

PUMP VIBRATION GUIDE

The most common factors affecting pump vibration include:

- Mechanical unbalance of rotating parts
- Mechanical unbalance from abrasive fluids wear
- Pump and driver natural frequency and resonance
- Miscellaneous mechanical problems
- Hydraulic disturbances
- Hydraulic resonance in piping
- Poor structural rigidity

Table 1 from ANSI/HI 9.6.4 can help identify possible sources of high pump vibration.



For more information on pump vibration, reference [ANSI/HI 9.6.4 Rotodynamic Pumps for Vibration Measurements and Allowable Values](#).

High Pump Vibration Source Identification			
Symptom(s)	Frequency (CPM)	Possible Cause	Comments
Radial plane vibration, proportional to unbalance and/or speed	1 × RPM	Imbalance <ul style="list-style-type: none"> • Impeller imbalance • Clogging • Weak foundation • Bad pipe support 	Common source of vibration
Vibrates at one speed only	1 × RPM	Mechanical Resonance <ul style="list-style-type: none"> • Motor imbalance • Impeller imbalance • Pump design • Weak foundation • Bad pipe support 	Confirm by bump test Natural frequency at run speed
	N × RPM		Confirm by bump test Natural frequency at blade-pass frequency N = Blade-pass frequency
	N × RPM	Acoustic Resonance	Confirm by waveform testing N = Blade-pass frequency
	N × RPM	Acoustic Resonance	Use pressure transducers to measure fluid pressure pulsations in the piping N = Blade-pass frequency
Axial vibration is greater than 50% of radial vibration levels	1 × RPM V × RPM	Vortexing Intake	Observe intake flow for stability V = number of impeller vanes
	1 × RPM 2 × RPM	Coupling Misalignment Bent Shaft	Confirm with dial indicators to document shaft runout
Erratic vibration	High > 6 × RPM	Bad Antifriction Bearings	Use velocity to measure Listen at bearing housings
Vibration stops instant power is shut off	1 × RPM 1 or 2 × Synch speed	Electrical	Bad motor, power source, or variable-frequency drive

Source: Hydraulics Institute Pump FAQs:

What factors cause excess pump vibration, and how can the specific cause be identified?