Application Note

Sentinel and Scout Battery Life Estimates

OVERVIEW

The Sentinel and Scout wireless nodes contain an intrinsically safe battery pack. The battery pack contains lithium thionyl chloride batteries along with IS protection circuits, including a fuse. Care must be taken as to never short the battery output or the internal protection fuse will blow. These batteries have high power density along with extended temperature range operation.

Two main parameters factor into the battery life of a Sentinel, the check-in interval and the sensor on time. The vast majority of the battery capacity goes to power the attached sensor, so it is important to minimize the sensor on time (warm up time) and use as long an update interval as practical for the application.

Applications requiring rapid updates rates or long sensor on times are often best served with a Sentinel solar system.
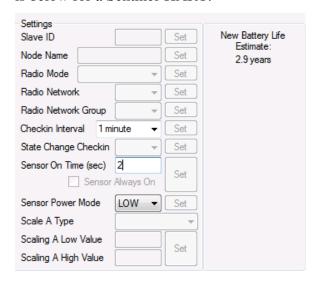
BATTERY DISCHARGE/ALARM THRESHOLD

The Sentinel and Scout batteries exhibit a flat discharge curve, with a sharp fall off at the end of their life. This behavior requires careful monitoring of the battery voltage to determine when a battery is nearing end of life. Typically, a battery alarm threshold of 3.1V-3.0V is recommended. The low battery alarm register reported by the nodes has a threshold of 3.0V. For critical measurements a regular battery replacement schedule as preventive maintenance is recommended. The Sentinel and Scout report their battery voltage (which it measures with sensor powered) at each check-in interval.

BATTERY LIFE ESTIMATE CALCULATOR

The SignalFire ToolKit provides a battery life estimator, which will update whenever an operational parameter is changed. The Toolkit battery life estimator may also be used "offline" when not connected to a Sentinel/Scout. To use the battery life estimator, select the appropriate device type window, and select the Check-in internal, Sensor On time, and Sensor power mode. The calculated estimated battery life is displayed. An example is below for a Sentinel-HART.

The Sentinel-Analog also requires an average sensor current value is entered as the current is viriable. For example a 4-20mA sensor systems battery will last much longer if the average sensor current is close to 4mA during its lifetime verses sitting close to 20mA.

BATTERY LIFE ESTIMATES FOR TYPICAL CONFIGURATIONS

Using the SignalFire ToolKit battery life calculator the tables on page 3 were calculated for various check-in intervals and sensor on times. These are only estimates as other factors can effect battery life, however we have found that these estimates are often conservative verses real installations.

The calculated values are in years of battery life.

Sentinel-HART Low sensor power (12.5V)

Sensor On Time (sec)	Check-in Interval								
		5 sec	15 sec	1 min	2 min	4.5 min	10 min	15 min	30 min	60 min
	2	0.3	0.8	2.9	5.5	10+	10+	10+	10+	10+
	5	0.3	0.5	1.7	3.3	7.0	10+	10+	10+	10+
	30	0.2	0.3	0.5	0.9	1.8	3.6	5.2	9.7	10+
	45	0.2	0.2	0.4	0.7	1.3	2.5	3.7	6.9	10+
	60	0.2	0.2	0.4	0.5	1.0	2.0	2.9	5.4	10+

Sentinel-HART High sensor power (18.5V)

Sensor On Time (sec)	Check-in Interval								
		5 sec	15 sec	1 min	2 min	4.5 min	10 min	15 min	30 min	60 min
	2	0.3	0.7	2.4	4.6	9.7	10+	10+	10+	10+
	5	0.2	0.4	1.4	2.6	5.6	10+	10+	10+	10+
	30	0.2	0.2	0.4	0.7	1.3	2.8	4.0	7.6	10+
	45	0.2	0.2	0.3	0.5	1.0	1.9	2.8	5.3	10+
	60	0.2	0.2	0.3	0.4	0.8	1.5	2.2	4.1	10+

Sentinel-Digital

	5 sec	15 sec	1 min	2 min	4.5 min	10 min	15 min	30 min	60 min
	1.8	5.1	10+	10+	10+	10+	10+	10+	10+

Check-in Interval (header above Sentinel-Digital columns)

Sentinel-Analog 4-20mA (assuming 12mA average sensor current)

Sensor On Time (sec)	Check-in Interval								
		5 sec	15 sec	1 min	2 min	4.5 min	10 min	15 min	30 min	60 min
	0.1	0.2	0.7	2.8	5.5	10+	10+	10+	10+	10+
	1	0.2	0.4	1.6	3.0	6.6	10+	10+	10+	10+
	2	0.2	0.3	1.1	2.1	4.5	9.3	10+	10+	10+
	5	0.2	0.2	0.6	1.1	2.3	4.9	7.1	10+	10+
	10	0.2	0.2	0.3	0.6	1.3	2.8	4.1	7.7	10+

Sentinel-Analog 1-5V (3.5mA sensor current) Low Sensor power (12.5V)

Sensor On Time (sec)	Check-in Interval								
		5 sec	15 sec	1 min	2 min	4.5 min	10 min	15 min	30 min	60 min
	0.1	0.5	1.5	5.5	10+	10+	10+	10+	10+	10+
	1	0.4	1.1	4.1	7.8	10+	10+	10+	10+	10+
	2	0.4	0.9	3.2	6.1	10+	10+	10+	10+	10+
	5	0.3	0.6	2.0	3.7	7.8	10+	7.1	10+	10+
	10	0.3	0.5	1.3	2.3	4.8	9.9	4.1	7.7	10+

PRESSURE SCOUT

Pressure Scout

Sensor Sample Interval (seconds)	Check-in Interval								
		5 sec	15 sec	1 min	2 min	5min	10 min	15 min	30 min	60 min
	5	0.9	2.0	5.0	5.7	6.6	8.3	8.3	8.3	8.3
	15	N/A	2.4	6.9	8.4	10+	10+	10+	10+	10+

For the Pressure-Scout, a check-in interval of 1-minute without alarm sampling enabled is 7.5years. All check-in intervals of 2+ minutes without alarm sampling enabled is 10+ years.