* (document number: DMM7510-901-01). This manual is available online at <http://www.keithley.com/support>. Search for “DMM7510 Reference Manual”.

### Upgrade considerations for the Model DMM7510.

Version 1.0.0h is the initial firmware release.

Upgrade files are available on the Keithley Instruments website (<http://www.keithley.com>).

To find firmware files on the Keithley Instruments website:

1. Select the **Support** tab.
2. In the model number box, type **DMM7510**.
3. Select **Firmware**.
4. Click the search button. A list of available firmware updates and any available documentation for the instrument is displayed.
5. Click the file you want to download.

## Version 1.0.0h Release

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### Overview

Version 1.0.0h is the initial production release for the Model DMM7510. Known Issues, Usage Notes, and Enhancements are listed in the following pages of this document.

### Compatibility concerns

PR54340 LoopUntilEvent and the Graph screen's "Trigger" tab may not remember triggers by default in future firmware releases.

**Models affected:**

DMM7510

**Concern:**

The LoopUntilEvent trigger model template defaults to never clear observed events (see description in "Known Issues" section). This is the only option available in 1.0.0h firmware and is therefore the default. In future firmware versions, support will be added to clear events on entry of the wait block. This will become the new default selection.

The Graph's "Trigger" tab uses the LoopUntilEvent template. Future firmware will add a new option to clear event on entry or never. The default will be "on entry" which differs from 1.0.0h firmware since it only supports "never" implicitly.

**Recommendation:**

If using this command, specify the fourth parameter to indicate the delay (normally optional and 0 when not specified). This will ensure that future firmware retains the existing default for clear behavior.

```
trigger.model.load("LoopUntilEvent", <event_number>, <percent>, [<delay>],  
[<reading buffer>], [<reading block>])
```

If possible, adopt the new command arguments once available in a future firmware release. The older argument list above will still be accepted for legacy support.

### Critical Fixes

N/A

### Enhancements

PR55094 Command needed for earliest point in a continuous (circular) buffer

**Models affected:**

DMM7510 (all variations)

**Symptom:**

When working with continuous buffers, indexing the first measurement will not necessarily give you the oldest one when the buffer starts to wrap around. This is due to data being written to a continuous buffer in a circular fashion where it continues to overwrite the oldest data after it fills. Unless you know how many measurements were taken, it can be unclear how to index the oldest measurement.

**Workaround:**

New start and end properties were added to buffers. They return the index to the earliest and latest point in the buffer. These will be documented in a future update to the manual.

	SCPI	TSP
Index of earliest measurement	TRACeACTual:START? <optional buffer name as string>	bufferVar.startindex
Index of latest measurement	TRACeACTual:END? <optional buffer name as string>	bufferVar.endindex

For the SCPI command, if no buffer name is provided, it will default to “defbuffer1”.

Example: You can print the measurements in a buffer (b) in chronological order as follows. This should not be attempted while the buffer is being filled since it is then chasing a moving target.

```
b = buffer.make(1000)

-- Placeholder: Assume you take many measurements here to fill buffer b

printbuffer(b.startindex, b.capacity, b)
printbuffer(1, b.endindex, b)
```

PR55234 It may be easy to forget to delete autoexec script after a system reset

**Models affected:**

DMM7510 (all variations)

**Symptom:**

Create a config script and make it run at power up (Copy to Power Up). This makes a copy of it as the “autoexec” script which runs each time the instrument powers up. If you later perform a System Reset, this will not delete the “autoexec” script causing the instrument to revert back to custom settings after a power cycle.

Similarly deleting the original script will not delete the “autoexec” script. A copy gets made when you select the option to run a script at power up.

**Workaround:**

Delete the “autoexec” script. Clarity will be added to a future version of the manual.

**Noncritical Fixes**

N/A

## Known issues

PR55094 Compact buffers do not support negative measurements

**Models affected:**

DMM7510 (all variations)

**Symptom:**

If you create a buffer with a “Compact” style, the negative sign will not be reported. All negative measurements will appear to be positive (the absolute value of the measurement). This does not affect default buffers (defbuffer1 and defbuffer2) since they are fixed at “Standard” style.

**Workaround:**

When creating a custom buffer, use the “Standard” or “Full” style. Avoid “Compact” buffers until this is resolved.

PR54340 LoopUntilEvent and the Graph screen’s “Trigger” tab remember triggers by default

**Models affected:**

DMM7510 (all variations)

**Symptom:**

If you use the “LoopUntilEvent” Trigger Model template or the Graph’s Trigger tab (Menu > Graph > Trigger tab), trigger events that occur during execution of other trigger model blocks will be remembered. This will cause the trigger model’s “Wait” block to advance and finish taking measurements when it is later reached.

No count is maintained for multiple triggers. The instrument latches only one trigger event and clears it when the Wait block advances.

Example: Configure LoopUntilEvent to wait for a digital input line. When the digital input is pulsed, it will advance the trigger model. If a second pulse occurs (even while the instrument trigger model is executing other blocks), the instrument will latch its occurrence. The next time the event is waited on, it will fire immediately.

**Workaround:**

There is no known workaround for this issue at this time.

A future firmware version will involve adding an optional parameter to the Wait block to clear previously seen events on entry. Clearing “on entry” will become the new default. Never clearing will still be supported by a future setting that will be added.

PR54918 Loading a configuration list from the trigger model turns off autoranging

**Models affected:**

DMM7510 (all variations)

**Symptom:**

If you create a trigger model that uses a “Config List” block to recall or load a previous or next set of settings, autoranging is turned off. By default, this leaves the instrument on the 1000V range. This occurs even if the configuration list index attempts to turn autoranging on.

**Workaround:**

If possible, use a trigger model that does not depend on Configuration Lists.

If possible, apply settings using Configuration Lists outside of the trigger model.

PR54333 SCPI problems with MIN/MAX for the Threshold Level unique to Frequency or Period functions

**Models affected:**

DMM7510 (all variations)

**Symptom:**

Use the [SENSe[1]]:<function>.THRShold:LEVEl command where <function> is FREQuency or PERiod to attempt to set the level to MINimum or MAXimum. It will incorrectly attempt to set it to 700V, independent of range. On lower ranges, this generates an error.

**Workaround:**

Specify the actual value instead of using the MINimum or MAXimum parameter.

PR54737, A saved setup (SCPI) or configuration script (TSP) may generate errors when recalling or running it  
PR54700

**Models affected:**

DMM7510 (all variations)

**Symptom:**

A saved setup or configuration script saves and restores the state of the instrument. When the instrument saves the settings into a configuration script, it generates incorrect TSP syntax for some settings in the script. As a result, errors are generated when the script is run to recall the setup. This aborts the execution of the configuration script and halts the process to restore settings. For detailed information on the errors, refer to the Event Log. Warnings do not halt script execution.

This problem only applies to a subset of TSP command sequence with examples shown in the table below. Most configurations are not affected.

**Workaround:**

Transfer the setup or configuration script to a computer. Edit it with a text editor and correct the command that generated the error so that it uses the proper syntax.

Possible Errors:

Invalid Command Sequence:	Correct Command Sequence
dmm.measure.func = dmm.FUNC_CONTINUITY dmm.measure.range = <a number>	dmm.measure.func = dmm.FUNC_CONTINUITY
dmm.measure.func = dmm.FUNC_DIODE dmm.measure.range = <a number>	dmm.measure.func = dmm.FUNC_DIODE
trigger.model.* commands appear before settings for "--set up DMM" (look for comment in script)	Move the trigger.model.* commands to appear after the settings for "--set up ACAL" (look for comment in script)

PR54656 Cannot set the aperture to 0 for the digitizer using SCPI

**Models affected:**

DMM7510 (all variations)

**Symptom:**

You cannot set the aperture to 0 using the SCPI language as documented in the manual. Either of these commands will generate an error:

```
:SENSE:DIG:CURR:APER 0      ERROR!
:SENSE:DIG:VOLT:APER 0      ERROR!
```

**Workaround:**

Use "AUTO" instead of 0 if you wish to select an Automatic aperture.

```
:SENSE:DIG:CURR:APER AUTO    CORRECT!
:SENSE:DIG:VOLT:APER AUTO    CORRECT!
```

PR54688 Cannot always abort scripts that use the trigger model with Frequency or Period functions

**Models affected:**

DMM7510 (all variations)

**Symptom:**

Configure the trigger model to take Frequency or Period measurements using a script. Attempt to abort the script while it is running. The instrument may not always halt execution of the script.

**Workaround:**

Allow the trigger model in the script to run to completion.

PR54377 Trigger model hangs if a config list attempts to switch between Digitize and Measure

**Models affected:**

DMM7510 (all variations)

**Symptom:**

Create a trigger model using a Measure block that also loads a point from a config list with the function set to take digitizer measurements. The conflict between the DMM Measure and Digitize will cause the trigger model to run indefinitely once started. It is not possible to stop it. This also applies if you create a trigger model with a Digitizer block with a config list that sets up a DMM Measure function.

**Workaround:**

Avoid mismatches between Digitizer and DMM Measure that can be introduced when using config lists with the trigger model. Consider configuring and loading separate trigger models or writing a TSP script to achieve the desired behavior.

PR55118 Trigger model doesn't update to follow active buffer

**Models affected:**

DMM7510 (all variations)

**Symptom:**

Use the Graph's Trigger tab to configure a trigger model. After the trigger model is generated, change the active buffer from the home screen. The trigger model will not get updated and will still put measurements in what was previously the active buffer.

**Workaround:**

There are several ways to avoid this:

- (1) Change the Active Buffer before configuring the trigger.
- (2) After changing the Active Buffer, force regeneration of the trigger model by making a change to any setting on the Graph's Trigger tab.
- (3) Manually reconfigure the trigger model to change the buffer selected in the Measure/Digitize block (Menu > Trigger Flow).

PR54974, UI graph occasionally appears to be missing digitizer data  
PR54934

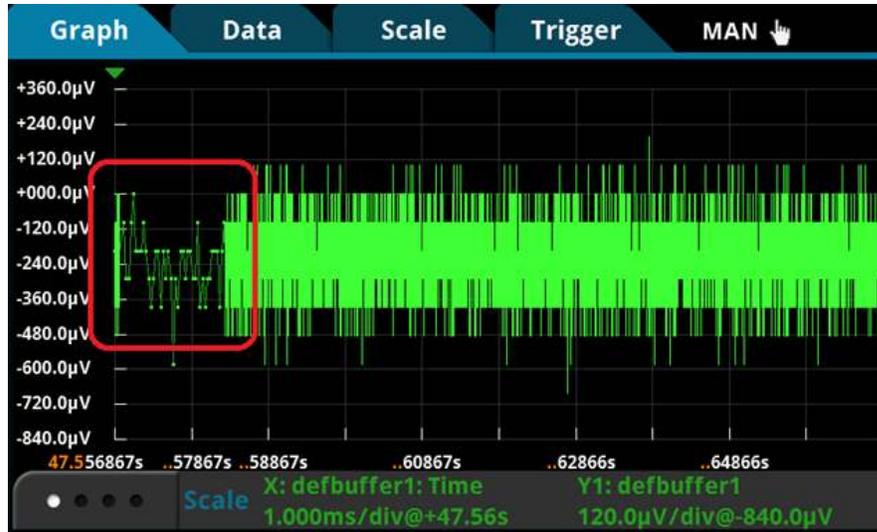
**Models affected:**

DMM7510 (all variations)

**Symptom:**

When using the UI to view bursts of digitizer data on the graph, you may see areas that appear to have missing data. See the example in the image below. Even though data is being sampled consistently throughout the viewable range, it appears as though fewer points are available in the circled area.

This may only occur when more than 5,000 points are visible on the graph at once and sample rates exceed 50k.



**Workaround:**

Pan or scale the graph by touching it to force a refresh. All data will appear. The measurements were taken and are in the buffer.

If you touch the screen in “Continuous Measurement Triggering” mode, panning in the time dimension will lock your time position. This will freeze your view on older data. If you continue to take measurements, your data will correctly disappear when the buffer wraps and the older data you were looking at is overwritten (assuming your buffer is continuous). If you wish to avoid this, it may be helpful to put the instrument in Manual (“Trigger Key Triggering”) mode and manually trigger each acquisition using the TRIGGER key.

PR54436 UI graph may fail to autoscale under certain circumstances

**Models affected:**

DMM7510 (all variations)

**Symptom:**

When viewing the graph, the graph may not autoscale correctly when the x-axis scale is set to “All”.

**Workaround:**

Pan or scale the graph by touching it to force a refresh. The autoscale algorithm will correct itself.

PR54415 UI graph does not display the dashed lines for the analog trigger levels set over the bus

**Models affected:**

DMM7510 (all variations)

**Symptom:**

Configure the analog trigger using remote bus commands. Then view the graph from the front panel. The dotted line to indicate the analog trigger level(s) will not appear.

**Workaround:**

There is no workaround over the bus. The only option is to program the level from the UI for it to be visible.

PR54741 UI graph can encounter scaling and panning difficulties when displaying 2 or more traces

**Models affected:**

DMM7510 (all variations)

**Symptom:**

Configure the graph to show 2 or more traces at once. Autoscale may not always work correctly. Panning and zooming the signals may also be difficult at times.

**Workaround:**

For screen gestures, try repeating the operation over the trace you wish to modify. If autoscale is not yielding expected results, try manually setting scale. The "Scale" tab can always be used to precisely set a scale to pan or zoom into a trace.

PR54718 UI Reading Table does not always allow scrolling to access all digitized readings

**Models affected:**

DMM7510 (all variations)

**Symptom:**

The UI Reading Table (Menu > Reading Table) may not allow you to scroll down using the touch screen or the on screen arrows even though there is additional data. This problem is particularly pronounced after using the "Jump to" option to navigate the table.

**Workaround:**

Use the "Refresh" button and then try to navigate again. This often works if the "Jump to" option has never been invoked. If this still does not work, use the "Jump to" option. Jumping should allow for full access to the entire data set.

PR54696 Web page virtual front panel stops updating after long periods of viewing a live graph

**Models affected:**

DMM7510 (all variations)

**Symptom:**

Configure your instrument to take measurements continuously and navigate to the graph screen. Meanwhile launch the instrument webpage and view the virtual front panel. If you leave the virtual front panel connected for longer than an hour, the web page image may freeze. Once it freezes, the virtual front panel will no longer display the screen image until rebooted. The instrument UI will continue to work correctly as will all other instrument functionality. Only the virtual front panel is affected.

**Workaround:**

Once the problem is encountered, the only work around is to reboot the instrument. Try to avoid leaving the virtual front panel connected for long periods on the graph screen while it is continuously being updated with high speed measurements.

PR54610 TSP-Linked networks cannot support transferring data back to the master in real time at high speeds

**Models affected:**

DMM7510 (all variations)

**Symptom:**

Set up a TSP network and configure a slave instrument to digitize measurements at high speeds (for example, 1 million readings/second). Attempting to transfer data across the TSP bus in real time at high speeds will cause bus errors. This may manifest as either of the following errors being reported.

"Error 1211: Node *N* is inaccessible"

"-1073807305, Device reported an input protocol error during transfer."

**Workaround:**

Transfer data after the measurement acquisition completes.

To avoid accidentally configuring a real time transfer, specify the node prefix when entering the buffer to store measurements. A slave should store high speed digitizer data in "node[N].defbuffer1" instead of "defbuffer1" when executing scripts on the master. If the node[N] prefix is left off, it will attempt to store data in the master node's buffer which will require measurements to be transferred at acquisition speeds and will overrun the bus.

PR48636 DMM7510 writes to a USB Flash drive file that is read only

**Models affected:**

DMM7510 (all variations), 2450, 2460

**Symptom:**

The DMM7510 will write over read-only files on flash drives. For example, if the DMM7510 attempts to write to file aaa.txt that is marked read-only, the DMM7510 will rewrite file aaa.txt without warning. This problem does NOT suggest the DMM7510 randomly overwrites arbitrary files on a flash drive.

**Workaround:**

There is no known workaround for this issue at this time.