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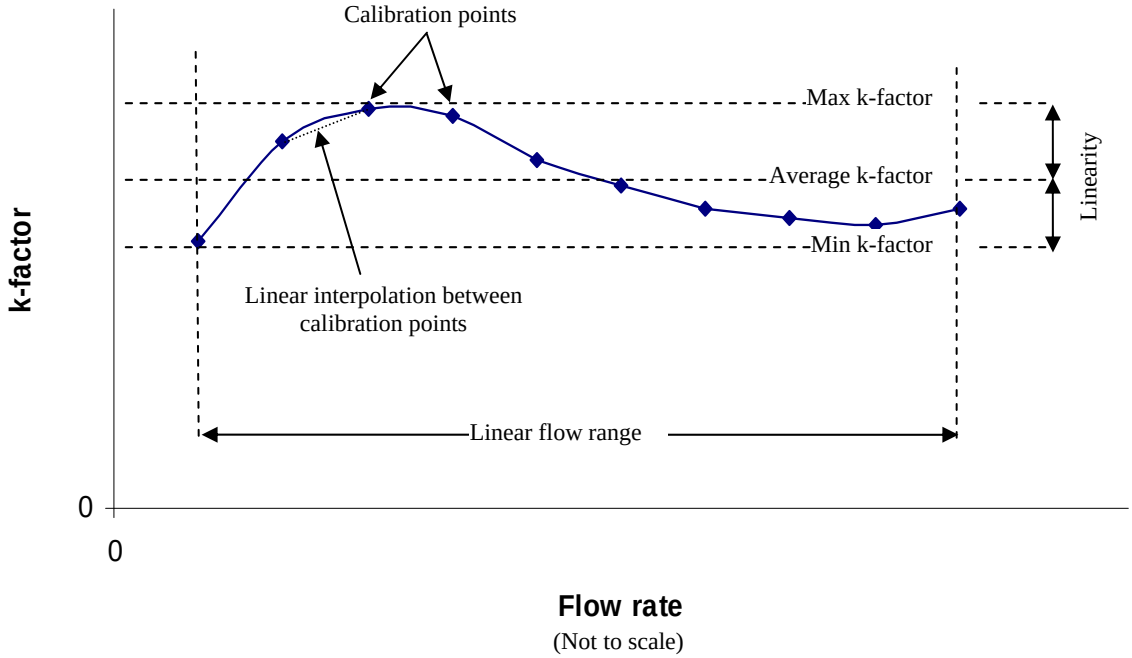
LINEARIZATION FEATURE FOR THE TURBINE FLOWMETER

A turbine flow meter is characterized by a calibration factor, commonly referred to as the k-factor. An ideal turbine flowmeter would have a k-factor perfectly constant (stable) across the entire flowmeter "linear flow range". In the real world the "perfect" flowmeter does not exist. The k-factor deviates from a "straight line" across the linear flow range. The variation of the k-factor, expressed as a percentage, is referred to as the linearity of the meter. Typical linearity for a Hoffer HO Series liquid turbine meter is +/- 0.5% or better based on a viscosity of 1 centistokes. Viscous liquids are commonly metered using turbine flowmeters with the user accepting a derated linearity specification. Typical conventional metering systems utilize an average k-factor across the linear flow range to calculate flow. This approach produces an error that is equal to the linearity of the turbine flowmeter.



An electronic technique is now available that basically eliminates the linearity error and improves the turbine flowmeter performance to be very close to the “repeatability” specification for that given series of turbine flowmeters. To take advantage of this “linearization” technique the turbine flow meter is calibrated over the desired flow range (within the repeatable flow range for that size flowmeter). A standard Hoffer calibration provides for 12 calibration test points and is traceable to NIST. The lowest and highest flow rate calibration test points are repeated to establish the repeatability for the flowmeter. The k-factors and corresponding turbine flowmeter signal frequencies are recorded during the calibration. These calibration test points, including the frequency output and the corresponding k-factors are stored into a “smart” electronics instrument. Hoffer offers a wide variety of microprocessor based electronic units that include the linearization feature. These smart electronic packages will accept the output from the turbine flowmeter and then utilize a look up table stored in the unit to correct for the non-linearity at that calibration test point. When the flowmeter frequency falls between calibration test points in the stored table, the microprocessor uses linear interpolation between the two closest calibration test points to calculate the correct k-factor. This calculation is being done continuously and is updated a number of times per second insuring the most accurate calculation of flow. The linearization technique improves the flowmeter linearity to the “repeatability” specification for that particular series of turbine flowmeters. In the case of the Hoffer HO Series of liquid turbine flowmeters, with linearization, the linearity is improved to +/-0.1% or better.