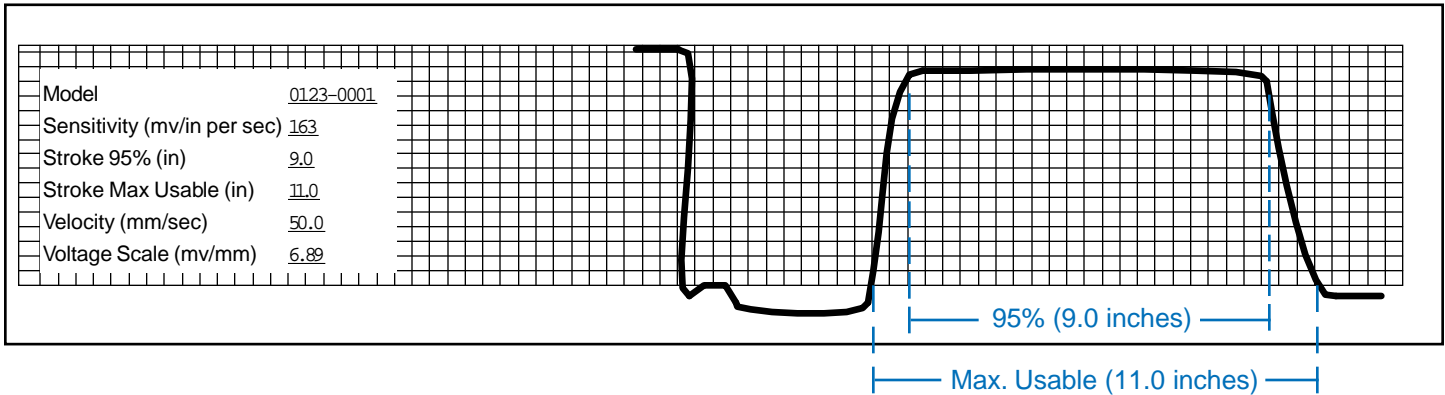


TRANS-TEKNOTE

Linear Velocity Transducer Calibration Report



The Trans-Tek Series 100 Linear Velocity Transducers produce a DC output voltage proportional to the velocity of the magnet relative to the coil. These units are designed and tested to assure that they conform to prescribed specifications. Each unit is calibrated by our QC Dept., and a strip chart recording of the results is packaged with each unit.

The items used to conduct a typical calibration are: Strip Chart Recorder, High Resolution Power Supply, Digital Volt Meter, and a proprietary Velocity Calibration Stand. The velocity stand provides a constant velocity, moving the magnet relative to the coil at 50 mm/sec. The DC output voltage generated from the transducer is recorded on a strip chart. Computation of the unit's sensitivity and conformance to accuracy requirements can be made from this data. Fixturing is provided so there is no contact between the magnet and the ID of the coils, assuring that a friction component does not alter the velocity in any way.

The strip chart recorder is initialized by applying a calculated DC voltage from a high resolution power supply. This calibration voltage is determined for each model LVT. To calculate the correct input voltage, a maximum sensitivity range must be selected. The strip chart example shown above is for model 0123-0001, whose maximum sensitivity is 175 mv/in/sec (this is a design parameter for each transducer.) Since the strip chart paper will record over a height of 50mm, a multiplication factor is generated. For model 0123-0001, the multiplication factor is:

$$"K" = (175 \text{ mv/in/sec}) / 50\text{mm} = 3.5 \text{ mv/in/sec/mm}$$

The formula for voltage input is:

$$V_{in} = (K)(\text{chart speed})(50)\text{mm}(0.0394 \text{ in/mm}).$$

The chart speed is fixed at 50 mm/sec (the same velocity at which the transducer is being tested). Solving for V_{in} yields 0.3445 VDC, which is the voltage applied to the recorder for the model 0123-0001. Since this is the maximum voltage the strip chart recorder will now record, dividing by 50mm yields the Voltage Scale value for the strip chart, which in this example is 6.89 mv/mm.

The system is automated so that once the magnet and coils are properly fixtured, a switch is engaged to start the calibration procedure. The calibration starts with the magnet outside the coils. The voltage recorded steadily increases until both poles of the magnet are within the working range of the coils. At this point, the voltage output stabilizes at the sensitivity of the transducer. In this example, the voltage output in the working range of the LVT is recorded at an average of 46.5 mm (there is some ripple shown on an actual calibration report). Since we already know the multiplication factor "K" = 3.5 mv/in/sec/mm, we can multiply this by 46.5 mm, yielding 162.75 mv/in/sec. This is rounded to the nearest whole number, in this case 163 mv/in/sec.

These transducers are specified to be accurate within 5% of the average sensitivity. As long as no point over the stabilized output exceeds 5% of the sensitivity, the unit will be accepted within the accuracy specification.