

To use the MIN MAX AVG Recording mode:

1. **Select the appropriate function** for the desired measurement. (ac volts, dc volts, resistance, ac current, dc current, and frequency)
2. **Connect the test leads** of the DMM to the circuit to be measured. Fluke's SureGrip test leads and probes offer a multitude of circuit attachment methods. Make sure you do this before activating the MIN MAX AVG function, otherwise, the minimum reading will be whatever the ambient value is on the unconnected test leads. This could throw off your analysis of the recorded data after the recording time period expired.
3. **Switch to manual range** by pressing the RANGE button. If necessary, repeat pressing the RANGE button until the correct range is indicated in the DMM's display. This step is necessary because the DMM will automatically switch to manual range mode whenever the DMM is placed in the MIN MAX AVG recording mode. Once MIN MAX AVG is activated, you cannot change the range setting.
4. **Press the MIN MAX** to activate the MIN MAX AVG recording mode. In the Fluke 170 Series, the display indicates the maximum reading and beeps each time a new low or high value is detected. In the Fluke 180 Series, the primary display indicates the maximum reading while the secondary display indicates the present measured value.

After insuring the DMM won't be disturbed and won't present a safety hazard to anyone, you can leave the DMM unattended while you focus on other tasks. At anytime during the recording period, you can review the stored readings using the procedure in the next step, or pause the recording mode without deleting the stored readings by pressing the HOLD button. To continue recording, press the HOLD button again.

5. View the stored readings by pressing **MIN MAX**. Each press of this button causes each of the stored values (lowest, highest and average readings) to be sequentially recalled to the DMM's display.

Elapse time stamp

The ability to determine when the lowest and highest reading was detected could also be useful information in determining the cause of an intermittent measurement. The Fluke 180 Series DMMs have the additional ability of storing the amount of time that has elapsed between the start of recording and when a new minimum or maximum or average value was stored during MIN MAX AVG recording. As a result, each stored minimum, maximum and average reading has a "time stamp" associated with it.

By separately documenting the time of day you activated the MIN MAX AVG recording mode, you can easily calculate the actual time of day a reading was detected by the DMM. For example, assume you activated the record mode at 3:07:00 p.m. and the highest reading displayed has an elapsed time of 47:05. You simply add the elapsed time to the start time to determine what time of day the highest reading was recorded. In this example that would be 3:54:05 p.m. the same day.

Using the MIN MAX AVG recording mode found in both the 170 and 180 Series DMMs, can be useful for some intermittent problems. But it assumes the circuit point you are connected to will indicate the highest or lowest reading when the problem appears. If the intermittent causes the measured value to be between the highest and lowest value, then the MIN MAX AVG function will not be of much help in determining the source of the intermittent.

Tip:

Do not remove the test leads from the circuit being measured until you have either pressed the HOLD button to stop the recording, or looked at and documented all the stored values. Removing the leads while recording will result in the DMM processing the values present on the disconnected leads and affect the AVERAGE value and possibly the lowest or highest stored values taken during the time the leads were connected to the circuit.

Advanced MIN MAX Recording functions

The Fluke 189 True-rms Multimeter not only has the stand-alone MIN MAX AVG Recording feature described above, but also incorporates this feature with another called AutoHOLD and additional storage memory to create the Event Logging function.

AutoHOLD has the ability to sense when a measured signal becomes unstable and when it re-stabilizes. Using the AutoHOLD feature to trigger the starting and stopping of the MIN MAX record function, you are not limited to using the DMM for problems that only result in signals moving to a minimum or maximum value.

To use the Event Logging feature, you will need a Fluke 189 True-rms Multimeter, FlukeView® Forms Documenting Software and a personal computer on which to download and view the recorded data. The DMM is taken to the site where the recording needs to be done and set up to record for a period of time, hopefully during which the intermittent will occur. Only after the recording is complete do you need the software and PC.

As in the MIN MAX AVG Recording steps above, setup the meter by selecting the desired measurement function and set the range of the meter manually. Connect the meter's input to the point to be measured and then activate Event Logging.