PulseEight Intelligent Safety Valve

The PulseEight Intelligent Safety Valve (ISV), tested to API 14A V2, offers a simple retrofit solution to safely restore production or injection in wells with a failure in existing downhole safety valves.

The Intelligent Safety Valve is a retrofittable system that can be deployed into the well via conventional intervention methodologies. It is mounted to a lock mandrel, packer or retrievable bridge plug, via a simple threaded crossover this provides flexibility in terms of setting method, but also setting depth.

Self-contained and self-powered, the ISV does not require any mechanical interface with other surface systems to function. Unlike conventional safety valve systems, the ISV is designed to send a wireless signal to surface at 24-hour intervals, confirming continued operation without the need of a function test. This Vitality Pulse utilises a subset of TAQA's Fluid Harmonics wireless telemetry system which can be monitored on existing SCADA systems or tied into TAQA's many onsite or virtual monitoring system options. Additionally, the vitality pulse can provide details on remaining battery life providing clear indications, in advance, of impending power depletion such that an intervention can be scheduled to keep the well producing for as long as possible. Where a battery change-out has not been able to be conducted, the tool will function closed when the battery depletion exceeds a minimum energy threshold, thus leaving the well in a safe condition until an intervention can be scheduled. This forms one part of a multiple fail close capabilities with the failure of other components such as the quartz pressure sensors causing the tool to close. Each closure event is coupled with a unique fluid harmonics signal to surface that will indicate the reason.

The PulseEight ISV uses a pressure monitoring system and electric motor to autonomously actuate the valve based on safety critical events or designed for predetermined Fluid Harmonics surface pressure routine. This truly versatile valve can operate in both production and injection wells giving many further options for wells which may be produced cyclically.

Designed to be unaffected by normal fluctuations in production the ISV is constantly monitoring the flowing pressure regime of the well and is awaiting a rate of change that is characteristic of a loss of surface containment. These rapid pressure drops trigger the valve to close, isolating flow from below. Similarly, pressure events associated with emergency shutdowns will also result in valve closure.

Features

- Slickline deployed
- Compatible with most lock mandrels and plugs
- Max 7,500psi differential rating
- Daily Vitality Pulse

Benefits

- Quick installation
- Restores production without workover
- No mechanical surface interface required
- Injection or production compatible
- Differential reopening capability

Re-opening the valve couldn't be simpler; a staged application, or removal, of pressure above the tool will cause the ISV to reopen. The number, amplitude and duration of each stage is individually configurable and is designed to create sufficient complexity to prevent accidental address but also sufficient simplicity to allow production to be restarted quickly. The ability to reopen with up to 1,500psi differential across the valve offers considerably more flexibility by removing the need to apply high surface pressures to rebalance across a closed valve.

Technical Specification

ISV Name	3 1/2″
OD	2.50″
ISV Length (3 batteries)	29.40ft
Max rate	10,000bbls/day
Body pressure	10,000psi
Static seal rating	7,500psi from below
Unloading rating	1,500psi
Service temp	110°C/230°F

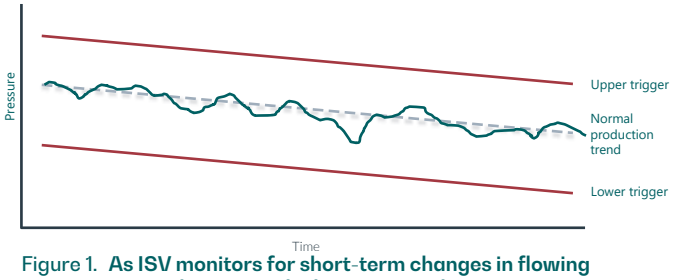

Figure 1. **As ISV monitors for short-term changes in flowing pressure, normal pressure decline is ignored**

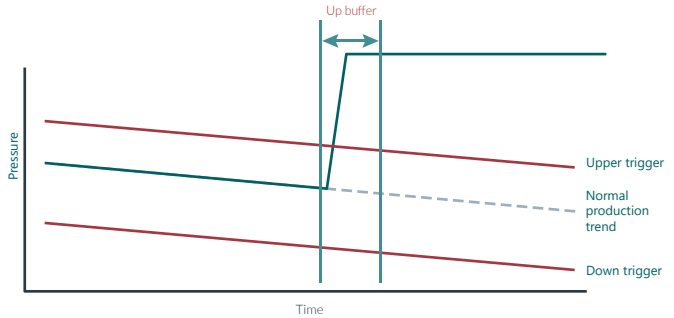

Figure 2. **Rapid pressure increases within the upper time buffer (such as ESD events) will cause the tool to close**

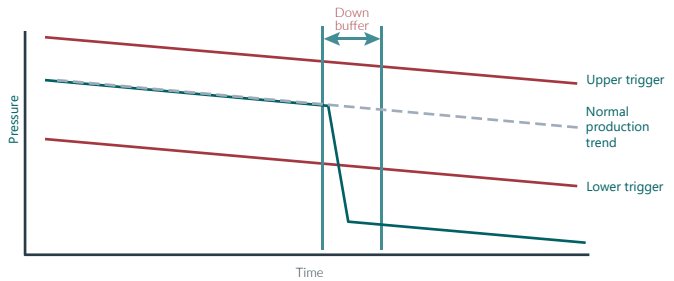

Figure 3. **Rapid pressure decreases within the lower time buffer (such as loss of surface containment events) will cause the tool to close**

PulseEight ISV is constantly monitoring flowing pressures and is engineered to ignore long-term production trends or sporadic peaks and troughs of normal production. This results in the trigger values always trending with the current flowing conditions. This prevents inadvertent actioning of the valve through everyday use, but ensures it will function closed when required. (See figure 1)

The time-based pressure changes, both up and down, allow the tool to recognise characteristics of loss of containment and emergency shutdown events. If the trigger threshold is exceeded in a rapid time frame, regardless of whether the entire buffer period has elapsed, the tool will start closing ensuring the flow is controlled in a suitable time frame. (See figures 2 and 3)