

## Under-utilized functions on your DMM

### Application Note

Measuring ac and dc voltage and current—you've got that. But what about the other features your DMM has—do you ever use them? Min/Max/Avg is an especially useful, but often overlooked function of your tool.

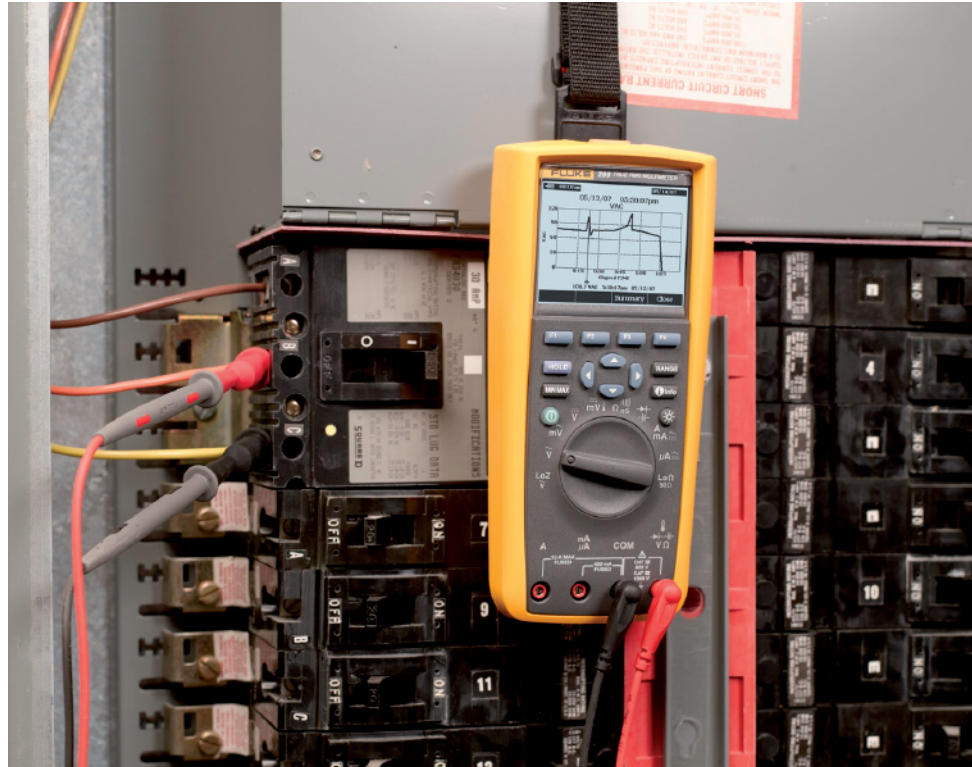
#### Min/Max/AVG

Many of the higher performance digital multimeters contain a min-max recording function which allows the user to capture a wide range of signal anomalies, such as multiple cycle sags or swells, unexpected signal fluctuations, or other types of unattended monitoring of a signal over time. The function works by sampling the input signal approximately every 100 ms or longer and can be applied to all primary meter functions (volts, amps, etc).

With Min/Max/Avg turned on, the meter will capture, and temporarily hold, the highest and lowest signal levels measured by the meter. In addition, the meter will maintain a running average of the signal levels measured during the monitoring process. The average reading is useful for smoothing out noisy signals, estimating the percent of time a circuit is active, and determining the overall level of instability for the monitored signal.

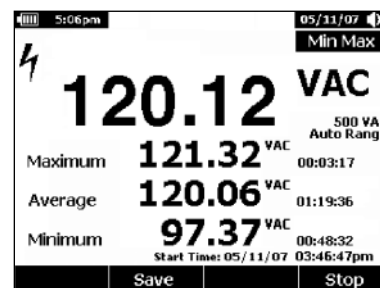
#### Timestamp

Along with these captured levels, some dmm's such as the Fluke-287 and 289, have an elapsed time clock, which timestamps the highest, lowest and average values. The timestamp tells you exactly when these readings



occurred, based on the start of the monitoring process. The actual start time for the Min Max session is also displayed so it is relatively easy to determine exactly when the signal changes have occurred.

Knowing the precise timing of the highest and lowest signal variations tells you exactly when unusual events may have taken place and gives you critical insight to the stability of the signal or the system being evaluated. This can be a real asset and a time saver as a troubleshooting tool, if you're looking for intermittent or unusual system performances that happen when you're not there.



## Recommended procedure for use

First and foremost, read the instruction manual and follow all safety precautions and use safe work practices.

### Using MIN-MAX-AVG function for signal monitoring

1. Select the appropriate meter function for the measurement to be monitored
2. Attach the test probes to the test points using suitable alligator clips or other connection devices that will allow for a solid connection while the monitoring process is in progress.
3. Once the leads are attached to the signal to be monitored, push the MIN MAX pushbutton once.
4. This starts the recording process. The Min Max symbol will appear.

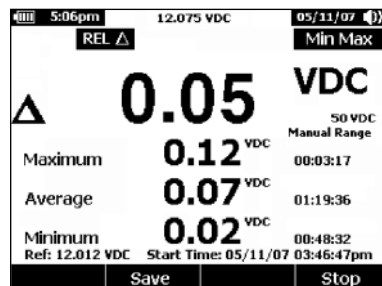
The monitoring process is now underway and the meter is ready to capture and display any changes to the signal which may occur during the Min-Max recording process.

### Displayed readings

As you can see from the image because the 287/289 has a large easy to read dot matrix display all critical information is easily seen in the meter's display, the current date and time, the maximum, average and minimum values along with the elapsed time of each and the actual start time of the process.

Once the monitoring process is complete, but before disconnecting the test leads from the circuit, press the F4 Stop pushbutton. This retains the recorded values for viewing and saving. If the user doesn't press the F4 Stop pushbutton before disconnection of the leads the Minimum value would be lost and the Average value would be compromised.

In summary, the Min Max record mode contained within the Fluke 287 and Fluke 289 multimeters offer the users another very powerful troubleshooting tool by allowing the user to do unattended monitoring while looking for unusual signal events.



Min-Max in progress

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