Product Presentation

CyTime™ Sequence of Events Recorders
SER-3200/2408

Cyber Sciences™
Precision Timing for Reliable Power. Simplified.™
 Know what happened and when—*to 1 msec!*

1. **Understand**—Forensics tool
   - Perform root-cause analysis based on reliable data.
   - View current and voltage waveforms captured with each event.
   - Determine if the initial source was internal or external.

2. **Respond**—Act quickly
   - Evaluate control sequences, timing, and operator actions.
   - Confirm protective device time-current coordination.
   - Restore service quickly if an outage does occur.

3. **Prevent**—Take corrective actions
   - Resolve or mitigate persistent problems.
   - Provide documentation for the electric utility, legal, insurance, etc.
   - Identify slow breakers before they can cause an arc flash hazard.
SER is essential where reliable power is important:

- Data centers
- Hospitals
- Industrial facilities
- Universities
- Airports
- Microgrids & alternative energy
CyTime™ Sequence of Events Recorders
SER-3200 and SER-2408

- Status monitoring of 32 channels:
  - 32 high-speed digital inputs (SER-3200)
  - 24 inputs, 8 relay outputs (SER-2408)

- Event recording, 1 msec timestamps:
  - 8192 events in non-volatile memory
  - Stopwatch function (elapsed time)
  - Operations counters
  - Trigger output for waveform capture

- Remote control of 8 outputs:
  - Over Ethernet, via Modbus TCP (SER-2408)
Get the visibility you need throughout your electrical power distribution system

- **Typical monitored points:**
  - Breaker status: open/closed/tripped
  - Relay trip signal: normal/trip
  - Control switches: open/close commands
  - Control scheme status: auto/manual/test
  - Auto-transfer switch (ATS) status:
  - normal/emergency/test
  - UPS status: normal/transfer/bypass
  - Generator status: stopped/running
  - Battery status: normal/alarm
  - TVSS, transformer temperature, fan status and other auxiliary contacts and alarms
Circuit breaker monitoring options

- **Economical breaker monitoring**
  - One input per breaker (open/closed)
  - Best for branch breakers closest the loads

- **Basic breaker monitoring**
  - 2 inputs per breaker (open/closed + tripped)

- **Reliable breaker monitoring**
  - 3 inputs per breaker (open + closed + tripped)
  - Separate monitoring of “a” and “b” contacts to distinguish “open” vs. control power loss

- **Other contacts:**
  - open/close commands (from control switch)
  - cradle position (drawout breakers)
SER: the “black box” recorder for power systems

- Root-cause analysis: event reconstruction
- Reliability: control systems timing confirmation
- Availability: avoid downtime, or reduce duration
- Arc-flash safety: early warning of slow breakers

This black-box recorder’s data is used again and again...
Consider a typical incident…

- Here’s what you know:
  - The approximate time of the incident
  - The equipment affected

- Here’s what you may not know:
  1. What caused the incident?
  2. The exact time things began?
  3. The exact time the loads were affected?
  4. What happened between #2 and #3?
     - What equipment did or did not operate?
     - In what order did everything happen?

SER gives you the answers.
CyTime™ Event Recorder—Key Features

- **Flash Memory SD Card** (setup data)
- **EZ Connector for IRIG-B or DCF77 IN** (optional)
- **PTP Hub for IRIG-B, DCF77 or 1per10 OUT** (optional)
- **10/100 Ethernet** (HTTP, FTP, PTP, NTP, Modbus TCP)
- **SD Card**
- **DIN-rail Mounting**
- **Embedded Web Server**
- **LCD and Keypad**
- **Rugged Metal Enclosure**
- **32 High-Speed Digital Inputs** (or 24in / 8out)
- **High-Speed Trigger Out** (e.g., waveform capture)
- **Time Sync IN/OUT (RS-485)**
- **OR**

**Key Features**

- 32 High-Speed Digital Inputs
- 10/100 Ethernet
- Embedded Web Server
- DIN-rail Mounting
- LCD and Keypad
- Rugged Metal Enclosure
- Time Sync IN/OUT (RS-485)
- Flash Memory SD Card
- EZ Connector for IRIG-B or DCF77 IN (optional)
- PTP Hub for IRIG-B, DCF77 or 1per10 OUT (optional)

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**CyTime™ Event Recorder**

- Key Features:
  - 32 High-Speed Digital Inputs
  - 10/100 Ethernet
  - Embedded Web Server
  - DIN-rail Mounting
  - LCD and Keypad
  - Rugged Metal Enclosure
  - Time Sync IN/OUT (RS-485)
  - Flash Memory SD Card
  - EZ Connector for IRIG-B or DCF77 IN (optional)
  - PTP Hub for IRIG-B, DCF77 or 1per10 OUT (optional)
Monitoring and setup over a network using a standard web browser
### Embedded Web Server—Events Page

**Event #**

**Date/Time of event**
(1 ms resolution)

**Channel name**
(user-defined)

**I/O status**
(user-defined labels for off/on)

**Event type**
(e.g., status change, time sync lock/fail, etc.)

**Time quality**
(at time of event)
(indicates accuracy)

**Delta Time**
(elapsed time since previous event)

<table>
<thead>
<tr>
<th>Event</th>
<th>Date and Time</th>
<th>Channel</th>
<th>Event Type</th>
<th>Status</th>
<th>Time Quality</th>
<th>Delta Time</th>
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<tbody>
<tr>
<td>1204</td>
<td>04/18/2016 11:03:31.468</td>
<td>Fdr FCB3 Trip Contact</td>
<td>Input Status Change</td>
<td>Normal --&gt; TRIPPED</td>
<td>0:Good (&lt; 1ms)</td>
<td>0.094</td>
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<td>1203</td>
<td>04/18/2016 11:03:31.374</td>
<td>Fdr FCB3 OC Relay</td>
<td>Input Status Change</td>
<td>Off --&gt; Trip Signal</td>
<td>0:Good (&lt; 1ms)</td>
<td>0.140</td>
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<td>1202</td>
<td>04/18/2016 11:03:31.234</td>
<td>Fdr FCB2 Status</td>
<td>Input Status Change</td>
<td>Open --&gt; Closed</td>
<td>0:Good (&lt; 1ms)</td>
<td>0.094</td>
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<tr>
<td>1201</td>
<td>04/18/2016 11:03:31.140</td>
<td>Fdr FCB2 Switch</td>
<td>Input Status Change</td>
<td>Open --&gt; Close</td>
<td>0:Good (&lt; 1ms)</td>
<td>204 days</td>
</tr>
</tbody>
</table>
## Monitoring—Status

The Status page displays real-time status of all inputs/outputs.

### CyTime Event Recorder

<table>
<thead>
<tr>
<th>#</th>
<th>Channel Name</th>
<th>Status</th>
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<td>01</td>
<td>Input 01</td>
<td>On</td>
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<tr>
<td>02</td>
<td>Input 02</td>
<td>On</td>
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<td>Input 04</td>
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<td>05</td>
<td>Input 05</td>
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<tr>
<td>06</td>
<td>Input 06</td>
<td>Off</td>
</tr>
<tr>
<td>07</td>
<td>Input 07</td>
<td>Off</td>
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</table>

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<thead>
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<th>#</th>
<th>Channel Name</th>
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<tbody>
<tr>
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<td>Input 17</td>
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<tr>
<td>18</td>
<td>Input 18</td>
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<td>19</td>
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<td>22</td>
<td>Input 22</td>
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<tr>
<td>23</td>
<td>Input 23</td>
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<th>Channel Name</th>
<th>Status</th>
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<td>Input 08</td>
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<tr>
<td>09</td>
<td>Input 09</td>
<td>Off</td>
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<tr>
<td>10</td>
<td>Input 10</td>
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</tr>
<tr>
<td>16</td>
<td>Input 16</td>
<td>Off</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>#</th>
<th>Channel Name</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>24</td>
<td>Input 24</td>
<td>Off</td>
</tr>
<tr>
<td>25</td>
<td>Input 25</td>
<td>Off</td>
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<td>26</td>
<td>Input 26</td>
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<td>27</td>
<td>Input 27</td>
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<td>31</td>
<td>Input 31</td>
<td>Off</td>
</tr>
<tr>
<td>32</td>
<td>Input 32</td>
<td>Off</td>
</tr>
</tbody>
</table>

### Status: Inputs:

- **On**: Active
- **Off**: Inactive
- **Forced**: Forced state
- **Inverted**: Inverted state

### DATA

*Data*: Last updated.

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Setup—Communications

Easy setup over a network using a standard web browser
Setup—Time

The Time Setup page offers flexible time sync options—both IN and OUT.
Each input has user-configurable descriptive text, filter, debounce, chatter, and other settings.
The Setup—Groups page allows customization of up to 16 EPSS data logs.
Control—Test

The Control-Test simulates status changes for testing with application software.
The Diagnostics page displays data about the CyTime itself, its operation and status.
Custom web page(s)

Create your own Custom pages, such as linking to drawings stored on SD card.
Time sync—easy as 1-2-3

1. **Choose time source**

2. **Time sync via PTP**

3. **Sync non-PTP devices**
PTP (IEEE 1588): Precision time sync over Ethernet

1. **TIME SOURCE**
   - IRIG-B
   - DCF77
   - NTP
   - Modbus TCP

   set the first SER’s time...

2. **PTP MASTER**
   - SER-3200-PTP
     - (or SER-2408-PTP)

   Ethernet

3. **PTP SLAVES**
   - PTP
   - all other SERs sync automatically via PTP
     - SER-3200-PTP
       - (or SER-2408-PTP)
     - SER-3200-PTP
       - (or SER-2408-PTP)
     - SER-3200-PTP
       - (or SER-2408-PTP)
PTP-enabling other EPMS devices (via legacy protocols)
Example: sync first SER from **NTP** server (GPS optional)

— first SER is located in MV switchgear
Example: sync first SER from GPS clock (via **IRIG-B**) — IRIG-B to first SER and to relays and meters that support it
Example: SER #1 as PTP Master, SER #2 as standby

—IRIG-B to both SERs (and others if desired)
Example: sync first SER from GPS clock (IRIG-B)

—first SER in same panel as clock, relays sync via IRIG-B
Mounting—SER-3200/2408

- Standard DIN rail

(The bottom jaw of each mounting bracket is spring-loaded.)
Dimensions—SER-3200
Dimensions—SER-2408
Specifications—SER-3200/2408

**Certifications**
- UL-Listed, cULus (UL 61010)
- CE Mark
- FCC, class A
- RCM
- RoHS compliant, lead free
- W3C compliant web pages
- UNH InterOperability Lab
- Made in USA

**Key specifications**
- Inputs/outputs, 32 channels: 24 Vdc
- Control power: 24 Vdc, 10 watts
- Time sync inputs: PTP, NTP, IRIG-B, DCF77
- Time sync outputs: PTP, IRIG-B, DCF77, 1per10, ASCII/RS-485
- Communications: Ethernet, Modbus TCP
- Memory: 8 GB (standard), 32 GB (optional)
## Ordering info

<table>
<thead>
<tr>
<th>Catalog no.</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>SER-3200-P2X2</td>
<td>CyTime SER-3200 Event Recorder, base model, 32-inputs</td>
</tr>
<tr>
<td>SER-3200-PTP</td>
<td>CyTime SER-3200 Event Recorder, 32-inputs and PTP option</td>
</tr>
<tr>
<td>SER-3200-32GB</td>
<td>CyTime SER-3200 Event Recorder, 32-inputs, PTP and 32GB options</td>
</tr>
<tr>
<td>SER-2408-P2X2</td>
<td>CyTime SER-2408 Event Recorder, 24-inputs and 8 relay outputs</td>
</tr>
<tr>
<td>SER-2408-PTP</td>
<td>CyTime SER-2408 Event Recorder, 24-inputs, 8 outputs and PTP option</td>
</tr>
<tr>
<td>SER-2408-32GB</td>
<td>CyTime SER-2408 Event Recorder, 24-inputs, 8 outputs, PTP and 32GB options</td>
</tr>
<tr>
<td>PTP-UPGRADE</td>
<td>PTP (IEEE 1588) Field Upgrade Kit for CyTime SER-3200/SER-2408</td>
</tr>
<tr>
<td>EZC-IRIG-B</td>
<td>EZ connector for SER (IRIG-B input, 5 Vdc)</td>
</tr>
<tr>
<td>EZC-DCF77</td>
<td>EZ connector for SER (DCF77 input, 24 Vdc)</td>
</tr>
<tr>
<td>PLX-5V</td>
<td>PTP Legacy Interface (5V DCLS, for unmodulated IRIG-B output)</td>
</tr>
<tr>
<td>PLX-24V</td>
<td>PTP Legacy Interface (24V DCLS, for DCF77, 1per10 or 24V IRIG-B output to STR-IDM)</td>
</tr>
<tr>
<td>STR-IDM</td>
<td>IRIG-B Distribution Module (requires STR-100/IRIG-B or PLX-24V)</td>
</tr>
</tbody>
</table>
For more info...

- SER product page:  
  - www.cyber-sciences.com/ser.php

- Tech library:  
  - www.cyber-sciences.com/library.php
Events Happen...
(in milliseconds)

The History of Power Monitoring...

- Waveform capture (1990s)
- Web-enabled (2000s)
- Precision timing (Today)

1 ms

Power monitoring at the speed of NOW!

CyTime™
Sequence of Events Recorder

www.cyber-sciences.com