High Process Noise

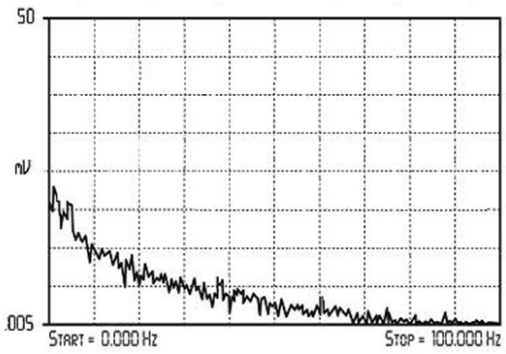
The High Process Noise diagnostic detects if there is a process condition causing unstable or noisy readings, but the noise is not real flow variation. One common cause of high process noise is slurry flow, like pulp stock or mining slurries. Other conditions that cause this diagnostic to activate are high levels of chemical reaction or entrained gas in the liquid. If unusual noise or variation is seen, this diagnostic will activate and deliver a PlantWeb alert. If this situation exists and is left without remedy, it will add additional uncertainty and noise to the flow reading.

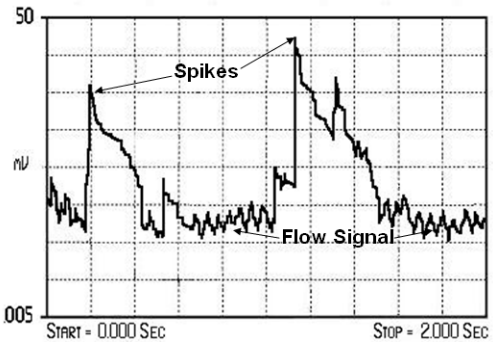
High Process Noise Functionality

The High Process Noise diagnostic is useful for detecting situations where the process fluid may be causing electrical noise resulting in a poor measurement from the magnetic flow meter. There are three basic types of process noise that can affect the performance of the magnetic flowmeter system.

1/f Noise

This type of noise has higher amplitudes at lower frequencies, but generally degrades over increasing frequencies. Potential sources of 1/f noise include chemical mixing and the general background noise of the plant.



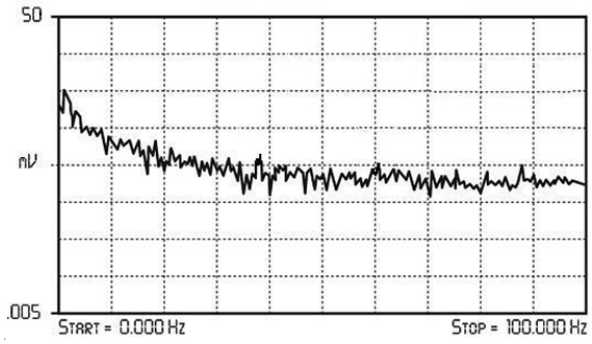


Spike Noise

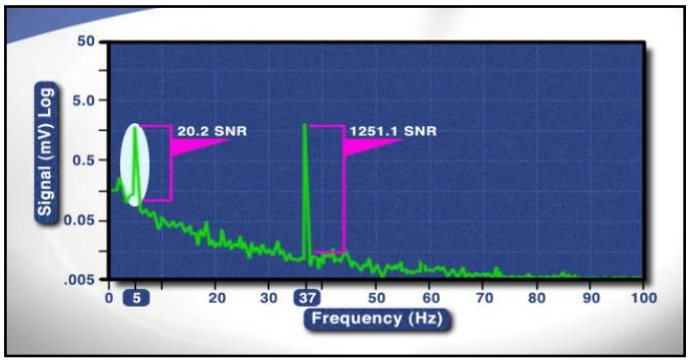
This type of noise generally results in a high amplitude signal at specific frequencies which can vary depending on the source of the noise. Common sources of spike noise include chemical injections directly upstream of the flowmeter, hydraulic pumps, and slurry flows with low concentrations of particles in the stream. The particles bounce off of the electrode generating a "spike" in the electrode signal. An example of this type of flow stream would be a recycle flow in a paper mill.

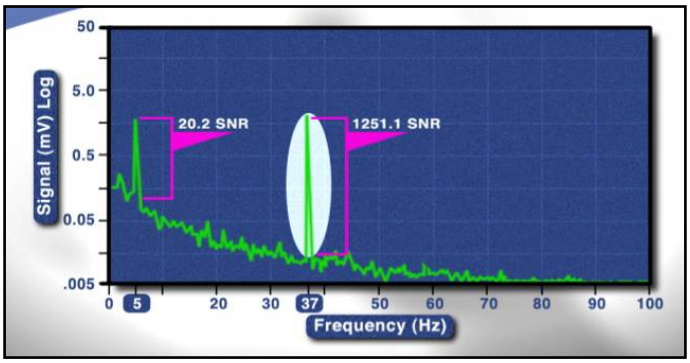
White Noise

This type of noise results in a high amplitude signal that is relatively constant over the frequency range. Common sources of white noise include chemical reactions or mixing that occurs as the fluid passes through the flowmeter and high concentration slurry flows where the particulates are constantly passing over the electrode head. An example of this type of flow stream would be a basis weight stream in a paper mill.



The transmitter continuously monitors signal amplitudes over a wide range of frequencies. For the high process noise diagnostic, the transmitter specifically looks at the signal amplitude at frequencies of 2.5 Hz, 7.5 Hz, 32.5 Hz, and 42.5 Hz. The transmitter uses the values from 2.5 and 7.5 Hz and calculates an average noise level. This average is compared to the amplitude of the signal at 5 Hz. If the signal amplitude is not 25 times greater than the noise level, and the coil drive frequency is set at 5 Hz, the High Process Noise diagnostic will activate indicating that the flow signal may be compromised. The transmitter performs the same analysis around the 37.5 Hz coil drive frequency using the 32.5 Hz and 42.5 Hz values to establish a noise level.





Enabling the High Process Noise Diagnostic

The High Process Noise diagnostic can be turned on or off using AMS Suite: Intelligent Device Manager, a 375 Field Communicator, or the Local Operator Interface (LOI) as required by the application. If the advanced diagnostics suite 1 (DA1 Option) was ordered, then the High Process Noise diagnostic will be turned on. If DA1 was not ordered or licensed, this diagnostic is not available.

Understanding the High Process Noise Parameters

The High Process Noise diagnostic has two read-only parameters. It does not have any configurable parameters. This diagnostic requires that flow be present in the pipe.

5 Hz Signal to Noise Ratio
This is the current value of the signal to noise ratio at the coil drive frequency of 5 Hz. This is a read-only value. This number is a measure of the signal strength at 5 Hz relative to the amount of process noise present. If the transmitter is operating in 5 Hz mode, and the signal to noise ratio at 5 Hz remains below 25 for one minute, then the High Process Noise diagnostic alert will activate.

37 Hz Signal to Noise Ratio
This is the current value of the signal to noise ratio at the coil drive frequency of 37 Hz. This is a read-only value. This number is a measure of the signal strength at 37 Hz relative to the amount of process noise present. If the transmitter is operating in 37 Hz mode, and the signal to noise ratio at 37 Hz remains below 25 for one minute, then the High Process Noise diagnostic alert will activate.

Troubleshooting the High Process Noise Diagnostic

The following procedures can be used in the event that the transmitter detects high levels of process noise.

If the High Process Noise diagnostic activates while operating in 5 Hz mode, proceed with the following steps:

1. Increase transmitter coil drive frequency to 37 Hz and, if possible, perform an Auto Zero (for details on changing the coil drive frequency or performing an Auto Zero, consult the installation manual).

2. Verify flowtube is electrically connected to the process with grounding electrode, grounding rings with grounding straps, or lining protector with grounding straps.

3. If possible, redirect chemical additions downstream of the magmeter.

4. Verify process fluid conductivity is above 10 microsiemens/cm.

If the signal to noise ratio is less than 25 while operating in 37 Hz mode, proceed with the following steps:

1. Turn on the Digital Signal Processing (DSP) technology and follow the setup procedure (refer to the installation manual for more details). This will minimize the

level of damping in the flow measurement and control loop while also stabilizing the reading to minimize valve actuation.

2. Increase damping to stabilize the signal (refer to the installation manual for details). This will add dead-time to the control loop.

NOTE
Activating the DSP or increasing the damping may stabilize the flow signal, but will not clear the High Process Noise diagnostic message. To clear the diagnostic message, the High Process Noise diagnostic will need to be disabled.

3. Move to a Rosemount High-Signal flowmeter system. This flowmeter will deliver a stable signal by increasing the amplitude of the flow signal by up to ten times to increase the signal to noise ratio. For example if the signal to noise ratio (SNR) of a standard magmeter is 5, the High-Signal would have a SNR of 50 in the same application. The Rosemount High-Signal system is comprised of the 8707 flowtube sensor which has modified coils and magnetics and the 8712H High-Signal transmitter.

NOTE
In applications where very high levels of noise are a concern, it is recommended that a dual-calibrated Rosemount High-Signal 8707 flowtube sensor be used. These flowtube sensors can be calibrated to run at lower coil drive current supplied by the standard Rosemount transmitters, but can also be upgraded by changing to the 8712H High-Signal transmitter.

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