



White Paper:

## **How To Select A Panel Meter That's Best For Your Application**

A practical paper focused on helping users ensure the sensor they specify will perform as expected in their application by determining true accuracy. Equally important, it covers the factors that determine if a meter will be a best choice for a user's application.

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# How To Select A Panel Meter That's Best For Your Application

Panel meters are available with a wide range of capabilities and accuracy that can vary from manufacturer to manufacturer or from meter to meter.

Some are not more than a single input type or two and a digital display or analog meter. Other panel meters are programmable, accept several types of inputs such as temperature sensors, voltage, current and potentiometers. There are specific function meters designed to measure only one thing such as temperature.

Meters with higher functionality can be programmed for the type of device you are applying to the input, for offsets or nonlinear devices. Some have relay outputs as well as analog or digital outputs. Others have multiple input channels and can record data.

There is an entire category of panel meters that include a bar graph display as well as digits to display specific values.



Panel meters for associated functionality include timers, counters and frequency meters. Another

functional category is power meters that monitor AC power, typically for commercial or industrial applications.



Adding to the choices panel meter buyers have to consider are how many digits the meter displays and separately, the accuracy of the meter.

Some applications require meters that can make and display measurements in a very short period of time, so the number of measurements per second would be a consideration for those applications.

Given all of the above, it can be helpful to have a guide to lead users to a good decision based on their application.

While it may seem to some that it is an easy task and there are only a few considerations, you can get a product that works best with and helps you get the most out of your application. The right meter can also save costs and last longer as described in the guidelines within this white paper.

# How To Select A Panel Meter That's Best For Your Application

The categories of questions to ask yourself in choosing a panel meter are:

- How many digits are needed?
- What accuracy is required?
- Need for fast measurements?
- Is the meter durable?
- What type of input is applied?
- Are relays needed?
- Is a signal output needed?
- What type of output?
- Is it easily configured?
- What programming options are best?
- Conducive to high volume apps?
- Data recording required?
- Display color options?
- Mounting/cutout options?
- Number of inputs needed?

Let's take these one at a time.

## How Many Digits Are Needed?

This may seem obvious, but it bears a little consideration.

To determine the number of digits your application needs, it is necessary to break it down into two more specific questions. First, what range do you need to measure and display? If it's 0 to 1,000 then 3 ½-digits would do for that requirement. If your application requires a range of 0 to 5,000, for

example, than a 4-digit display is needed for that requirement.

The second question you need to answer to determine the number of

digits needed is

do you need to display values that are less than one?

In other words what level of accuracy do

you want to display? Going back to the 0 to 1,000 range example, if you needed to display tenths then the range becomes 0.0 to 1000.9 and five digits are needed.

## What accuracy is required?

The accuracy a meter measures is usually a different thing from the number of digits displayed.

Manufactures may make meters more accurate that have more digits, but the better guide is to determine what accuracy your application needs and check the accuracy specification. It is

usually

expressed as a percentage of the input range.



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Beware of the meter when a manufacturer does not supply any accuracy specification at all!

If the signal range your application provides to the meter's input is from 0 to 10 V, and the accuracy of the meter is  $\pm 0.1\%$  of the range, the accuracy is:

$$\pm[(10V - 0V) \cdot 0.1] \div 100 = \pm 0.01 V$$

## Need for fast measurements?

If your application needs to measure and display changes at more than 5 times per second (200 msec), you likely need to be concerned with the rate at which the meter makes measurements.

In some meters you can select the measurement rate, so that even if you don't need to make faster measurements, perhaps you want to slow down the measurement for your application.

Some meters can make measurements as quick as every 20 msec or less. These usually have the ability to record data and output it, so that values can be reviewed at a speed the eye can follow.

## Is the meter durable?

This is a question every meter buyer should ask. If the meter you are buying comes with a long warranty, it is much more likely to last than one that offers a short guarantee of only one or two years. If a manufacturer is guaranteeing free replacement of a meter that fails for up to five years, for example, that makes a strong statement that the manufacturer stands behind their product to the point that they are willing to "put their money where their mouth is" that their product will last a long, long time. Typically longer than the guarantee.



## What type of input is applied?

Obviously the meter you select has to accept the type of signal your application is supplying to it. There are some differences though. Most all sensors and other devices that you need a display for, will output a signal of a voltage or current.

So if your device or sensor output provides a signal of 0 to 20 mA or a small voltage, meters can be readily

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found to accept a current or voltage at their input. If you sensor is, for example a J- or K-Type thermocouple, some panel meters enable you to choose an input optimized for just a J, K...T, etc, type of thermocouple. The same hold true for RTDs as well as potentiometers.

Panel meters that offer a wide variety of input choices and input ranges will enable you to get the most out of the output signal your device provides. They will also make setting up the meter easier and faster. As an added bonus, you will likely be able to stay with the same familiar meter family for future applications, and that can also save time.



## Are relays needed?

When you have a device you need to control based on the value a sensor or transmitter outputs, some panel meters offer relay outputs that can be used to control many devices. Some applications may call for turning a valve on or off, others may need an alarm to sound if a signal is below or above a pre-determined level. Other applications may need a light to turn on to alert people of a condition that requires immediate attention.

Sometimes more than one relay is needed or even more than one type of relay, and this should be considered too.

## Is a signal output needed?

This consideration is pretty clear, either you only need to display a value or you need to display and pass that value to another device such as a controller. If you need to pass the value on, you will need to select a panel meter that can provide an output of the displayed value.

## What type of output?

When a panel meter provides an output, you need to know what the device you are sending the meter's output to

accepts. Do you need an analog output signal or digital output? If the answer is digital, there are several types to select from and again, it obviously depends on what the device you are sending the output to requires. RS-232, RS-485. There is also the question of which protocol is needed, Modbus, Profibus, etc.

## Is it easily configured?

There may be many meters that work with your application and asking if it is configurable from your PC using

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software provided by the manufacturer can save a lot of time and hassle.

Even if a manufacturer has made an effort to streamline programming their meters using buttons on the front of the meter, it can't compete with the ease of having a software application that let's you click a tab, read a list of types of input and ranges you need, click a radio button or two, in the application and save the new setting to the meter.

## [What programming options are best?](#)

(Write while running OM Link)

## [Conducive to high volume apps?](#)

If your application is to integrate one or more panel meters into a product your company is manufacturing, that means you will be applying settings to many meters for each production run. In this case, it's beneficial to select a panel meter that can have the same settings programmed in bulk to many meters at once—especially if it can be done with a single click in the manufacturer's application, running on your pc.

## [Data recording required?](#)

If your application

generates data that needs to be saved for review at a later time, a panel meter that has data recording and digital output features could be helpful.

## [Display color options?](#)

Panel meters that can display two or three colors and be assigned values to change color at can be extremely helpful.

If your application has a limit that you want to ensure is not exceeded, a display that can

change the color of the digits or a portion of a bar from green to red when, say, 80% of the

limit is reached makes it easy to tell at a glance if the limit is approaching or reached.

With three colors, orange can be used when approaching a limit and red when the limit is reached.

## [Mounting/cutout options?](#)

For applications with a shallow space behind the panel, some meters are designed with a short body to accommodate those situations.

If creating rectangular cutouts for a panel meter are an issue, some



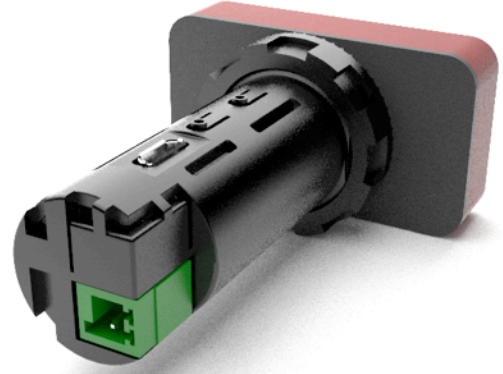
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meters have a rectangular display and face combined with a round shape behind the face. This type of meter requires only that a hole be drilled to mount it correctly.



### Number of inputs needed?

If your application has more than one signal that needs to be displayed and you would like to be able to cycle through them on one meter, multi-input meters are available. Some have four or even eight inputs and can be programmed to cycle through the inputs by pressing a button on the front of the display.



A good supplier can be of even more help, asking the right questions to get you the meter that best matches your application.