STI Vibration Monitoring Inc.

Field Application Note

Transducer Conventions

CONVENT

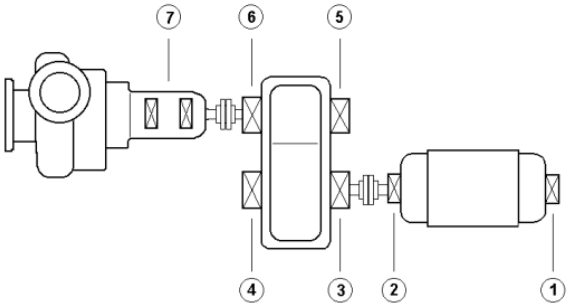
This application note provides a set of conventions to provide order and meaning to how transducers relate to their mounting and the machine.

MOTION TOWARDS

Vibration transducers measure all vibration they sense regardless of the direction of the mechanical vibration. The displayed output of a transducer will resemble a sinusoidal wave pattern, with some portion of the signal above (or on the positive side) the zero reference and some portion below (or on the negative side) the zero reference.

A common convention employed in the design and construction of all transducers is that motion towards the transducer will cause a positive signal output. This convention allows the analyst to determine how the rotor or bearing case is moving in relationship to the sensor. This information is vital when determining phase relationships between various sensors and between the rotor and its case.

BEARING NUMBER



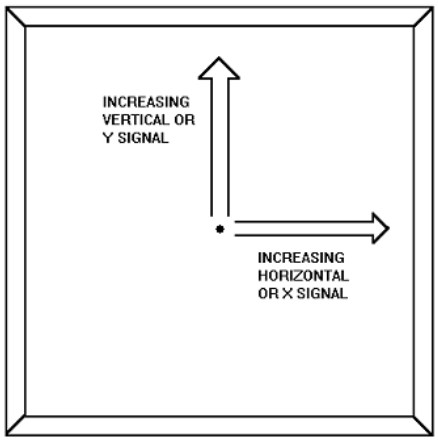
Distinguishing one bearing from another is an important consideration when installing or analyzing several bearings on a machine train. A common convention is to start numbering the bearings starting from the driver end. The choice of whether to use numbers or letters is immaterial; the sequence should increase as additional bearings are added to the diagram.

Machine trains with gear increasers may cause some confusion when the gear is considered. When numbering a gear, continue numbering the bearings along the gear shaft instead of around the gear casing.

X & Y

When two transducers are installed in a single plane, such as two Eddy Current sensors on one bearing, they have a relationship to each other, which must have a standard specification. Defining their orientation and relationship to each other requires understanding how an oscilloscope operates. The oscilloscope was the first, and still is, a basic analysis instrument.

A dual channel oscilloscope allows viewing the output signals from two different sensors simultaneously on a cathode ray tube (CRT). When the oscilloscope is in the XY, or Cartesian mode, the center of the screen represents zero output from both sensors. This operational mode is sometimes called orbit mode. As the signal from the horizontal sensor increases (in the positive direction) the dot, or trace on the display moves to the right. An increasing signal in the vertical plane causes the trace to move up on the display. Thus, following standard Cartesian notation, the positive X (horizontal) input is to the left of the positive Y (vertical) input.



Two sensors must be installed 90° from each other to measure the entire amount of vibration in two planes (vertical and horizontal).

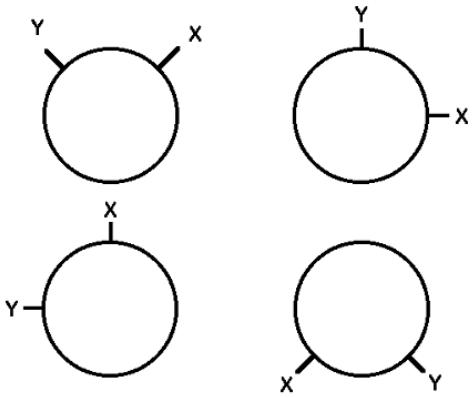
This requirement stems from the fact that each sensor is designed to measure vibration only along the sensor's axis. If the sensors are not installed at a 90° orientation, one of the sensors will be measuring some of the vibration, which is being measured by the other, which can only confuse any analysis.

STI Vibration Monitoring Inc.

Field Application Note

Transducer Conventions

CONVENT



To distinguish one sensor from the other they are labeled X and Y. Determining which is X and which is Y requires using the bearing number convention discussed earlier (viewing the sensors from the driver end) and utilizing standard oscilloscope orientation. Within the 90° orientation the X sensor is located to the left of the Y sensor when the sensors are mounted above the horizontal split line of the bearing. Should the sensors be oriented at a different location on the bearing, simply imagine the sensors located above the horizontal and follow the stated orientation convention. This convention applies regardless of shaft rotation direction.

Transducer Conventions Checklist

1. Motion Towards
2. Bearing Number
3. X & Y