Sure Cross® Power **Solutions:** FlexPower and **Battery** Life

Sure Cross® Power **Solutions**

The Sure Cross Power Solutions guide lists the various power options for Sure Cross devices. Also included in this guide is a battery life calculation for some discrete and analog sensors and brief instructions explaining how to measure your sensor's current draw and calculate the estimated battery life for your installation.

Using 10 to 30 V dc Power

For locations with power, the 10 to 30 V dc devices offer an easy-to-install solution for sensing devices.

- 10 to 30 V dc can power more sensors and more types of sensors to obtain the necessary data.
- The number of sensors powered by the Sure Cross device is only limited by the number of I/O points available.
- The Node may be set to high-speed I/O sample and reporting rates for quicker data collection.

What is FlexPower®?

Banner's FlexPower technology supplies a true wireless solution by allowing the device to operate using either 10 to 30 V dc, 3.6 V lithium D cell batteries, or solar power. This unique power management system can operate a FlexPower Node and an optimized sensing device for up to five years on a single lithium D cell.

- FlexPower Nodes may be powered from 10 to 30 V dc and use an external battery supply module to provide a battery back-up solution.
- When a FlexPower Node receives 10 to 30 V dc, it operates like a standard 10 to 30 V dc Node.
- Good applications for FlexPower devices operating from batteries include sensors that require no or very little power, including dry contacts, RTDs, and thermocouples.

The following FlexPower options are available:

- DX81-LITH, a single battery supply module;
- DX81P6, a 6-pack of lithium batteries;
- DX81H, a single battery supply module designed specifically to power the DX99 Intrinsically Safe devices with polycarbonate housings; and
- BWA-SOLAR PANEL 3W, 5W, or 20W, solar panel assemblies.

DX81-LITH: Single battery supply module

DX81H: Single battery supply module designed specifically to power the DX99 Intrinsically Safe devices with polycarbonate housings

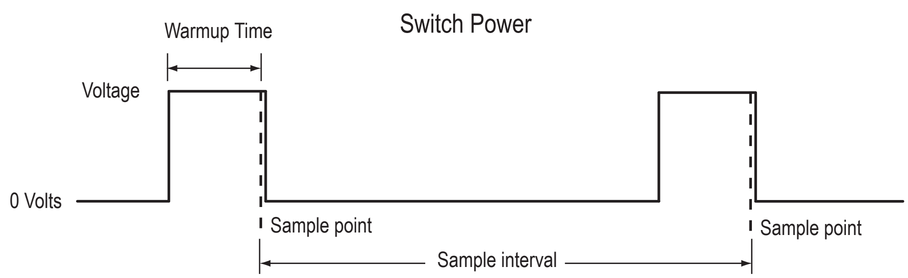
DX81P6: Six-pack battery supply module

BWA-SOLAR PANEL 3W, BWA-SOLAR PANEL 5W, or BWA-SOLAR PANEL 20W: Includes 3 W, 5 W, or 20 W solar panel; order the controller separately when you are not using the solar panel with a DXM Wireless Controller. For more information about solar power solutions, see *Sure Cross® Solar Solutions*.

Switch Power

Efficient power management technology enables some FlexPower devices to include an internal power supply, called switch power (SP), that briefly steps up to power sensors requiring 5, 10, or 15 V power (e.g. 4 to 20 mA loop-powered sensors). When the switch power output cycles on, the voltage is stepped up to power the sensor for a specific time. The warmup time denotes how long the sensor must be powered before a reliable reading can be taken. After the warmup time has passed, the input reads the sensor, then the switch power shuts off to prolong battery life. The switch power voltage, warm-up time, and sample interval are configurable parameters.

- To reduce power consumption and extend battery life, use slower sample and reporting rates. Faster sample and report rates can be configured, but decrease battery life. For details, refer to the DIP switch configurable parameters for your device.
- The FlexPower switched power management system can operate a FlexPower Node and most sensing devices for up to five years on a single lithium D cell.



FlexPower with Integrated Battery

Some FlexPower devices operate using a battery integrated into the housing.

These devices powered by integrated batteries:

- Operate only from the battery and cannot use an external power supply, and
- Are limited in the available I/O because of the limited connectivity.

Battery Life Calculations

Battery Life for Some Analog Sensors

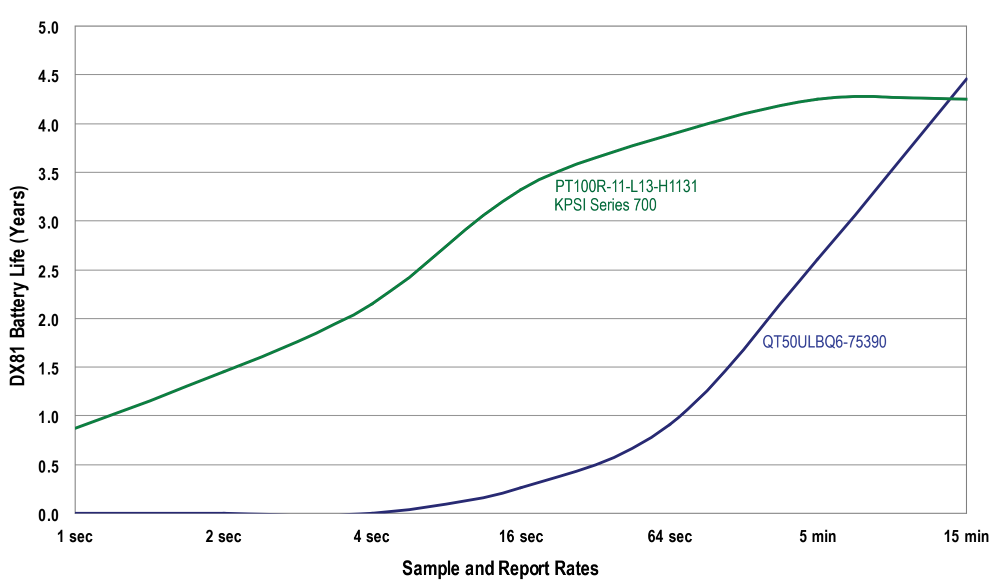
The battery life calculations, in years, for some analog sensors are shown in the table below.

Table 1: Battery Life in Years

	Manufacturer	Device	Model	Boost Voltage	Warmup Time
1	Banner	U-Sonic/Distance	QT50ULBQ6-75390	15 V	500 ms
2	Esterlink/KPSI	Submersible Level	KPSI Series 700	10 V	10 ms
3	Turck	Pressure	PT100R-11-L13-H1131	10 V	10 ms

	Sample and Report Rates						
	1 second	2 seconds	4 seconds	16 seconds	64 seconds	5 minutes	15 minutes
1	0.00	0.00	0.00	0.26	0.91	2.61	4.45
2	0.87	1.45	2.15	3.32	3.89	4.25	4.25
3	0.87	1.45	2.15	3.32	3.89	4.25	4.25

Note, battery life calculations are based on the sensor operating 24 hours a day, 365 days a year.



For each sensor characterized, a boost voltage and warmup time was specified. The sample and reports rates were varied to calculate the estimated battery life. For example, a Banner QT50ULBQ6-75390 sensor set to a boost voltage of 15 volts, a warm-up time of 500 milliseconds, and a sample and report rate of 15 minutes, should have a battery life of 4.45 years.

All battery life calculations are approximations based on a strong radio signal. Weaker radio connections and missed packets will decrease the battery life.

Discrete **Configuration**

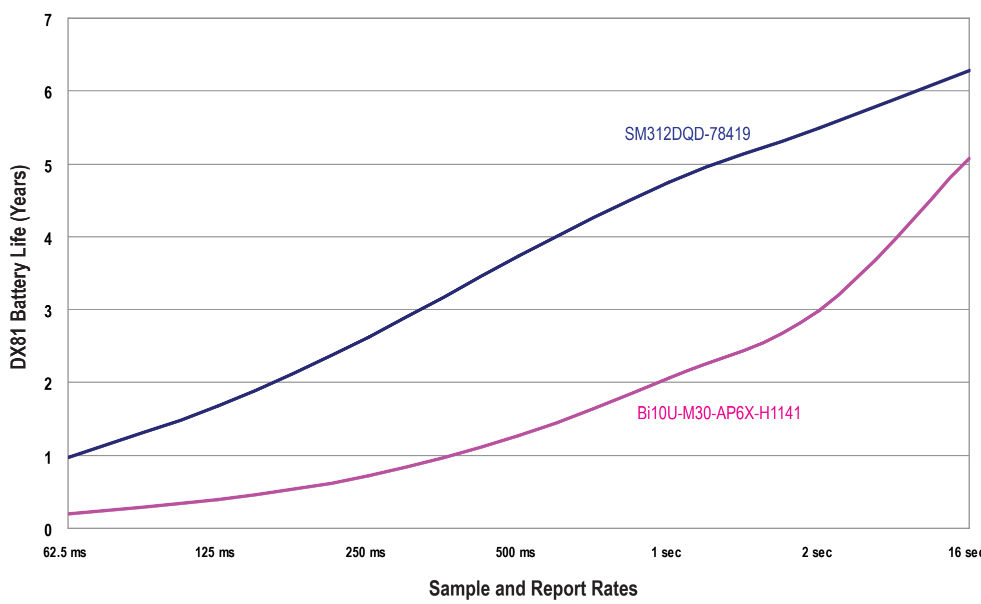
The battery life calculations, in years, for some discrete sensors are shown in the table below.

Table 2: Battery Life in Years

	Manufacturer	Device	Model	Boost Voltage	Warmup Time
1	Banner	Optical	SM312DQD-78419	5 V	4 ms
2	Turck	Inductive Proximity	Bi10U-M30-AP6X-H1141	10 V	10 ms

	Sample and Report Rates						
	62.5 ms	125 ms	250 ms	500 ms	1 second	2 seconds	16 seconds
1	0.97	1.67	2.62	3.74	4.75	5.49	6.28
2	0.20	0.40	0.72	1.27	2.05	2.99	5.07

Note, battery life calculations are based on the sensor operating 24 hours a day, 365 days a year.



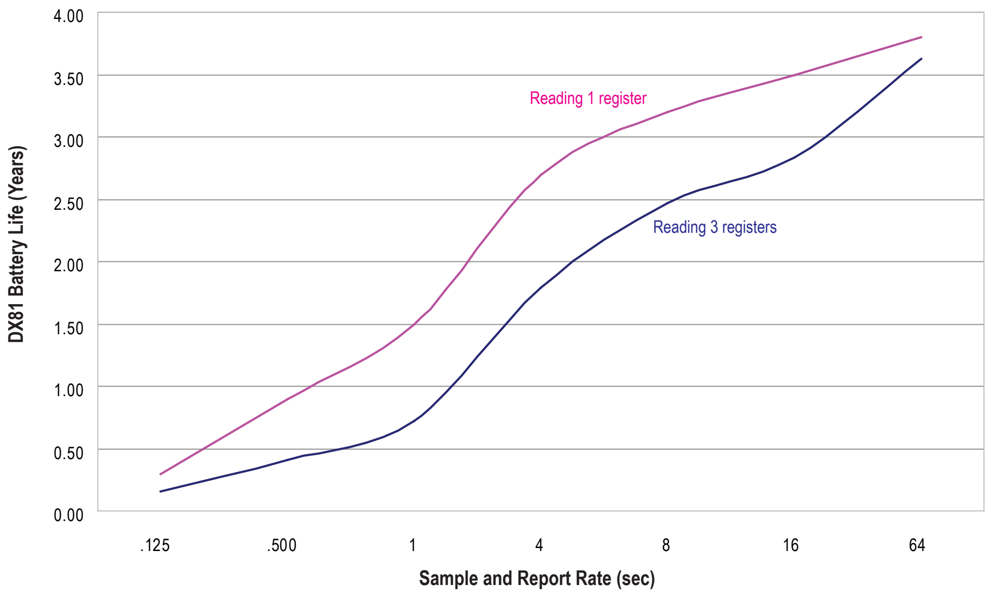
For each sensor characterized, a boost voltage and warmup time was specified. The sample and reports rates were varied to calculate the estimated battery life. For example, a Banner Optical sensor, model SM312DQD-78419, set to a boost voltage of 5 volts, a warm-up time of 4 milliseconds, and a sample and report rate of 16 seconds, should have a battery life of just over 6 years.

The curves for discrete devices represent a “worst case” as far as battery use because we are assuming for each sample of the sensor’s output a change in state has occurred (e.g., target present to target absent or vice versa), sending a radio message from Node to Gateway. No messaging occurs unless there is a change to report. Actual battery life depends on how many state changes actually occur.

All battery life calculations are approximations based on a strong radio signal. Weaker radio connections and missed packets will decrease the battery life.

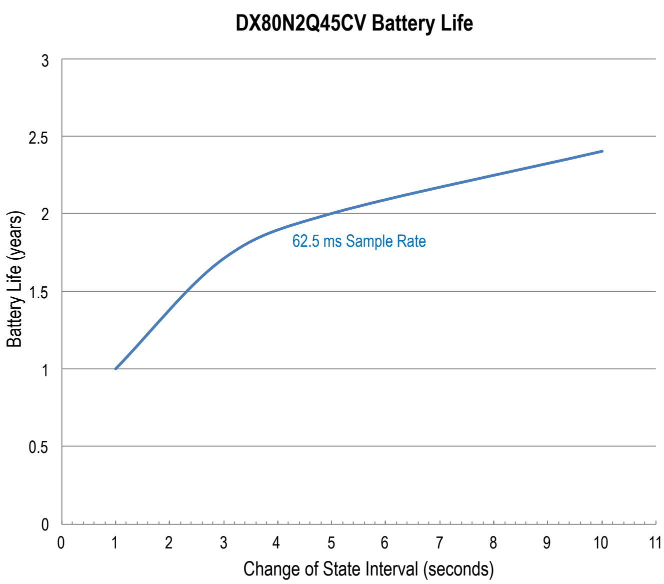
Battery Life of Temperature and Humidity Sensor

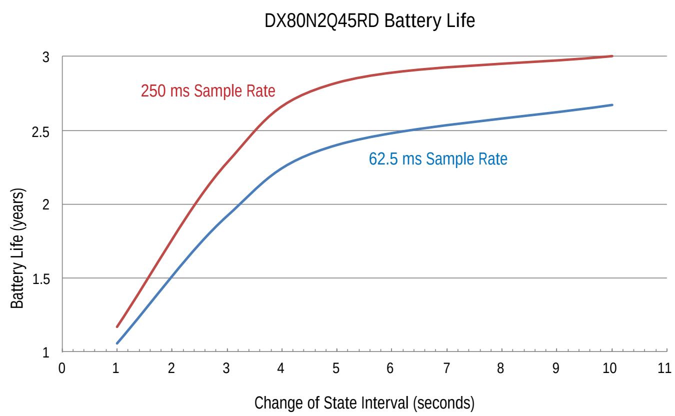
The following battery life calculations are based on reading/reporting one register or reading/reporting the contents of all three registers.

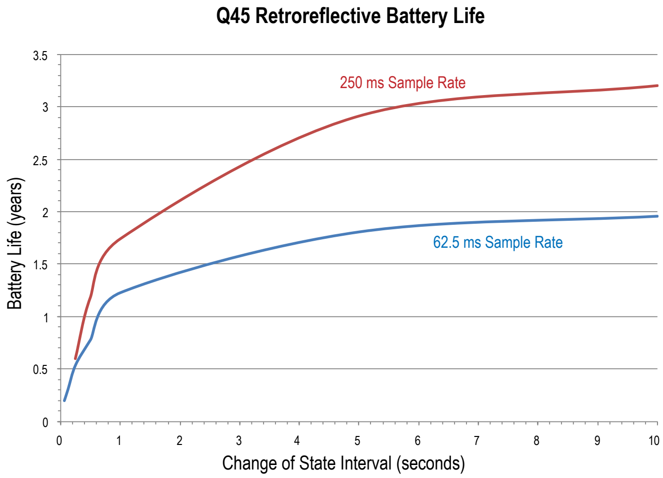


These values are estimated based on the current hardware and software configuration and are subject to change without notice. Environmental conditions will also contribute to the battery's lifespan. Current estimates are based on a battery operating at room temperature. All battery life calculations are approximations based on a strong radio signal. Weaker radio connections and missed packets will decrease the battery life.

Battery Life of Wireless Q45 Nodes







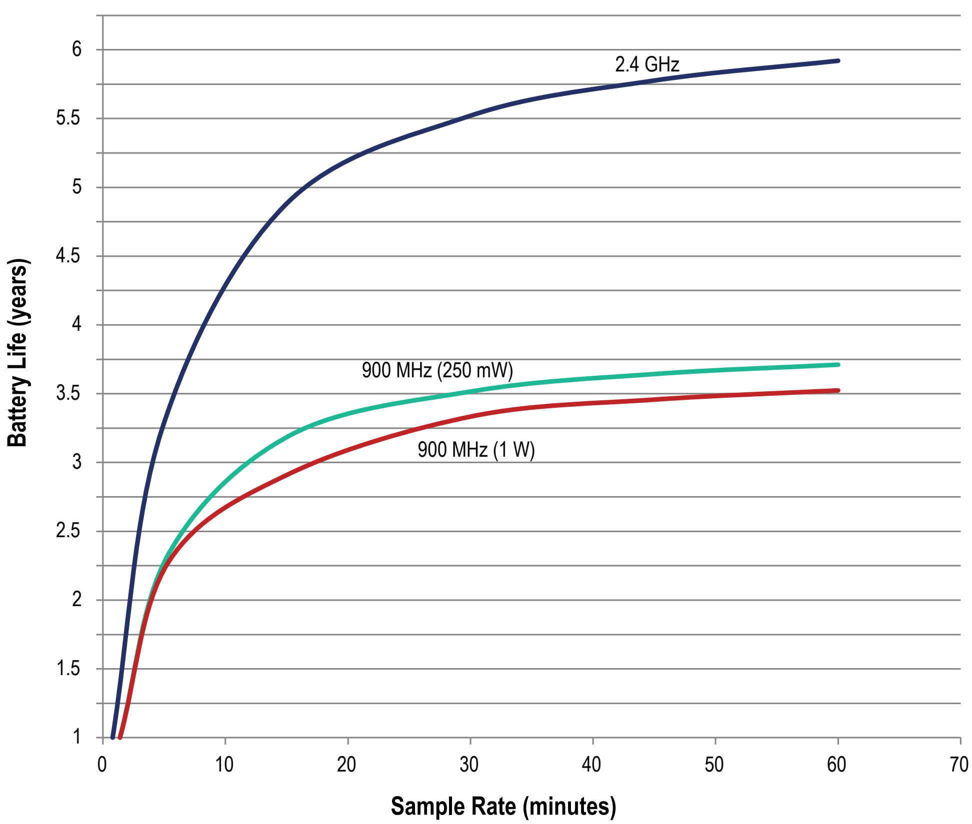
Battery Life for a P6 Node Connected to a Vibration and Temperature (VT1) Sensor

The following battery life estimates use the default configuration of the Performance P6 Node, which is a 5 minute sample and report rate.

900 MHz 1 Watt: 2.5 years
900 MHz 250 mW: 3.4 years
2.4 GHz: 4.3 years

Battery Life for a Q45U Node Connected to a 1-Wire Serial Sensor

This is the battery life curve for a 1-wire serial sensor (such as a VT1 Vibration/Temperature sensor) connected to a 1-Wire Serial Interface Node, such as a Wireless Q45VT or Q45U Node.



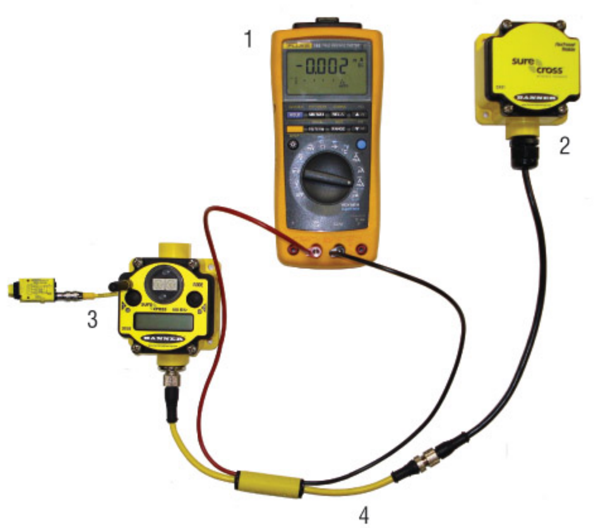
Calculating Battery Life

To estimate the battery life for a sensor not included in our list, use the configuration and cable shown (Banner cable BWA-HW-010) to measure the current draw of your system.

1. Connect the cable to the FlexPower Node and the battery supply module as shown below. The cable's male end plugs into the FlexPower Node and the female end plugs into the battery module.
2. Connect an averaging Fluke meter to the leads. Set the meter to read in amps, not milliamps.
3. Turn off the Node's LCD panel by clicking button 2 five times.
4. Allow the meter to measure the operation for at least 10 times the length of the sample rate.

To estimate the battery life in hours: `Battery Life (in hours) = (16,000 mA Hr) ÷ (average current in mA)`

To estimate the battery life in years: `Battery Life (in years) = (16,000 mA Hr) ÷ [(average current in mA) (8736 Hr per year)]`



1. Averaging Fluke Meter
2. DX81 Battery Supply Module
3. DX80 FlexPower Node with MINI-BEAM
4. BWA-HW-010 Cable, FlexPower Current Monitoring