Transducer Follies

A transducer is a transmitter with a sensor attached. A sensor is a device that changes an electrical property when there is a change in some physical environmental factor, such as heat or humidity. The signal from a sensor is small. A transmitter is a circuit that modifies the small sensor signal into a large electrical signal that won't degrade with wire run length or noise.

A 4/20mA loop can represent anything. Common values are temperature, pressure, energy, flow, frequency, etc. and in any range within that measurement, such as 0 to 10, 0 to 200, etc. Nothing is more frustrating when setting up a 4/20mA loop than to not know the scaling of the transducer. This prevents one from setting up the indicators, PLCs, etc. attached to the loop so they indicate the true measured value.

The first and best solution is to inspect the transducer and research the documentation that came with it for whatever information it might provide. The model number might have some obvious pertinent information, but will certainly assist in identifying the transducer when the manufacturer is called.

Another method to use is to directly measure the reaction of the transducer to the input. This will require some equipment, so this isn't always possible. For instance, if one has a RTD simulator and a milliammeter, one can feed the transmitter with a signal until one measures a 4mA and a 20mA output and thereby learn the range.

A common problem for field installers is setting up a pump controller with a submersible transducer and they do not have the scaling of the transducer. If no other options are available, one can calculate the range of the transducer by submersing the transducer and measuring the depth of the transducer and the milliamp output at that depth. If one has either a 3620, 3019, or 3020 as the controller for the loop one can set the minimum display to 4.00 and the maximum display to 20.00 to temporarily turn it into a milliammeter. Submerse the transducer into water a measured amount of feet, and read the current through the loop. Calculate:

Span = (submersion depth)/((milliamps output at submersion depth) – 4) * 16

For example, we submerge the transducer 5 feet and read an output of 7.46mA, therefore:

Span = 5/(7.46 – 4)*16 = 5/3.46*16 = 23.1 feet

The scaling for common transducer pressure ranges are:

5PSI = 11.6', 10PSI = 23.1', 15PSI = 34.7' and 20PSI = 46.2'.

So this is obviously a 10 PSI transducer.