ULTRASONIC INTELLIGENT SENSORS

ClampOn DSP Particle Monitor

DIGITAL SIGNAL PROCESSING

CLAMPON®
ULTRASONIC INTELLIGENT SENSORS

ClampOn DSP Particle Monitor.

ADVANTAGES

- **Fast non-intrusive installation**
- **Real time measurement**
- **High sensitivity**
- **Noise cancelling**

BACKGROUND

All factory owners or operators want to operate their plant as efficiently and profitably as possible. An oil or gas well can be regarded as a factory, and the ClampOn DSP Particle Monitor gives operators the best tool for maximizing profits, by means of controlling and minimizing the production of sand.
Sand production in oil and gas wells is a serious issue for oil and gas producers. The challenge is not merely to avoid sand production, but also to optimize well productivity, as even small quantities of particles in the well flow can cause significant damage.

ClampOn's instruments are in operation on thousands of wells every day, and the company is the world's largest supplier of sand monitoring systems.
The ClampOn DSP Particle Monitor is the answer for operators who want to keep their wells producing safely at the highest level possible; i.e. anyone who needs a quantitative, real-time and accurate measure of produced sand particles.

CLAMPON DSP PARTICLE MONITOR IS USED FOR

- Finding maximum sand free production rate
- Establishing maximum acceptable sand rate
- Well optimization
- Well testing
- Sand Management

OPERATING PRINCIPLE

The unique, patented ClampOn DSP Particle Monitor provides operators focusing on sand management and corrosion-erosion issues with even more accurate information than previously available. The ClampOn DSP Particle Monitor measures sand/particles through passive ultrasonic technology; it detects the ultrasonic signal that is generated by particles impacting on the inside of the pipe wall, just after the bend where the sensor is located. The instrument has onboard Digital Signal Processing (DSP) for analyzing of the data picked up by the instrument. Measurement is done in real time and results are continuously displayed on the control PC/system, giving the operator immediate and reliable data when a well starts producing sand.
The Particle Monitor offers

- Latest generation DSP
- Extreme sensitivity
- Near perfect noise filtration

INSTALLATION

The ClampOn DSP Particle Monitor is easy to install and operate. It's non-intrusive design and clever clamp-on fixtures makes it an effortless job to install, both at yard and in the field for retrofit systems. Installation point is downstream of a bend/elbow, where the turbulent flow profile is fully developed, enabling users to measure even the smallest amount of fine particles, without the requirement for an in situ calibration. This produces a dramatic reduction in field calibration costs.

Signal is transferred in real time to a PC with ClampOn Sand Monitor software, or directly to the operators control system. Once a ClampOn system is installed, it requires very little maintenance. It's all about taking value from the data and information it provides!

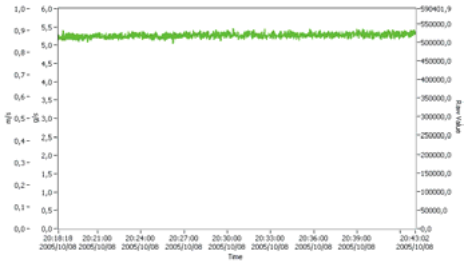


Figure. 1. The signal from the sensor experienced on a high flow rate – high pressure gas well using a traditional/alternative sensor without DSP filtering technology.

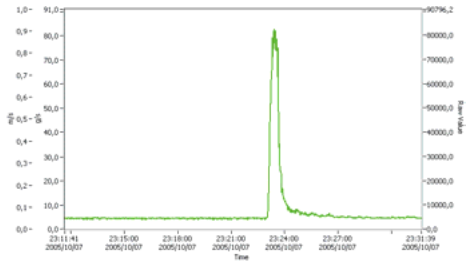
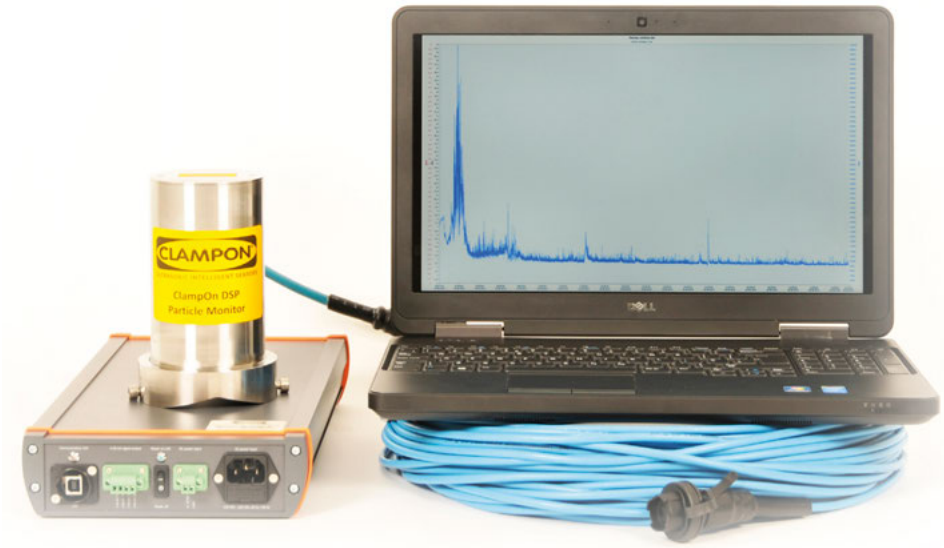


Figure 2. Sensor signal experienced on the same well, now with the new ClampOn DSP filter. This shows how the sensor has completely removed the flow noise, allowing the operator to monitor the true nature of the sand being produced.



ClampOn DSP Particle Monitor.

KEY SPECIFICATIONS

• Method of operation:	Passive acoustics (ultrasonic)
• Processing:	Intelligent DSP electronics inside sensor unit
• Method of installation:	Non-intrusive, clamped to pipe surface
• Minimum particle size*:	Oil/water: 25 microns/1PPM Air/gas: 15 microns/1 PPM
• Minimum sand rate*:	0.01 g/s
• Minimum flow velocity*:	0.5 m/s
• Uncertainty*:	±5% (with calibration by means of sand injections)
• Repeatability:	Better than 1%
• Interface options:	RS485 (ASCII, binary, ModBus RTU), 4-20mA
• Two-way communication:	Yes
• Software upgrading:	Yes
• Pipe surface temperature:	-40 °C to 125 °C [-40 °F to 257 °F] * *
• Flow regimes	Oil, gas, water, multiphase
• Diagnostic features:	Intelligent "health check"
• Ingress protection:	IP66/IP68
• Housing material:	Stainless Steel 316L
• Ex approval:	Ex ia, Ex d
• Dimensions/Weight:	Ex ia: ø80 mm x 144 mm [ø3,1" x 5,7"] / 2kg [4,4 lb] Ex d: ø112 mm x 132 mm [ø4,4" x 5,2"] / 4 kg [8,8 lb]
• Power Consumption:	Max 1.6 Watt per sensor

** Depending on flow conditions*
*** Depending configuration/certification*

All specifications are subject to change without notice

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