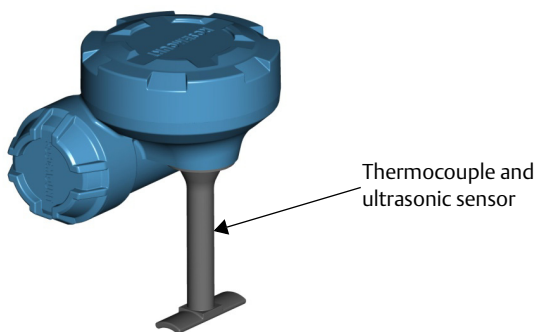


Rosemount 708 Wireless Acoustic Transmitter

Theory of Operation

The Rosemount 708 Wireless Acoustic Transmitter is designed for use in numerous applications including pressure relief valve monitoring and steam trap monitoring. This document will outline the theory of operation for the transmitter.

The Rosemount 708 Wireless Acoustic Transmitter is a WirelessHART[®], battery powered transmitter. The transmitter is a multi-variable device with two sensors: a thermocouple and an ultrasonic sensor.



The “foot” of the transmitter is designed to be clamped onto a pipe, within 6 inches (15.24 cm) of the steam trap or pressure relief valve to be monitored. The foot should be in direct contact with the piping, underneath any insulation, but perfect contact is not required.

The temperature measured is the skin temperature of the pipe. This measurement is not required for pressure relief valve monitoring.

The ultrasonic sensor has peak sensitivity in the range of 35 to 45 KHz, usually associated with the “acoustic” range. The sensor is factory calibrated using an electronic noise generator to ensure predictable and repeatable sensitivity over a range of frequencies and amplitudes. The Rosemount 708 publishes a count which is a relative measure of the amplitude of the average signal across the spectrum. No additional signal processing is done by the Rosemount 708 to analyze or identify the spectral content of the input signal. Therefore, applications requiring identification of a certain signal for resonance frequencies are not currently possible with the Rosemount 708 transmitter. During the commissioning of the Rosemount 708 transmitter with AMS Device Manager or AMS Wireless Configurator, a method is run with the Rosemount 708 transmitter when it is installed. This method measures and automatically sets the background noise level (in counts) of the application. Warnings are given during this method if the application is too noisy (often a failed trap or venting valve) or too quiet to establish logical thresholds for alerting. In these cases, users can manually set alerting threshold levels after verifying that the application is in a normal state. It is not necessary for the user to configure Rosemount 708 alert levels when the SteamLogic software is used to monitor steam trap state. The SteamLogic software calculates alerting thresholds using information about steam parameters and trap type supplied by the user. For pressure relief valve applications, an alert can be set (typically 3x the “normal” count level) to indicate a vent state. This can be modified by the user.

The steam trap state is calculated using patented algorithms in the SteamLogic software supplied with every unit. The trap state is determined using the temperature and counts, as well as the line pressure and trap type as configured by the user in the software. The SteamLogic software can identify 3 steam trap states: good, cold, and blow through. In general, a cold trap state is detected when the 708 reports a waveguide (pipe) temperature below a threshold value calculated from the steam parameters

Rosemount 708 Wireless

provided by the user in SteamLogic. A blow through trap state is detected when the 708 reports an ultrasonic value above a threshold value calculated from the steam parameters and trap type provided by the user in SteamLogic. It should be noted that as steam traps regularly operate to release condensate, the noise level will momentarily change. The SteamLogic software assures that the user will not have false positives caused by ultrasonic level spikes related to normal trap operation. As shown in the figures below, the change in counts from a “low” to a

“high” level is dramatically different for a “good” and “bad” trap. The exact requirements per trap type and conditions are embedded in the SteamLogic software’s algorithms. The SteamLogic software and Rosemount 708 wireless acoustic transmitter work with the following steam trap types: Bi Metal, Disk, F&T, Inverted Bucket, Thermostatic, and Orifice. The SteamLogic software and Rosemount 708 transmitter can work with steam traps from any manufacturer.

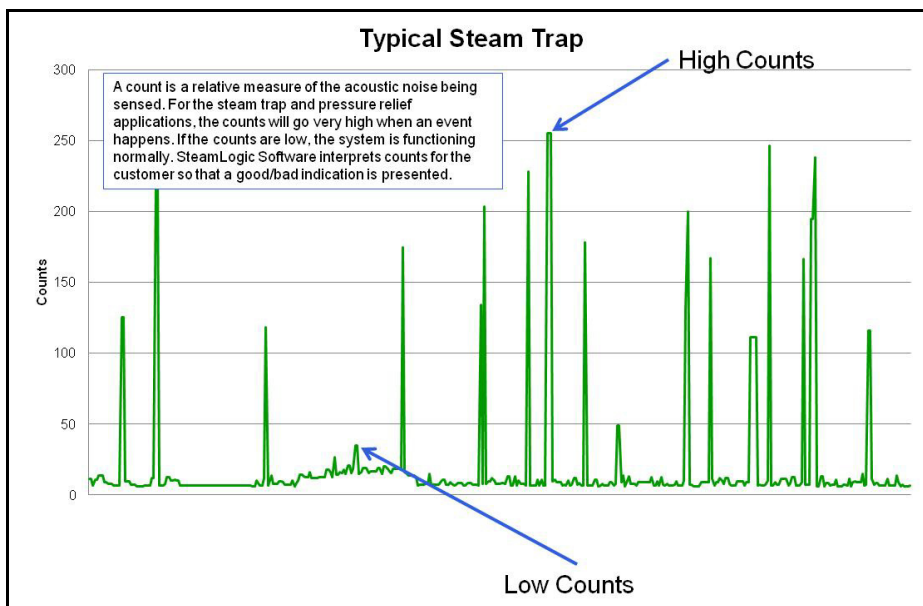


Figure 1: Typical Steam Trap Acoustic Reading

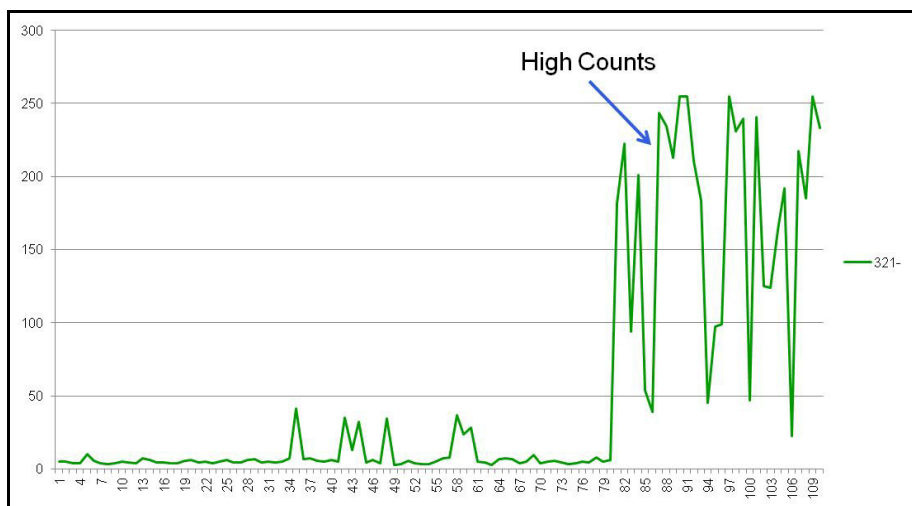


Figure 2: A “Bad” Steam Trap Will Have High Counts

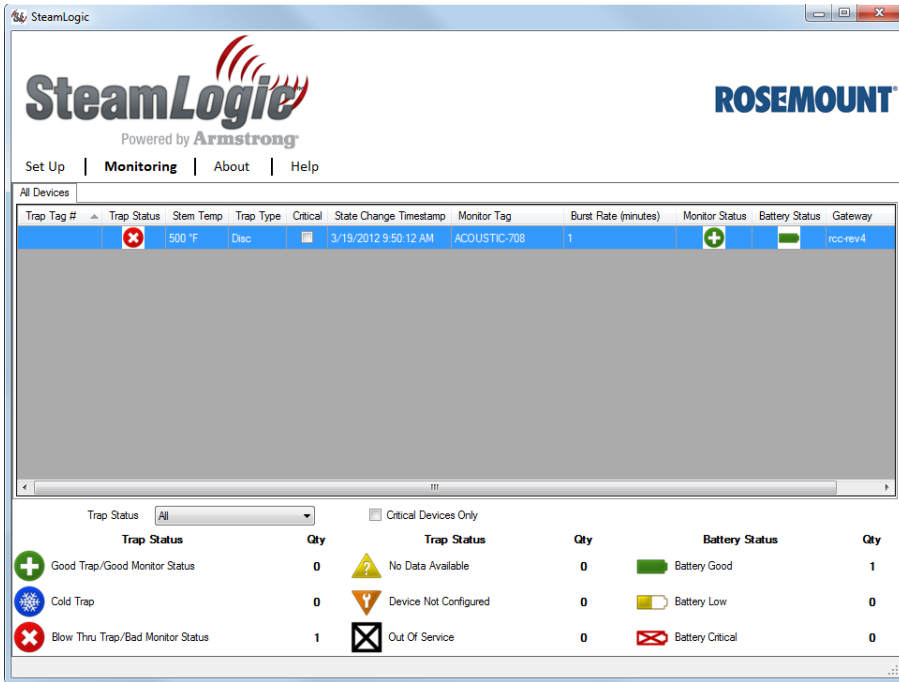


Figure 3: “Blow Thru” Steam Trap in SteamLogic

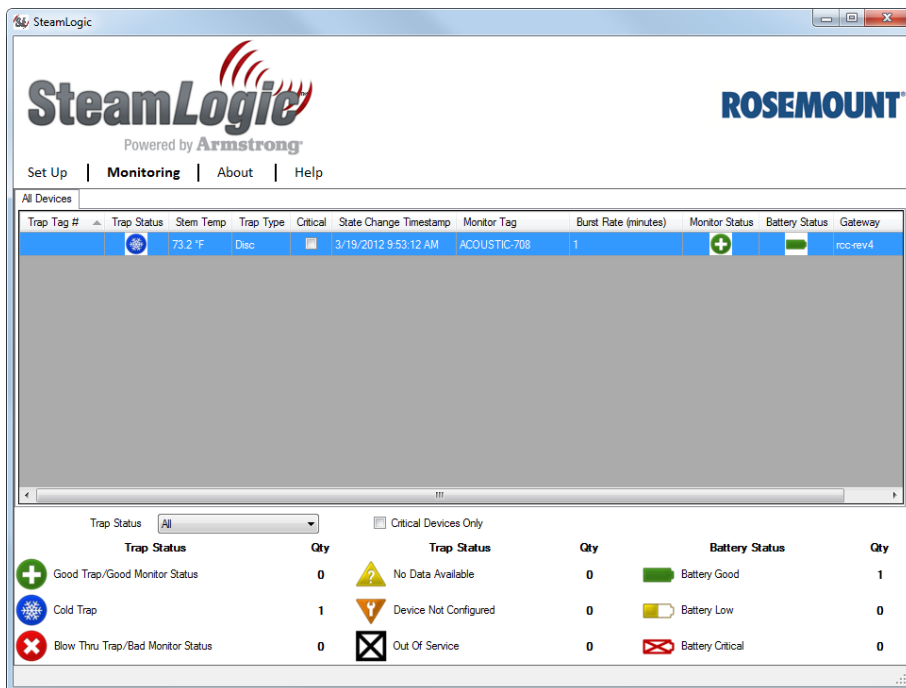


Figure 4: “Cold” Steam Trap in SteamLogic

Rosemount 708 Wireless

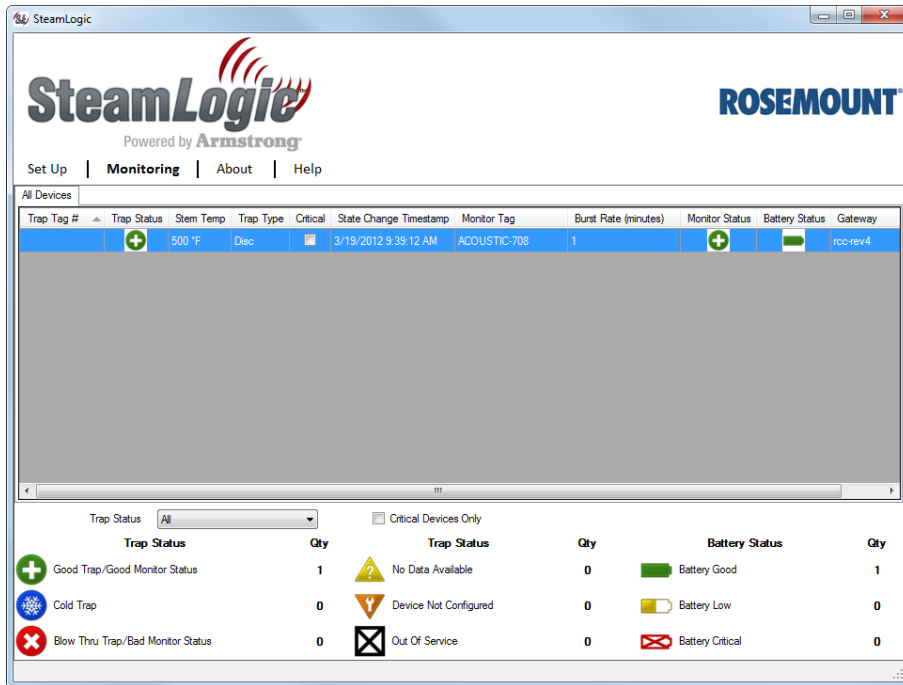


Figure 5: "Good" Steam Trap in SteamLogic

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