

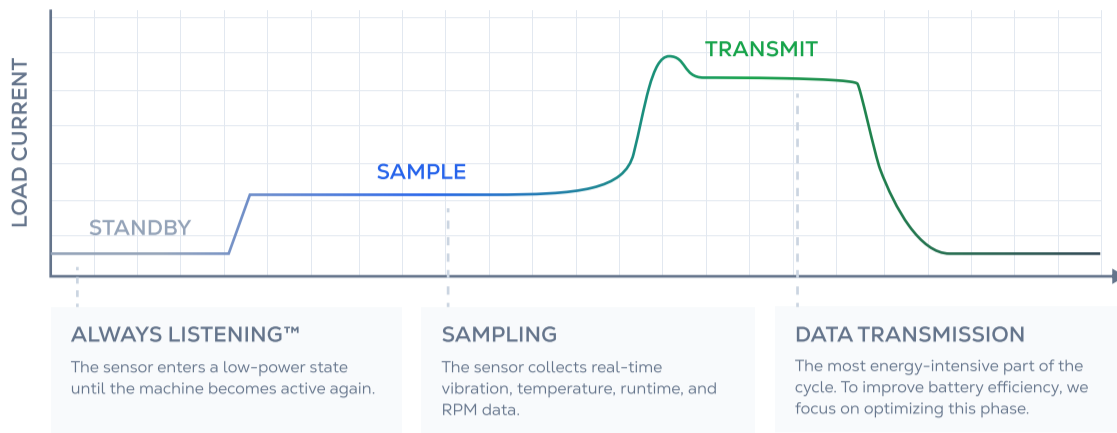
SMART TRAC ULTRA

Certified 3-Year Battery Life

One of the highest-ranking concerns when deciding on a vibration monitoring solution is battery life. This document attests to the battery duration of Smart Trac Ultra, the TRACTIAN vibration sensor.



SENSOR OPERATING CYCLE



BATTERY LIFE SPAN ACCORDING TO SENSOR SAMPLING

$$\text{Battery Life Span} = \frac{\text{Battery Capacity}}{\text{Average Consumption}}$$

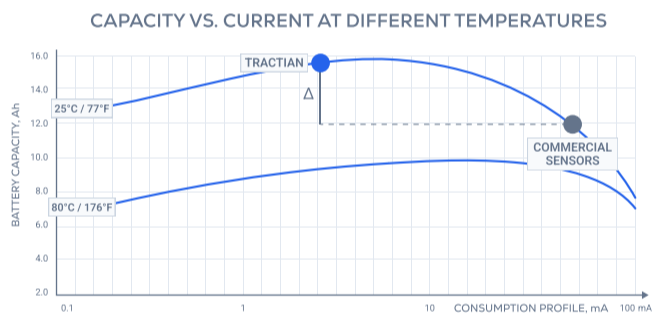
Sample Type	Average Consumption
Expert	136µAh
Trend	20µAh
Auto Diagnosis™	33µAh
Always Listening™	2µAh

Sensor Set Up	Expert	Auto Diagnosis™	Trend	Always Listening™	Battery Life Span
1	Disabled	Every 45 min	Every 11 min	On	3.1y
2	Every 12h	Every hour	Every 10 min	On	3y
3	Disabled	Every 15 min	Disabled	On	3.6y
4	Every 24h	Every hour	Every 10 min	On	3.1y

WHY OTHER COMPANIES FAIL AT ESTIMATING BATTERY LIFE

The naive approach when estimating battery life is using the total nominal battery capacity without considering where and how the battery will function – i.e., the operating temperature and how much current it will consume over time.

TRACTIAN takes operating temperature into account when estimating battery life span, and also balances parameters to ensure an optimal current profile.

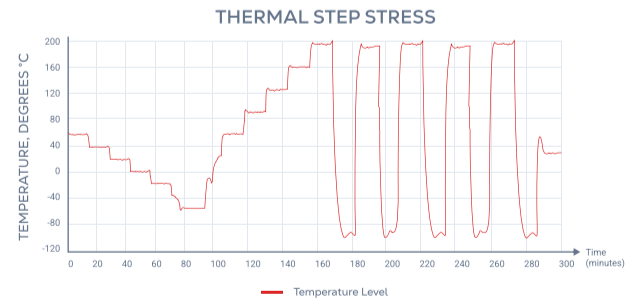
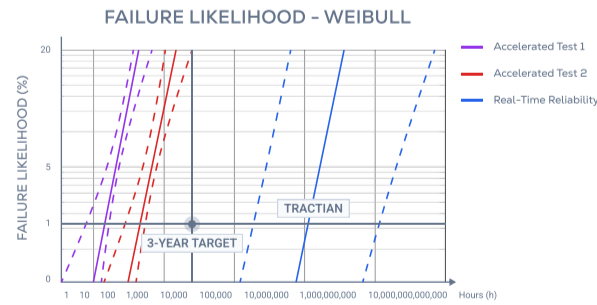


	TRACTIAN	Commercial Sensors
Battery capacity	17Ah	17Ah
Capacity at 25°C	17Ah	17Ah
Capacity at 80°C	16Ah	10Ah
Capacity with optimized current profile	16Ah	8Ah
Error	2%	83%
Total Life Span	3 years	6 months

TESTING AND VALIDATION

Batteries are stressed in two ways: accelerated tests and long-term testing. We design our tests so that the sensor lasts for 3 years with high reliability under all the worst usage conditions.

The accelerated tests are composed of heating and cooling cycles, which accelerate battery wear, following the military standard MIL-STD-810. This allows us to simulate longer periods of time – 3+ years, in this case – in a few weeks.



EQUIVALENT LIFESPAN CONSIDERING FAULTS FOUND DURING ACCELERATED TESTING

$$t_{\text{Vib_Test}} = k \cdot t_{\text{Vib_Use}} \cdot \left(\frac{W_{\text{Use}}}{W_{\text{Test}}} \right)^w$$

$k = 1,5$
 $w = 4$

Test Item	Test Method	Conclusion
High Temperature Operation Test	Compliant with MIL-STD-810H:2019 Method 501.7 Procedure II	Pass
Low Temperature Storage Test	Compliant with MIL-STD-810H:2019 Method 502.7 Procedure II	Pass
Low Temperature Operation Test	Compliant with MIL-STD-810H:2019 Method 502.7 Procedure II	Pass
Random Vibration Test	Compliant with MIL-STD-810H:2019 Method 514.8	Pass

For more information, visit traction.com or contact our support team.