Measuring short interrupts on the mains with a Fluke ScopeMeter® 190 Series II

Electrical energy is the driving force of today's world. It is available almost everywhere you go, and is capable of driving all sorts of equipment from heating and cooking equipment, through motors and ventilators to the PC that this application note is written on. And it’s available all the time. Or is it?

**Power interruptions**

Unfortunately the unconditional availability of electrical power can never be taken for granted. In fact, quite frequently interruptions occur of various durations. Many of these pass unnoticed, but some may prevent your equipment from working properly. The longest interrupts are obviously the ones that make all lights go down and all equipment stop. But sometimes, we see only a single piece of equipment blink as if the power has been interrupted, after which operation continues immediately with nothing else apparently indicating that anything has happened. This then raises question of whether the ‘hiccup’ was due to a power malfunction, or to the fact that the affected piece of equipment itself is faulty.

An oscilloscope from the ScopeMeter 190 Series II can be a valuable tool in finding answers here, as it allows you to detect these short-duration interrupts of the electrical power system.

**Pulse width triggering**

ScopeMeter 190 Series II oscilloscopes are equipped with a pulselwidth-trigger mode. This trigger mode is able to detect if the mains voltage is interrupted. To do so, we set up the ScopeMeter to recognize the absence of any voltage for longer than ¾ of a cycle, this is 15 ms (or 12.5 ms for a 60 Hz system), as this can only happen during an interrupt of the normal cycle.

1. Connect the ScopeMeter probe to input A, and connect the probe ground clip (alligator) to the mains neutral. Connect the probe tip to the ‘live’ mains line. Be careful in making these connections as the mains system carries hazardous voltage! Use only the safety–designed accessories described with the Fluke ScopeMeter.

Alternatively, if a low-voltage transformer is part of the system under test, measure on the low-voltage side of that transformer as this provides the necessary safety barrier.

1. Select the ScopeMeter to work in ‘Scope’ mode, and make sure the instrument is in ‘Auto’ mode (see upper right corner of the screen). If it is not in ‘Auto’ mode,
press the green AUTO/MANUAL button to set the indicator in the upper-right corner to read ‘Auto’. A continuous sinewave will now be visible. Change the time-base setting to give about 2 or 3 cycles per horizontal division, so select 20 or 40 ms/div (see figure 1).

‘Pulsewidth >t’, select ‘Update on trigger’ in order to catch successive interrupts rather than only one.

Press Enter until all selections are made, and the menu text is switched off again. The up and down controls (s and t) can now be used to change the time duration of the interrupts that the scope will respond to. Set this to 15 ms (or 12.5 ms when working on a 60 Hz system). The oscilloscope is now ready to respond to any short-term interrupt of the mains voltage.

Figures 3 and 4 provide some examples of power interrupts that were captured.

**Conclusion**

Malfunctioning of electronic equipment is sometimes related to short-duration interrupts of the mains supply. This calls for a tool to find such interrupts, complete with date and time of occurrence. Fluke ScopeMeter 190 Series II oscilloscopes are capable of conveniently detecting and storing such power interrupts. Even if many such events occur over a longer period of time, up to 100 individual events can be stored, complete with date- and time-indicator, making longer-term power monitoring easier than ever.