

Application Note: Sasquatch Installation and Integration Best Practices

June 16, 2017

Background

Sasquatch Plunger Velocity sensor is the next generation of plunger arrival sensors. Sasquatch senses the plunger arrival like the Cyclops Plunger Arrival sensor and also measures surface velocity. This Application Note suggest best practices when installing Sasquatch and integrating with wellsite controls.

Installation

Lubricator Spring

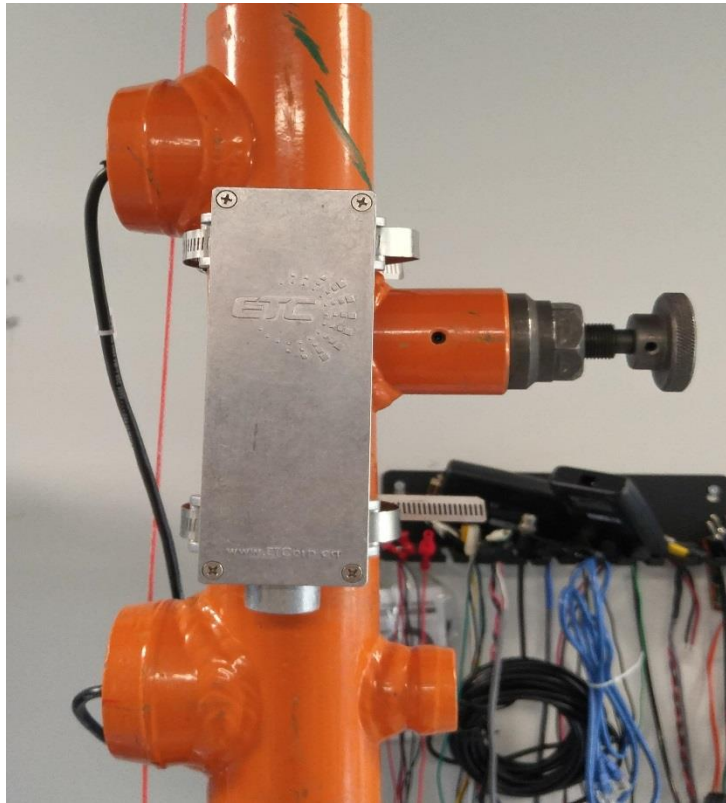
Install Sasquatch so the plunger completely travels past the sensor before striking the spring

Sasquatch uses two magnetic sensing elements to watch the plunger arrival. The plunger must travel completely past both elements to measure velocity.

Lubricator Ports

Install Sasquatch so it is centered on lubricator ports or Auto-catch

Lubricator ports can alter the magnetic waveform as a plunger arrives. Position Sasquatch so it is evenly spaced around lubricator ports. In the picture below Sasquatch is located between the two lubricator ports and centered on the manual catch.

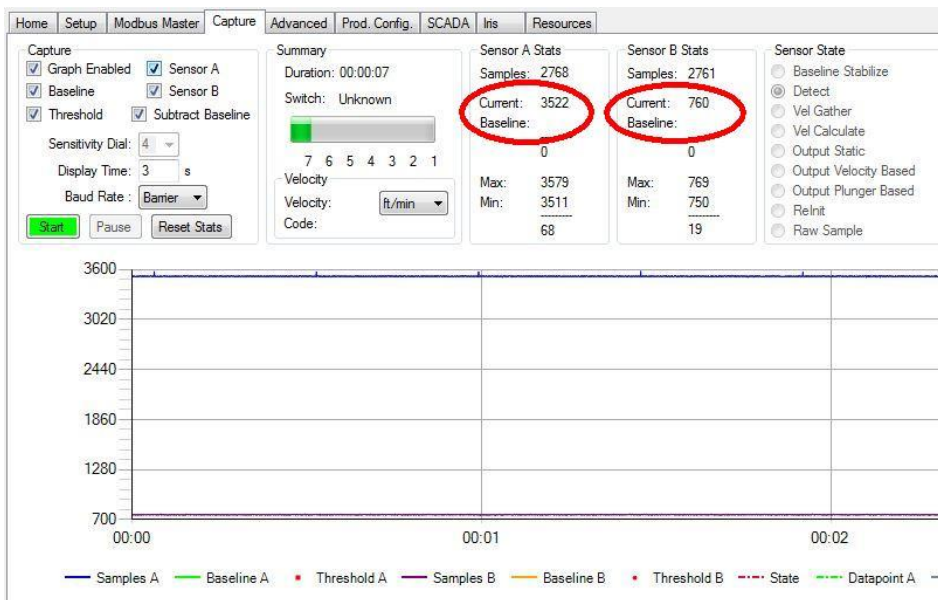


Dial Setting

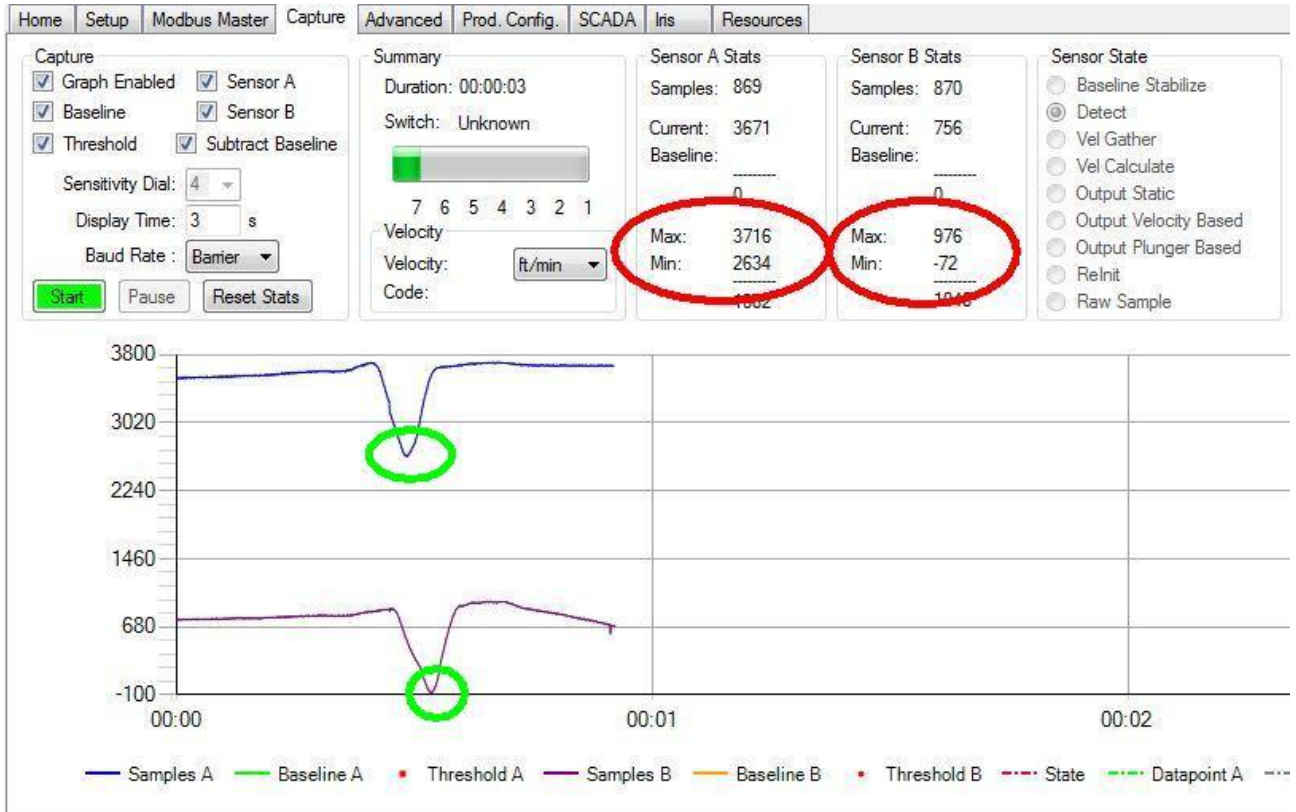
Set Dial Setting to be 25% to 33% of the signal deflection on arrival

Note: Set Sasquatch to Normal mode after following the procedure below.

1. Connect Link to Sasquatch
2. Set Sasquatch so it is in **Raw Samples** mode
3. Note the Current value for each sensor from Vision. This is each sensing element's baseline



4. Bring the Plunger up to surface
5. Stop the capture after the plunger arrives. Note the Maximum and Minimum values for each sensor



Each plunger type has a different magnetic waveform but the biggest change from the baseline is when the plunger passes each magnetic sensing element. Sometimes the Maximum value is the point of maximum deflection. For this plunger the Minimum value denotes this point.

Plunger Deflection = Baseline – Minimum OR Maximum – Baseline

Threshold setting ~25%-33% of Plunger Deflection

For the plunger above:

Plunger Deflection (Sensor B) = 760 – (-72) = 830

Threshold setting ~ 208 (25% of 830)

Dial Setting 4

The following table shows each dial setting on the sensor and the equivalent threshold.

Dial Setting	Threshold
1	1600
2	800
3	400
4	200
5	100
6	50
7	25

Controller Integration

Sasquatch is configured by default to always watch for the plunger. It will record plunger arrivals, bouncing plungers and plunger drops. If the user is only interested in measure and logging the plunger velocity on arrival there are several methods available to configure Sasquatch. The following options are different methods when integrating Sasquatch to only record the plunger arrival.

Option 1 – Power Sensor during Rise

The sensor can be powered up just before plunger is brought to surface (valve is opened) and can be powered down after the plunger velocity has been read from the sensor. This is the default behavior for ETC's plunger lift controllers.

The drawback to this option is the timestamps in the velocity log on the sensor will not be valid.

Option 2 – Use Start detect and Stop detect coils

The sensor has two Modbus coils that can start and stop (pause) the plunger detection.

The controller should write the Start coil just before the plunger is brought to the surface. After the plunger has arrived at surface and the velocity has been retrieved from Sasquatch the Stop coil should be written.

The advantage of Option 2 over Option 1 is that Sasquatch will retain the current time (used for logs) between plunger cycles.

Register	Description	Read	Write
0:0011	Start Plunger Detection	N/A	1 – Start detection
0:0012	Stop Plunger Detection	N/A	1 – Stop detection

Option 3 –Reinitialize Timer

If the control system does not have the logic to start and stop the sensor using Options 1 and 2 then the sensor can be configured to not look for the plunger for a set amount of time. The Re-initialize timer (which is programmed in seconds) will start after the plunger arrives. The timer should be set so it expires after the plunger drops.

Register	Description	Read/Write
4:0047	Re-initialize Timer	1 – 65,535 s default = 1 s

The disadvantage of this option is that if the sales (afterflow) time varies widely from plunger cycle to cycle then there is a chance the sensor will not be ready to detect the next plunger arrival.