

## Introduction to 2-Wire Meters

### What Is a 2-Wire Meter?

A 2-wire “self-powered” meter, as its name implies, needs only two input connections to perform its required function. All operating power is supplied solely by the signal being measured. Most engineers and technicians are familiar with analog-readout, 2-wire, pointer-style gauges – from the ammeters and voltmeters in their car’s instrument cluster, to the reliable VOM (Volt-Ohm- Meter) on their bench.

The analog gauge’s operation is straightforward. A small electrical current carried by two wires sets up a magnetic field in a coil which in turn causes a needle pointer inside the gauge to be proportionately deflected in one direction or another. All of these pointer-style gauges normally have only a positive terminal and a negative terminal – hence the 2-wire designation.

Until now, users who needed a more accurate and easy-to-read digital readout for a parameter as simple as a dc voltage had to contend with a general-purpose digital panel meter’s (DPM) maze of input connections. There were connections for the power supply, connections for the signal source, connections for signals called “Analog Common” and/or “Power Common,” connections for decimal points, etc., etc.

To make matters worse, many DPM vendors’ data sheets did little to simplify the installation by using phrases like “single-ended inputs only” or “observe common mode voltage limitations.” These phrases, while in themselves not very complex, only helped to further confuse the situation. Getting the meter to function properly frequently involved several calls to the vendor’s applications engineering staff – assuming they had a staff – and the costly “sacrificing” of a meter or two.

### Enter the 2-Wire Digital Meter

The scenario described above had become all-too-familiar to Murata Power Solutions’ Applications and Design Engineers. There had to be a simpler way to make everyday ac and dc measurements with digital meters. Our Applications Engineers’ never-ending tales of customer woes, combined with Murata Power Solutions’ proprietary low-power LED and LCD display technology, inevitably led to the development of 2-wire digital panel meters.

Murata Power Solutions’ new line of 2-wire meters can replace older, less-precise analog meters in many applications. 2-wire meters, in both LED and LCD display versions, are now available for monitoring the following signals: ac voltages from 85 to 600Vac; positive and negative dc voltages from 2 to 264Vdc; ac frequencies from 47 to 450Hz; and 4-20mA inputs from all manner of process monitoring instrumentation. The following section answers the most frequently asked questions (FAQ’s) we receive regarding the operation of these revolutionary 2-wire meters.

### 2-Wire Meter FAQs (Frequently Asked Questions)

#### Question: Do digital 2-wire meters still function when their inputs go to zero?

No. All digital instruments require a minimal amount of power to drive their internal electronics. However, the input level at which 2-wire instruments stop functioning is normally well below the level at which the system being monitored has stopped functioning.

#### Question: What happens when the input goes below the minimum specified level?

The answer to this question is model dependent. LCD display models will normally continue to operate well below their specified minimum input levels, but the display’s contrast will gradually diminish, and more importantly, the readout accuracy is no longer guaranteed.

For LED display models, the intensity of the display will diminish, but the readout will remain fairly accurate down to the level at which the display becomes so dim that it becomes unreadable. In applications in which the display is required to be totally off at times, be sure to drive the meter with components which bring the input signal all the way to zero.

#### Question: Why aren’t absolute maximum input ratings specified?

Absolute maximum input levels are specified on our data sheets as the “Input Voltage Range” or simply “Input Range.” This rating is the meter’s maximum continuous operating level at the highest-rated operating temperature. In practical applications, momentarily exceeding the input range by 10% will not harm any of our 2-wire meters.

#### Question: What happens when a 2-wire meter’s input signal polarity is reversed?

Absolutely nothing – the display will not operate. Except for ac-mains powered devices whose inputs are not polarity sensitive, all Murata Power Solutions 2-wire meters are fully protected against reversed-polarity inputs (i.e., “input signals that are hooked up backward”).