APPLICATION NOTE

Choosing Between a State, Event and Pulse Recorder

The State, Event and Pulse Recorders, although related, each serve very different purposes in meeting the needs of a specific application.

- A State Recorder indicates how long an event lasts;

- an Event Recorder indicates when an event occurs; and,

- a Pulse Recorder indicates the number of times an event occurred in a given time interval.

This application note will discuss the difference between the three different types of units and provide some insight into practical applications to help the user choose the right product for their application.

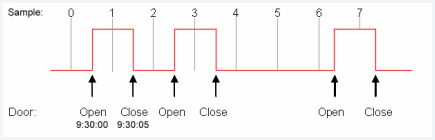
STATE RECORDER

The State Recorder records a time-stamped value whenever the state of the signal changes over a period of time. This is useful when the user needs to be able to collect data on an event duration.

Example:

If the user is monitoring traffic through a door, the State Recorder would take a data point:

1. when the door opens; and,
2. when the door closes.



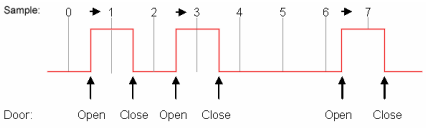
The State Recorder records the data points to indicate how long a door was open; that is, the data collected tells the user that a change in the “state” of the door occurred:

1. when the door opened at 9:30:00 am; and,
2. when the door closed at 9:30:05 am

The user can then calculate that the door was open for a period of 5 seconds.

However, it should be noted that:

If the leading edge of a state change occurs between position 0 and position 1, it will be recorded as taking place at position 1.

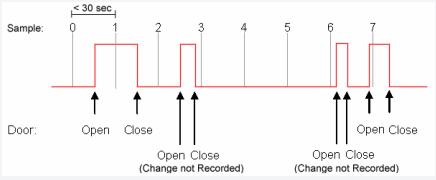


The State Recorder samples the state of the input at fixed intervals. In order for a state change to be recorded, the change must be present at the time it is sampled. If more than one transition occurs between position 0 and position 1, only the state of the input at the time of the sample will be recorded. In short, the sample period must be set to less than the minimum time required for the input signal to rise and fall. If the change in state does not persist long enough to be active at the time of sampling, it will be missed.

STATE RECORDER - Continued

Example:

If it takes 30 seconds for a garage door to open and close, the time period should be set to less than 30 seconds to ensure the state change is not missed.



Another example of an application for the State recorder is the monitoring of a furnace or pump turning on and off, both of which have a long enough state change to be captured by the State Recorder.

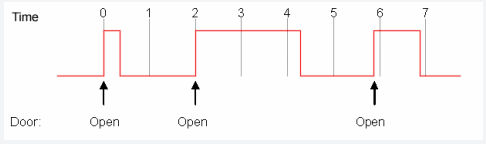
EVENT RECORDER

The Event Recorder records a single direction time-stamped data point when an event takes place within a fixed reading interval. This is useful when the user needs to be able to collect data on when an event occurred but does not need to know the duration of the event.

Example:

If the user is monitoring the traffic flow through a door, the Event Recorder will take a data point recording:

1. That the door opened, and
2. that the door opened again, and
3. that the door opened again.



Unlike the State recorder, it does not provide the data points that would indicate how long the door was open. The Event Recorder can track the number of times the door was open but not how long the door was open.

Example:

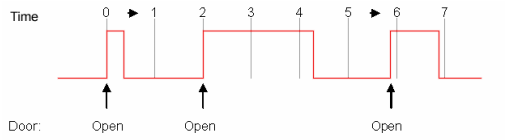
Data from the Event Recorder tells the User event occurred:

1. when the door opened at 9:30:00 am; and,
2. when the door opened at 9:37:04 am; and,
3. when the door opened again at 12:22:13 pm.

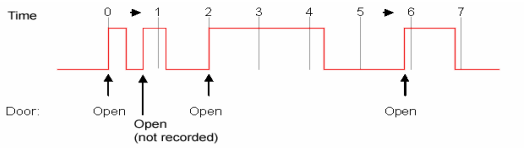
Thus, the user can track the number of times the door was opened but not how long the door was open each time.

The Event Recorder has a resolution of one second. This means that the device has the ability to record an event every second. Unlike the State Recorder, the Event Recorder does not require a persistent signal. The Event Recorder will trigger on the leading edge of the signal transition. However, it should be noted that:

If a data point occurs between position 0 and position 1, it will be recorded as having taken place at position 1.



If more than one data point occurs between position 0 and position 1, only a single data point will be recorded.



Another common application for an Event Recorder is monitoring tipping-bucket rain gauges. The Event recorder will record data when the bucket tips and the contact is closed. It is unlikely that the bucket on the rain gauge will tip more than once per second, therefore the Event Recorder will not miss recording any data points.

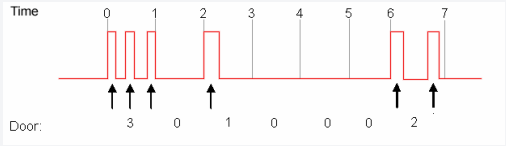
PULSE RECORDER

The Pulse Recorder records the number of pulses that happen over a period of time. Unlike the State or Event Recorder, the device does not time-stamp each pulse but rather groups together or bins the number of pulses according to the time period they occurred in.

Example:

If the user is monitoring traffic through a door, the Pulse Recorder will log the number of times the door was opened during each interval:

1. The door opened 3 times between 9:30 am and 9:31 am.
2. The door opened once between 9:47 am and 9:48 am.
3. The door opened twice between 12:32 pm and 12:33 pm.



The Pulse Recorder does not record information about the duration that the door is open. The Pulse Recorder is most useful when you need the ability to collect rapid pulses that are too fast for the Event or State. It offers a more efficient way to collect information from a source which produces pulses at a constant rate. By binning the data without recording a time-stamp, the Pulse Recorder uses less memory than the Event or State.

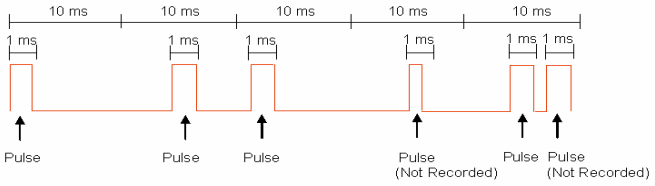
Example:

Using the data collected in the above example, the user can calculate additional data such as:

1. The door was open for a sum of 8 times over the full period.
2. The average number of times the door was opened per minute is twice.
3. There is more traffic through the door before 10:00 am than after 12:00 pm.

The Pulse Recorder requires a signal of at least 1ms duration and at least 10ms between the leading edge of each pulse to be counted. If these conditions are met, then every pulse will be logged up to almost 4.3 million pulses per time interval.

Conversely, a pulse may not be recorded if it is less than 1ms or if more than one pulse occurs within a 10ms period. If the latter happens, further data points may not be recorded until 10ms after the first pulse.



A common application for the Pulse Recorder is to measure the flow rate or total volume of a pipeline. The Pulse Recorder collects pulses generated by a flow meter and uses that information to calculate the number of gallons per minute. The flow meter produces a pulse that is to rapid too be collected by the Event or State, yet can easily be binned by the Pulse Recorder. The important data here is not the exact time when the pulse took place, but rather the number of pulses in a time interval.

If you have any further questions about your application, please contact MadgeTech Customer Support at (603)456-2011
or via e-mail: support@madgetech.com

ORDERING INFORMATION

Model	Description
STATE101	State Recorder
STATE110	State Recorder w/ High Speed Download
EVENT101	Event Recorder
EVENT110	Event Recorder w/ High Speed Download
PULSE101	Pulse Recorder
IFC110	Software, manual and 9-pin computer interface cable

ASK ABOUT OUR OTHER DATA RECORDERS

Temperature	**pH**
Humidity	**Level**
Pressure	**Shock/Vibration**
Bridge/Strain	**Submersible**
Current	**Intrinsically Safe**
Pulse/Event	**RF Transmitters**
Voltage	**Multi-parameter**