

Selecting a Compact Data Logger Based on Battery Life

Revised 07/07/2003 MJB

The new 110 series data loggers are specified with up to a 10 year battery life, while continuing to use the same battery as our previously available 101 series data loggers (1 year typical battery life). This product note will explain the differences in technology between the two series, demonstrate how to optimize the battery life of the 110 series to achieve the 10 year life specified and help users select the appropriate type of product for their application.

Features

The following chart compares some of the features of the two types of logger.

Logger Comparison Chart (Typical Values)		
Feature	**101 Series Logger**	**110 Series Logger**
Weight	1 oz	2 oz
Dimensions	0.6" x 1.4" x 2.5"	0.8" x 1.7" x 2.7"
Battery	LTC-7PN, 3.6V / 750 mAh	LTC-7PN, 3.6V / 750 mAh
Battery Life	1 year at 1 minute rate	10 years at 15 minute rate
Operating Environment	Indoor conditions	Indoor conditions
Temperature	-40 °C to +80 °C	-40 °C to +80 °C
Humidity	0 to 95 %RH noncondensing	0 to 95 %RH noncondensing*
Physical Memory	64 kB	64 kB
Communications	2400 baud	57600 baud
Download Time	9 minutes for full logger	30 seconds for full logger
Time Accuracy	1 minute/month	1 minute/month

*The 110 series is typically more sensitive to condensation.

The major differences between the loggers are download speed, battery life, size, and price.

Download Speed

The 110 series communicates with the PC at a speed of 57600 baud, compared with a speed of 2400 baud for the 101 series. This means that a 110 series logger can potentially download about 24 times faster than the 101 series. In practice, the Temp101 downloads a full run (32,767 temperature readings) in about 9 minutes of sustained communication. The Temp110 downloads the same amount of data in about 30 seconds. This can be a major advantage if the user is collecting and downloading large amounts of data.

Battery Life

The following chart compares battery life at different reading rates for the two types of logger. These are estimated typical values, and may not apply to a specific type of logger.

Battery Life Comparison Chart (Typical Values at 25 °C)*		
Reading Rate	**101 Series Logger**	**110 Series Logger**
2 seconds	4 months	1 month
5 seconds	5 months	2 months
10 seconds	6 months	3 months
15 seconds	8 months	4 months
30 seconds	12 months	8 months
1 minute	18 months	18 months
5 minutes	2 years	4 years
10 minutes	2 years	6 years
15 minutes	2 years	10 years
30 minutes	2 years	11 years
1 hour	2 years	12 years

*Based on one launch and download per run, each run utilizing full memory capacity.

The chart shows that battery life can be significantly better for the 110 series loggers when they are used at long reading intervals, 1 reading per minute or above. An important consideration not reflected in the chart is download or communication frequency. The 110 series is designed with a higher communication speed, which consumes battery power than a 101 series. The chart assumes that the devices are deployed for a full run (e.g. 32767 temperature readings), then downloaded once and re-launched.

Since most long-term logging applications are recording at intervals between 1 minute and 1 hour, and they are downloaded infrequently, the 110 series is an excellent choice for these applications.

For very long-term applications, where the logger will only be serviced yearly or at even longer intervals, the 110 series is the only choice. The 101 series battery life tops out at around 2 years of sustained operation. Under these circumstances, the 101 battery would have to be replaced every year to maintain proper operation.

Short-term logging applications may be better served with either type of device. The determination is usually made based on the user's preferences for battery life and download speed. Typically, larger amounts of data make higher download speed more attractive.

Fault logging is a common application where the user needs the most recent data available after a fault has occurred, but otherwise does not need the data at all. This typically involves a logger running continuously at a fairly short recording interval in wraparound mode. A current logger running at a 2 second rate would store enough data for 18 hours of information before the fault appeared. At a short recording interval, the 101 series is preferred because the battery will typically last for several months before needing to be changed.

At a long recording interval, such as 1 minute, the logger will provide weeks or months of data before the fault, and the 110 series is preferred.

The following chart summarizes some of the applications, and indicates which type of device is preferred for use in that application.

Application Comparison Chart		
Application	**101 Series Preferred**	**110 Series Preferred**
Long Term Logging Long reading interval Infrequent downloads		X
Very Long Term Logging Unattended operation Years between downloads		X
Short Term Logging Minutes to hours Small amounts of data	X	
Short Term Logging Minutes to hours Larger amounts of data		X
Fault Logging Long term Short reading interval Wraparound enabled Data rarely needed	X	
Fault Logging Long term Longer reading interval Wraparound enabled Data rarely needed		X

Physical size

The 110 series is physically larger than the 101 series to accommodate the additional electronics required for the more advanced power management. This may make it unsuitable for some applications that would accept the 101 series loggers.

Price

The 110 series is more expensive than the 101 series because of the additional electronics required. The instrumentation-quality measurements performed by the 101 and 110 series put them in competition with much higher-priced equipment, and many of the "10-year" loggers provided by other manufacturers are priced at hundreds of dollars more.



MONARCH INSTRUMENT
15 Columbia Drive Amherst, NH 03031 USA
Tel: 603-883-3390 Fax: 603-886-3300
E-mail: sales@monarchinstrument.com Website: www.monarchinstrument.com