

INSTRUCTION BULLETIN

USER'S GUIDE

CyTime[™]

Sequence of Events Recorder

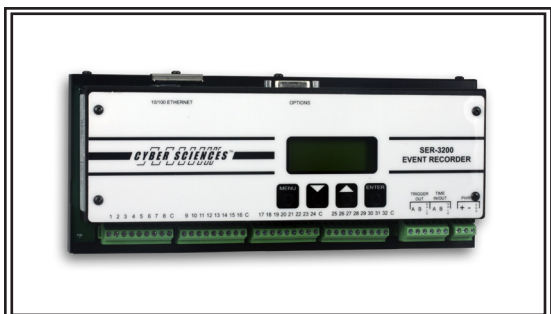
SER-3200 / SER-2408



CYBER SCIENCES[™]

Precision Timing for Reliable Power. **Simplified.**SM

TABLE OF CONTENTS



See Also—SER Reference Guide:

- *Modbus Register List*
- *Modbus Command Interface*
- *SER Event Log and EPSS Data Logs*
- *Advanced Setup via XML File*
- *Custom Web Pages*
- *PTP (IEEE 1588) Details*
- *Troubleshooting (LCD Error Codes)*

For More Information

CyTime SER Reference Guide (IB-SER-02)
EZC Instruction Bulletin (IB-EZC-01)
PLX Instruction Bulletin (IB-PLX-01)
STR-IDM Instruction Bulletin (IB-IDM-01)
Tech Note: Hi-res Time Sync using PTP/1588 (TN-100)
Tech Note: SER System Architectures (TN-101)
Tech Note: SER Data Export to CSV File (TN-201)

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SAFETY PRECAUTIONS

Important safety precautions must be followed before attempting to install, service, or maintain electrical equipment. Carefully read and follow the safety precautions outlined below.

DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH

- Only qualified workers should install this equipment. Such work should be performed only after reading this entire set of instructions.
- NEVER work alone.
- Before performing visual inspections, tests, or maintenance on this equipment, disconnect all sources of electric power. Assume that all circuits are live until they have been completely de-energized, tested, and tagged. Pay particular attention to the design of the power system. Consider all sources of power, including the possibility of backfeeding.
- Apply appropriate personal protective equipment (PPE) and follow safe electrical practices. For example, in the USA, see NFPA 70E.
- Turn off all power supplying the equipment in which the device is to be installed before installing and wiring the device.
- Always use a properly rated voltage sensing device to confirm that power is off.
- Beware of potential hazards, wear personal protective equipment, and carefully inspect the work area for tools and objects that may have been left inside the equipment.
- The successful operation of this equipment depends upon proper handling, installation, and operation. Neglecting fundamental installation requirements may lead to personal injury as well as damage to electrical equipment or other property.

Failure to follow these instructions can result in death or serious injury.

NOTE:

Electrical equipment should be serviced by qualified personnel. No responsibility is assumed by Cyber Sciences, Inc. for any consequences arising out of the use of this material. This document is not intended as an instruction manual for untrained persons.

1—INTRODUCTION

Product Overview

Note: This instruction bulletin describes product features and behaviors for the latest firmware version available at the time of publication. Cyber Sciences recommends updating to the latest firmware whenever feasible, available for free download:

www.cyber-sciences.com/downloads

The CyTime™ Sequence of Events Recorder provides precise time-stamped event reporting for 32 channels to enable root-cause analysis and advanced system diagnostics. The I/O configuration for the 32 channels varies by model:

- SER-3200—32 high-speed digital inputs
- SER-2408—24 high-speed digital inputs and 8 control relay outputs

Configurable event recording. Each input is individually configurable with digital filter, debounce and contact chatter functions to ensure reliable operation.

Event log. The CyTime SER records the date and time associated with all state changes to one (1) millisecond and stores up to 8192 events in non-volatile memory. Each event record contains the date/time stamp, event type, channel number and state, time quality, and unique sequence number.

Export events to CSV. An export button allows the user to save event data to a CSV file for further analysis in Excel or other software.

EPSS data log groups. Inputs and outputs can be assigned to a group for data logging purposes. If any input or output in a group changes state, then the states of all group members are recorded in its EPSS data log. This enables specialized reporting for mandatory tests of emergency power supply systems (EPSS) to document compliance with standards for healthcare and other critical-power facilities.

Operations counters. Operations counters are maintained for all 32 channels (inputs/outputs), with date/time of last reset. Each channel can be reset individually.

Ethernet communications. Network data communications to a host system are supported via 10/100BaseTx Ethernet using Modbus TCP protocol. The device also features an embedded web server to simplify setup and operation. FTP is supported for file transfer and firmware updates over a network. In addition, PTP (IEEE 1588) or NTP can be used for time synchronization over Ethernet.

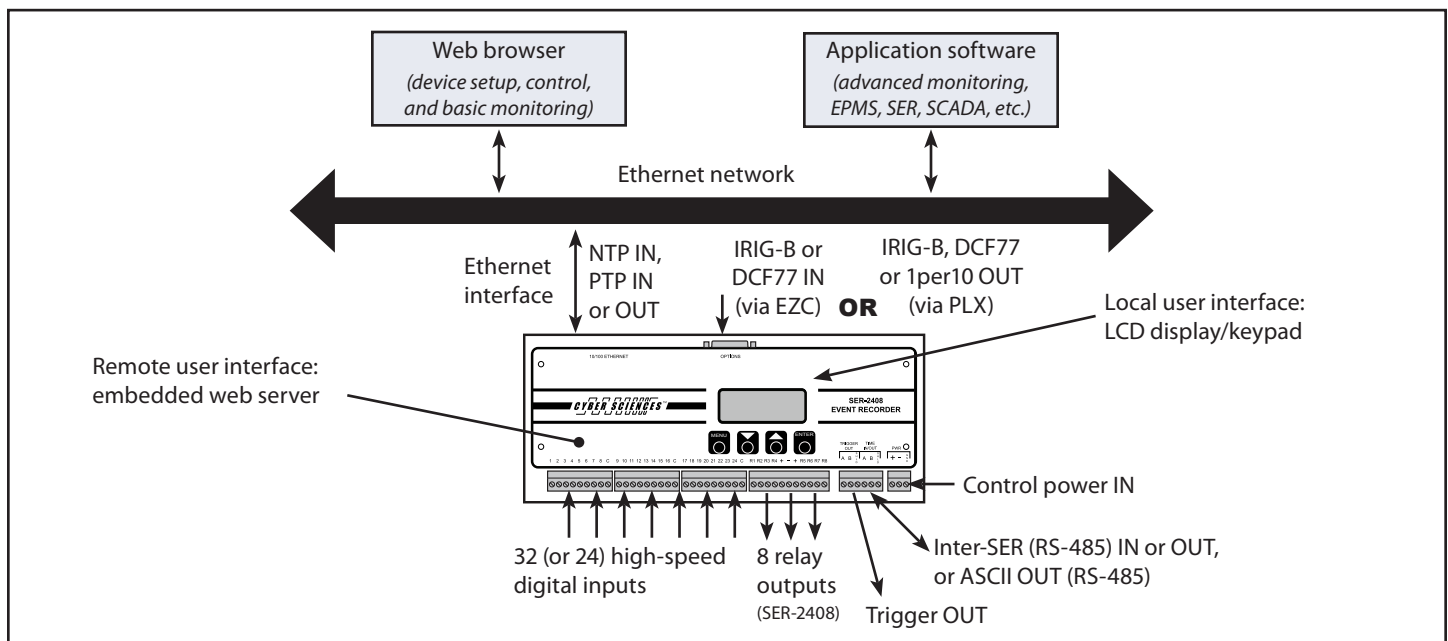


Figure 1-1. CyTime Sequence of Events Recorder product overview (SER-2408 shown)

Product Overview (cont.)

Status monitoring examples:

- Breaker status: open/closed/tripped
- Breaker control switch: open/close commands
- Relay trip signal: normal/trip
- Auto-transfer switch (ATS) status: normal/emergency/test
- Control scheme status: auto/manual/test
- UPS status: normal/bypass
- Generator status: stopped/running
- Battery status: normal/alarm

Time synchronization (PTP). High-resolution time sync (100 μ s) is supported using PTP (Precision Time Protocol, per IEEE 1588) over the Ethernet network used for data communications. (Timestamps \pm 0.5 ms.) The SER-3200/2408 can be configured as the PTP master (grandmaster clock for all other SERs and PTP-compatible devices) or a PTP slave, synchronized to a PTP grandmaster (another SER or third-party clock).

Time synchronization (other protocols). Hi-res time sync (100 μ s) using legacy protocols such as IRIG-B (unmodulated) or DCF77 is also supported. (Timestamps \pm 0.5 ms.) NTP or Modbus TCP time-sync are supported, but accuracy depends on network design and is typically \pm 100 ms or more.

Time-sync master. One SER can serve as a time-sync master to other slave devices via PTP or an RS-485 subnet. RS-485 serial protocol is either IRIG-B or DCF77 (per the time source) or ASCII (selectable). When PTP is the time source, an SER can output IRIG-B, DCF77 or 1per10 using an optional PTP Legacy Interface (PLX-5V or PLX-24V).

Trigger output. Any input can be configured to close a high-speed output contact to trigger an associated action, such as a power meter's capture of voltage and current waveforms coincident with an event. The trigger occurs in the same millisecond interval during which the event is detected, with no filtering applied.

Command relays over the network (model SER-2408). Open/close relay outputs remotely over an Ethernet network using the command interface (Modbus TCP).

Multiple Modbus masters. The SER supports data access from multiple Modbus TCP masters (up to 32 simultaneous Modbus connections). This enables integration of multiple systems and flexibility in how application software manages sockets.

Settings stored in non-volatile memory. All settings are stored in non-volatile flash memory on an SD card in XML file format. Configuration is accomplished using a standard web browser, or by modifying the setup file directly (by advanced users).

Benefits

Benefits for end users, system integrators and OEMs include:

Time-critical information for root-cause analysis (1 ms)

Time-stamped records of events—up to 8192 events stored in non-volatile memory.

Reliable event recording with “zero blind-time”

Event-recording engine records all events, even those occurring in rapid succession.

Advanced troubleshooting

High-speed trigger output to capture waveforms by a compatible power meter.

Simple setup using a web browser—no proprietary software

Embedded web server hosts user-friendly pages for setup and monitoring.

No maintenance required

Event data is stored in non-volatile ferromagnetic RAM memory, and user setup data is stored in non-volatile flash memory (SD card). There are no batteries to replace.

Easy system integration

Integrate with multiple systems via Ethernet, Modbus TCP, and web technologies.

Flexible time synchronization choices

PTP, IRIG-B, DCF77, NTP, Modbus TCP or SER inter-device (RS-485).

EPSS generator test-compliance reports enabled

16 data logs: when any group member changes state, all members' states are recorded.

Easy replacement

If a unit ever needs to be replaced, settings are transferable via XML setup file.

Future customization—add your own custom web pages at any time

Store equipment drawings and other documentation on SD card.

Regulatory approvals to global standards

UL-Listed (UL-508, EN-61010), CSA 22.2, CE, RCM, RoHS-compliant, lead-free.

Key Features

The CyTime SER-3200/SER-2408 Event Recorder is designed to be mounted on a standard DIN rail. The table below gives a description of each key feature.

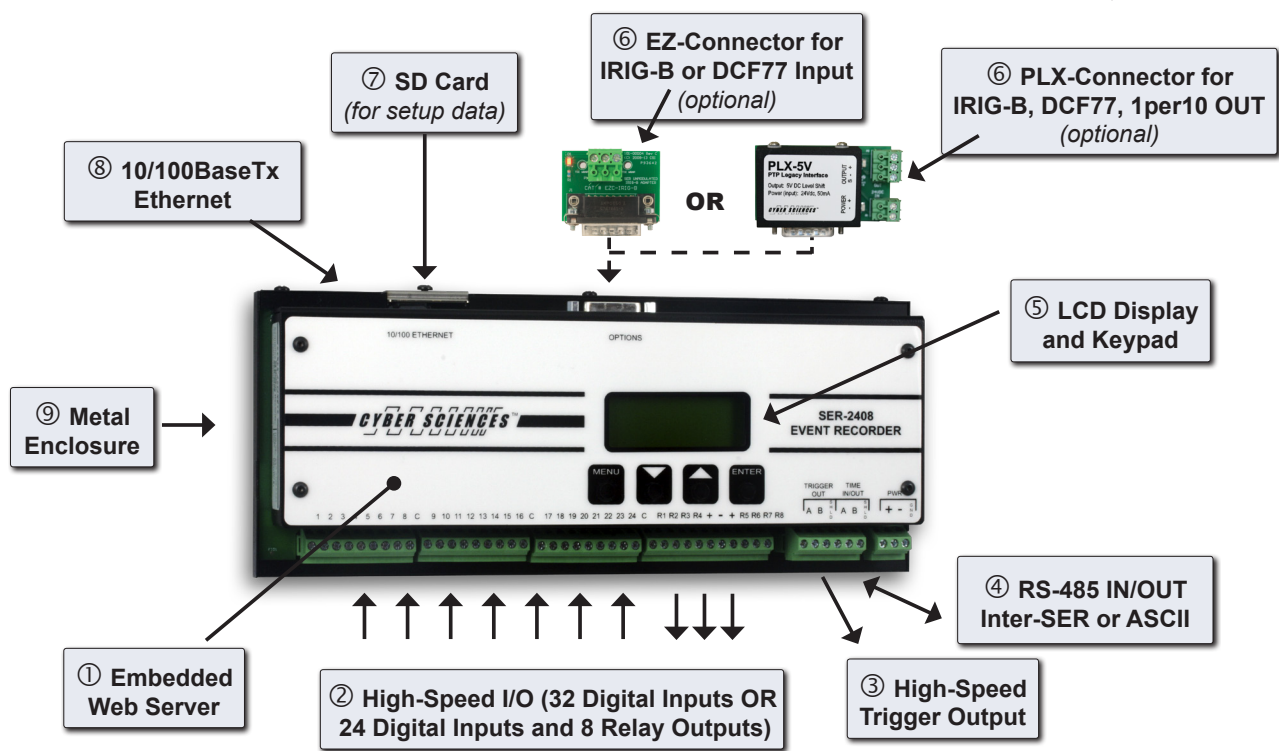


Figure 1-2. CyTime Event Recorder key features (model SER-2408 shown)

Table 1-1—Key Features

Feature	Description
① Embedded Web Server	Set up the device, monitor status, counters, diagnostics, and view event log records, all over the network, using a standard web browser.
② High-Speed I/O	SER-3200: 32 digital inputs in four (4) groups of eight (8) inputs. SER-2408: 24 digital inputs in three (3) groups of eight (8) inputs and one group of eight (8) outputs.
③ High-Speed Trigger Output	Digital output contact which can be configured to close momentarily on state change of one or more inputs to trigger an action, such as a waveform capture (WFC) by a compatible power meter.
④ Time Sync IN/OUT (RS-485)	Time sync OUT (when serving as a time-sync master to other devices) or time sync IN (when synchronized to another SER time-sync master) over RS-485 (2-wire plus shield). ASCII / RS-485 output is selectable.
⑤ LCD Display and Keypad	LCD display (backlit, 4-line by 20-characters) for local access to status and setup parameters. Menu, down-arrow, up-arrow and enter keys to operate LCD display.
⑥ EZC-IRIG-B/DCF77 (IN) or PLX-5V/PLX-24V (OUT)	DB-15-to-screw-terminal connector: EZ Connector (EZC) to accept IRIG-B or DCF77 time source (IN), or PTP Legacy Interface (PLX-5V or PLX-24V) to output IRIG-B, DCF77 or 1per10 (OUT).
⑦ SD Memory Card	SD memory card slot accepts a standard SDHC flash memory card, expandable to 32 GB. All device setup information is stored in XML file format on a 8GB SD card (standard) or 32GB (optional).
⑧ Ethernet Interface (10/100BaseTx)	Standard Ethernet RJ-45 network interface, with indicator LEDs for speed (10 or 100 Mbps) and link/activity. The SER auto-detects Ethernet wiring polarity and network speed.
⑨ Metal Enclosure	Industrial-grade, metal enclosure with standard DIN-rail mounting hardware.

Ordering Information

The following models and accessories are available for the CyTime SER-3200 and SER-2408 Event Recorders:

Table 1-2— CyTime SER and accessories catalog numbers

	Catalog no.	Description	—Voltage rating—	
			Control power	Inputs/ outputs
Sequence of Events Recorders (SER)	SER-3200-P2X2	CyTime Event Recorder, 32-inputs	24 Vdc	24 Vdc
	SER-3200-PTP ①	CyTime Event Recorder, 32-inputs, PTP option	24 Vdc	24 Vdc
	SER-3200-32GB ①	CyTime Event Recorder, 32-inputs, PTP + 32GB options	24 Vdc	24 Vdc
	SER-2408-P2X2	CyTime Event Recorder, 24-inputs/8-outputs	24 Vdc	24 Vdc
	SER-2408-PTP ①	CyTime Event Recorder, 24-inputs/8-outputs, PTP option	24 Vdc	24 Vdc
	SER-2408-32GB ①	CyTime Event Recorder, 24-inputs/8-outputs, PTP + 32GB options	24 Vdc	24 Vdc
	PTP-UPGRADE ① ②	PTP (IEEE 1588) Field Upgrade Kit for CyTime SER-3200/SER-2408	---	---
Accessories	EZC-IRIG-B	EZ connector for SER (input: IRIG-B time source)	---	---
	EZC-DCF77	EZ connector for SER (input: DCF77 time source)	---	---
	PLX-5V	PTP Legacy Interface (5V DCLS, for unmodulated IRIG-B output)	24 Vdc	---
	PLX-24V	PTP Legacy Interface (24V DCLS, for DCF77, 1per10 or 24V IRIG-B output to STR-IDM)	24 Vdc	---

① The PTP option is activated by a software license key, unique to each SER. When ordered with the -PTP or -32GB suffix, this key is installed at the factory. When ordered as a field-upgrade to an existing SER-3200/2408 (hardware version B1 or later), the key is provided via a license certificate.

② Please provide the serial number and MAC address of the existing CyTime SER at the time the order is placed for PTP field upgrade.

PTP (IEEE 1588) Option

Note: The PTP option requires SER hardware version B1 or later. For field upgrades of devices with earlier hardware versions, please contact Cyber Sciences for flexible options on returning unit(s) for factory modification to the latest hardware and firmware versions and activation of PTP license.

The PTP option is activated by a software license key, unique to each SER (based on its MAC address). When ordered using the -PTP or -32GB suffix, this key is installed at the factory, and a record of the key stored on the SD card.

When ordered as a field-upgrade to an existing SER-3200/2408 (must have hardware version B1 or later), the key is provided to the purchaser with a confirming license certificate. The key can be entered by the user via the device's own web interface using a standard web browser through the Setup-Admin web page.

If the SER-3200/2408 is configured as a PTP slave of a third-party grandmaster clock, the grandmaster must use options and settings that are compatible with the Simple PTP Profile (SPTP) used by the CyTime SERs. Normally, selecting the IEEE 1588 PTP E2E (End-to-End) Default Profile is sufficient. It may be desirable to increase the grandmaster's Delay Request Interval for large systems (more than one hundred slaves). Consult the clock manufacturer for specifications on the maximum number of PTP slaves it supports, as well as recommended adjustments to any other settings.

2—INSTALLATION

Dimensions

The dimensions for the CyTime Event Recorder are illustrated below. The dimensions are identical for both models (SER-3200 and SER-2408). The only difference is the connector for channels 25 through 32, as shown.

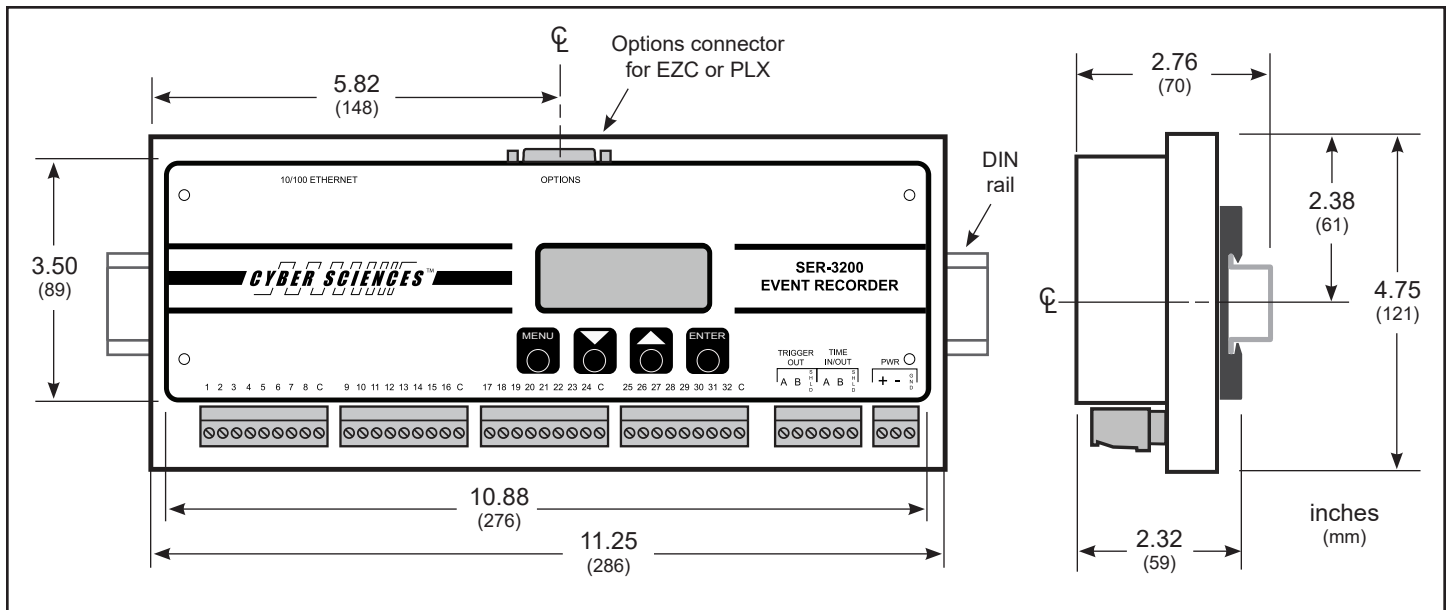


Figure 2-1. Front and side views, with dimensions—SER-3200

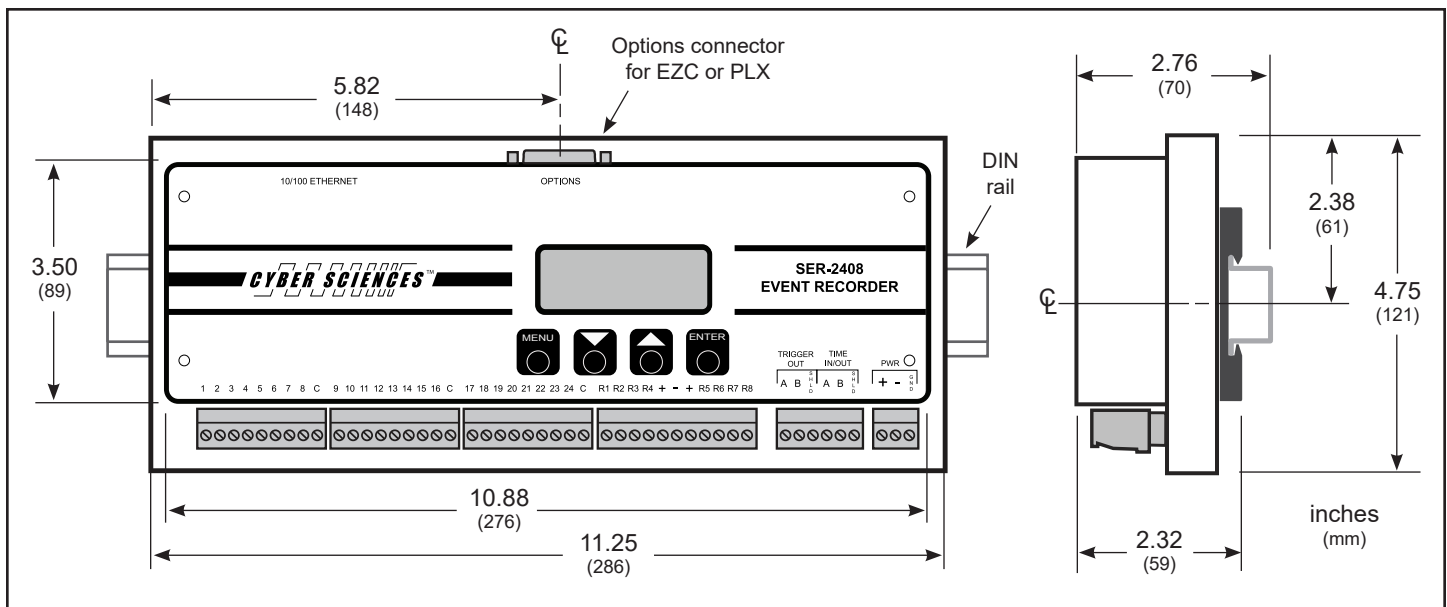


Figure 2-2. Front and side views, with dimensions—SER-2408

Mounting Considerations

The CyTime Event Recorder is designed to be mounted on a standard DIN rail in the orientation shown below. When choosing a mounting location, consider the following:

- Allow for easy access.
- Allow space for all wires to be neatly routed away from the device.
- Allow sufficient ventilation to stay within the operating temperature limits of the device (see section 7—Specifications).

Typical locations for mounting the SER include the following:

- Power equipment cell or compartment.
- Office or raised-floor environment.
- Auxiliary control panel or cabinet.

DIN-rail Mounting

The SER-3200/SER-2408 is mounted to a standard DIN rail by engaging the bottom edge first, then rotated into place as shown below:

- ① Start by engaging the lower edge of both DIN-mounting brackets with the bottom of the DIN rail as shown.
- ② Then raise the device to compress the spring-loaded jaws in the bottom clips to allow clearance for the edge of the top clips.
- ③ Rotate the top of the device to vertical...
- ④ ...and then lower the device into place onto the DIN rail.

To uninstall, simply reverse this process: raise the device (to compress the bottom springs) and then rotate the top outward.

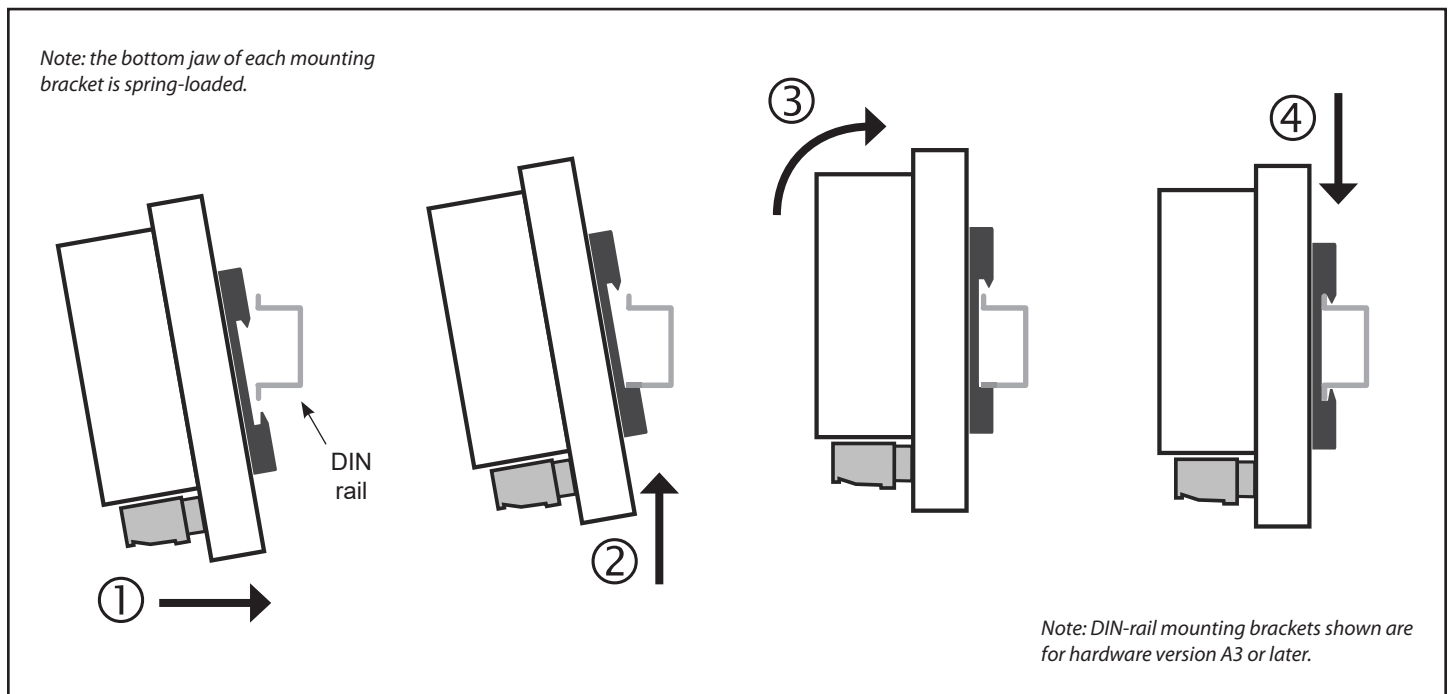


Figure 2-3. DIN-rail mounting (side views)

3—WIRING

Wiring Connections for SER-3200

Note: With PTP or IRIG-B time source, the CyTime SER typically requires 30 seconds to lock onto the precision time reference (Time Quality = Good). DCF77 may require up to 10 minutes.

An overview of wiring connections for the CyTime SER-3200 is shown below. The next page provides similar information for the SER-2408. Wiring connections include an Ethernet network interface (standard RJ-45 connector), time source input, digital inputs, control power input, optional trigger output, and optional time-sync IN or OUT (via RS-485 and/or PLX-5V or PLX-24V).

Removable plug-in, screw-terminal connectors are provided for connections at bottom. Optional adapters convert the DB-15 Options connector to a screw-terminal connector to support input or output of legacy protocols, such as IRIG-B or DCF77.

32 digital inputs (numbered 1-32) are divided into four (4) groups of eight (8), each sharing a common return (marked "C").

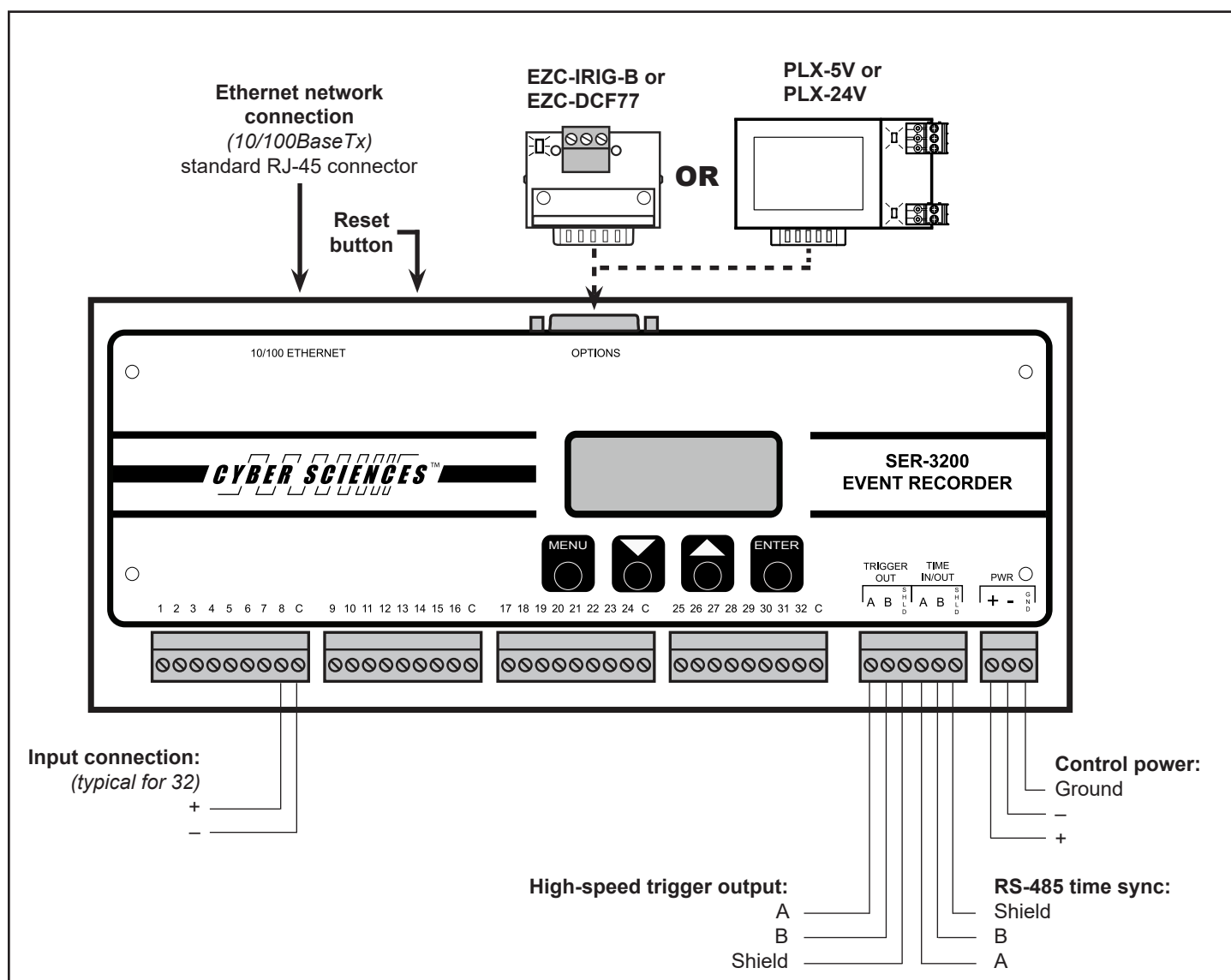


Figure 3-1. SER-3200 wiring connections

Wiring Connections for SER-2408

Note: With PTP or IRIG-B time source, the CyTime SER typically requires 30 seconds to lock onto the precision time reference (Time Quality = Good). DCF77 may require up to 10 minutes.

This page gives an overview of wiring connections for the CyTime SER-2408. (See previous page for similar information for the SER-3200). Wiring connections include an Ethernet network interface (standard RJ-45 connector), time source input, digital inputs, relay outputs, control power input, optional trigger output, and optional time-sync IN or OUT (via RS-485 and/or PLX-5V or PLX-24V).

Removable plug-in, screw-terminal connectors are provided for connections at bottom. Optional adapters convert the DB-15 Options connector to a screw-terminal connector to support input or output of legacy protocols, such as IRIG-B or DCF77.

24 digital inputs (numbered 1-24) are divided into three (3) groups of eight (8), each sharing a common return (marked "C").

Eight (8) relay outputs (R1 through R8) are further subdivided into two banks of four (4), each of which has a PLUS (+) connection for 24 Vdc control power and shares its own common. Control power voltage may be supplied from the same power supply that powers the device or from a separate, isolated 24 Vdc power supply.

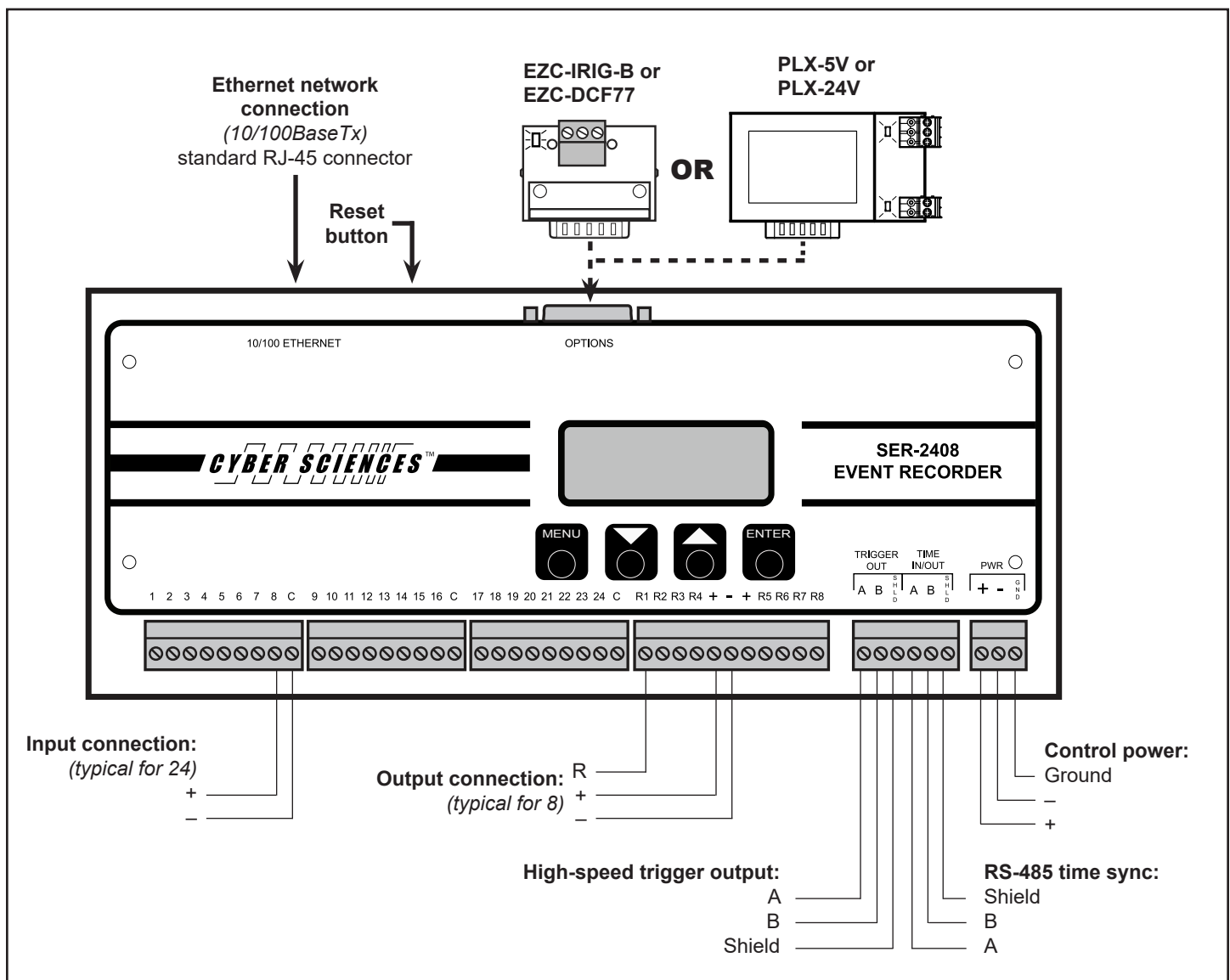


Figure 3-2. SER-2408 wiring connections

Digital Inputs (SER-3200)

The SER-3200 has 32 isolated digital inputs arranged in four (4) groups of eight (8), each sharing a common return, wired as shown.

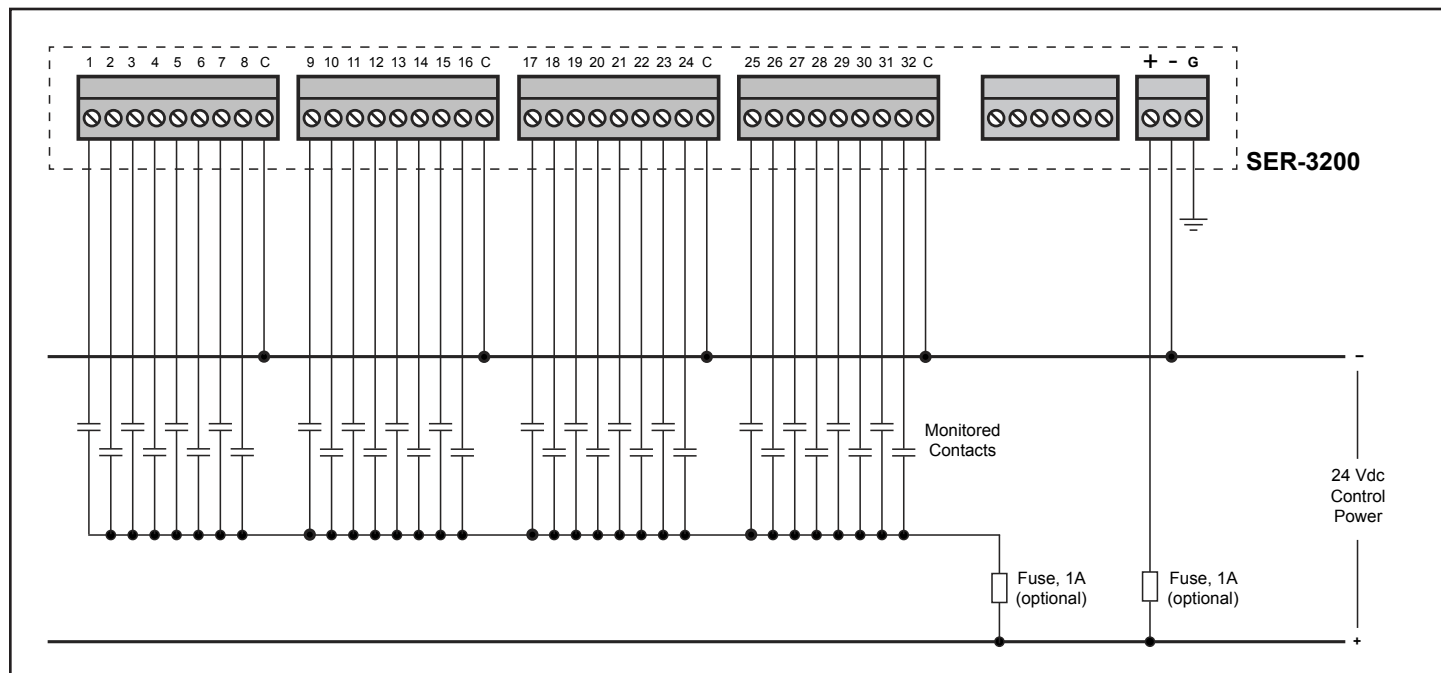


Figure 3-3. Digital input wiring connections (SER-3200)

Digital Inputs/Outputs (SER-2408)

The SER-2408 has 24 isolated digital inputs arranged in three (3) groups of eight (8), each sharing a common return, and one group of eight (8) digital relay outputs, also sharing a common return, wired as shown.

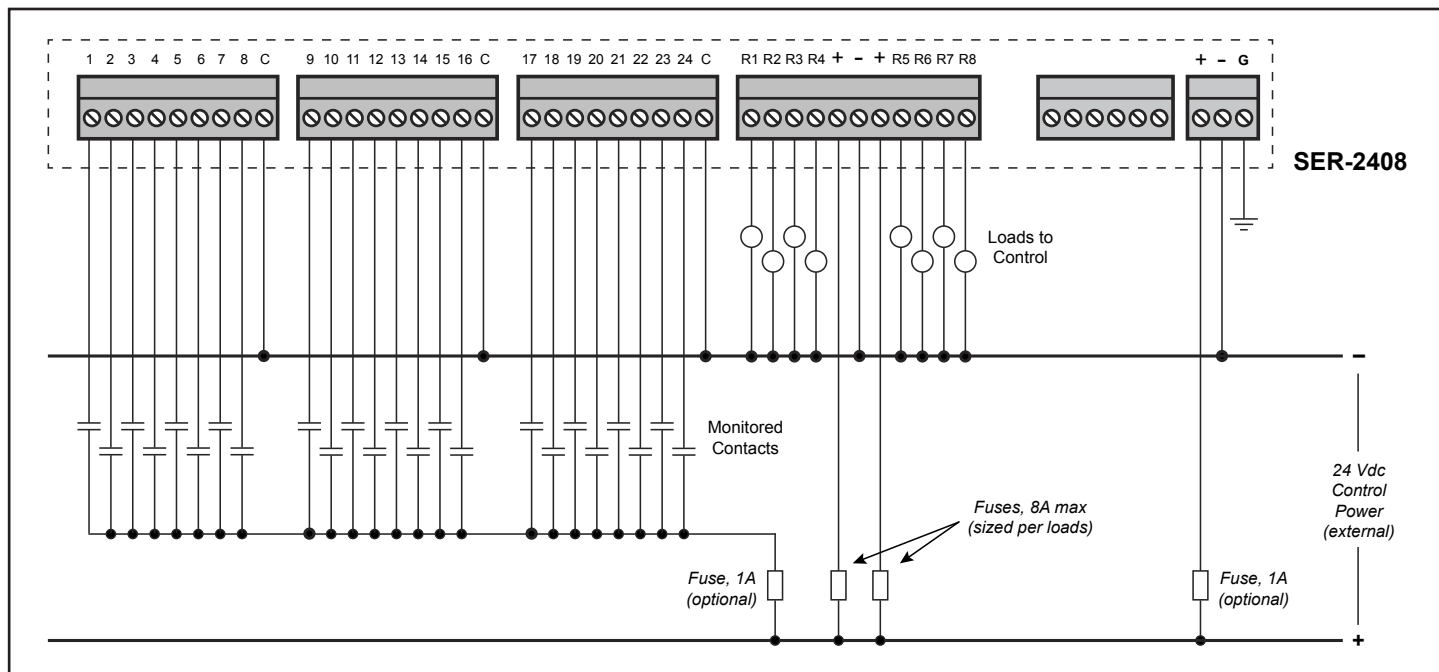


Figure 3-4. Digital input/output wiring connections (SER-2408)

Control Power

*Note: The common connection from the 24Vdc power supply should **not** be connected to green-wire ground unless specified by local electrical codes.*

The CyTime SER-3200/SER-2408 requires a control power source with nominal voltage of 24 Vdc. The control power connector has three terminals: 24 Vdc positive and common connections and a safety ground connection (green-wire ground).

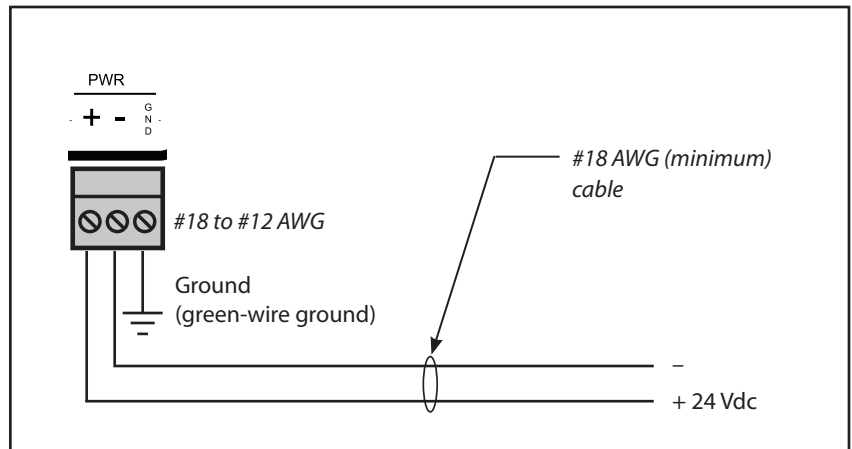


Figure 3-5. Control power connections

Time Sync (PTP Master or Slave)

The CyTime SER-3200/2408 Event Recorder supports PTP (per IEEE 1588). User setup determines whether the device functions as a PTP master or PTP slave (or neither). The SER-3200/2408 offers several time-sync input and time-sync output options, as well as trigger output for waveform capture. PTP can be used in conjunction with these capabilities to form a flexible system that is compatible with third-party clocks and can “PTP-enable” meters and relays that currently support only legacy protocols.

In the example shown in Figure 3-6, one or more CyTime Event Recorders are configured as PTP slaves and sync automatically with a GPS clock (by others) which serves as PTP master (grandmaster).

PTP time sync is accomplished over the same Ethernet network used for data communications, and so the only wiring connection is to the Ethernet network via the RJ-45 connector at the top of the device, using standard Ethernet cable (e.g., Cat. 5E).

Alternatively, a CyTime SER-3200/2408 can be the PTP master. In the example shown in Figure 3-7, the first CyTime Event Recorder serves as PTP grandmaster; all other SERs sync automatically using PTP over the Ethernet network. The SER serving as grandmaster may use any convenient time source: IRIG-B, DCF77, NTP or even periodic updates from an EPMS server using Modbus TCP over Ethernet.

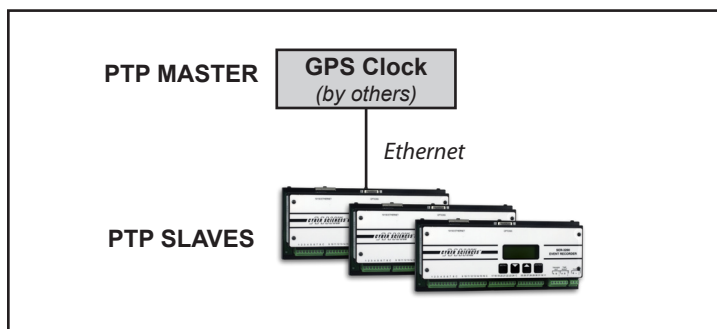


Figure 3-6. SER-3200/2408 as PTP slave(s) using PTP over Ethernet to sync with PTP master clock by others

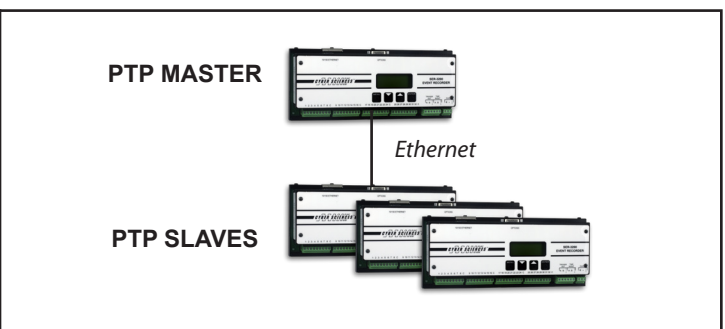


Figure 3-7. One SER-3200/2408 is PTP master and syncs all other SERs (PTP slaves) over Ethernet

Time Sync IN (IRIG-B or DCF77)

The CyTime SER accepts IRIG-B or DCF77 time reference via its DB-15 "Options" connector at the top of the device. An optional wiring accessory (EZC-IRIG-B or EZC-DCF77) facilitates wiring as shown in the figure below.

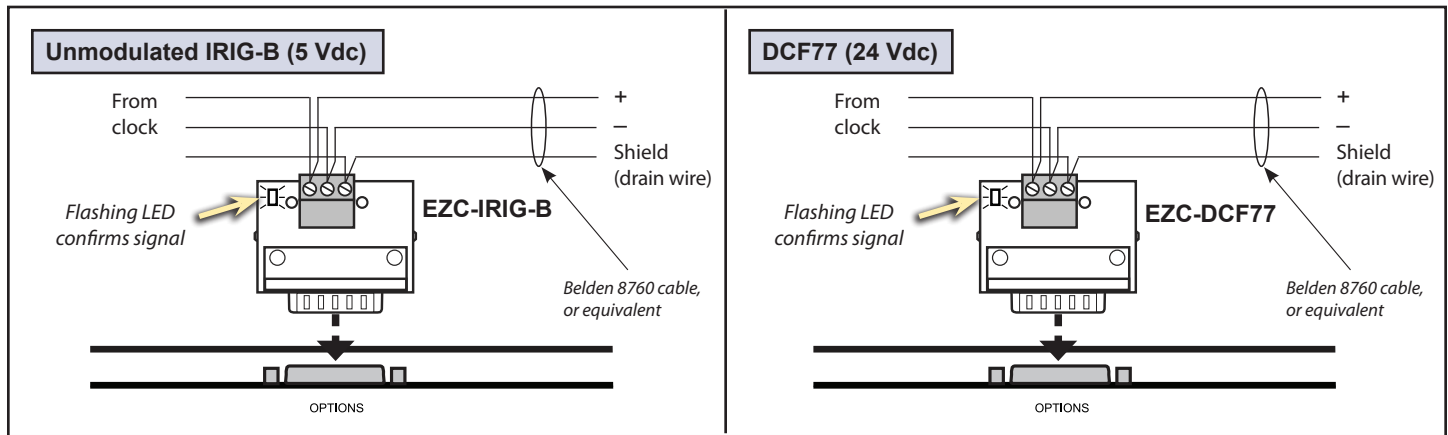


Figure 3-8. CyTime SER uses optional EZC-IRIG-B or EZC-DCF77 to accept time source of IRIG-B or DCF77, respectively.

Time Sync OUT (IRIG-B, DCF77 or 1per10)

When the time source is PTP, the CyTime SER can be configured to output a legacy protocol (IRIG-B, DCF77 or 1per10) via its DB-15 "Options" connector using a PTP Legacy Protocol Interface, type PLX-5V or PLX-24V, as shown below.

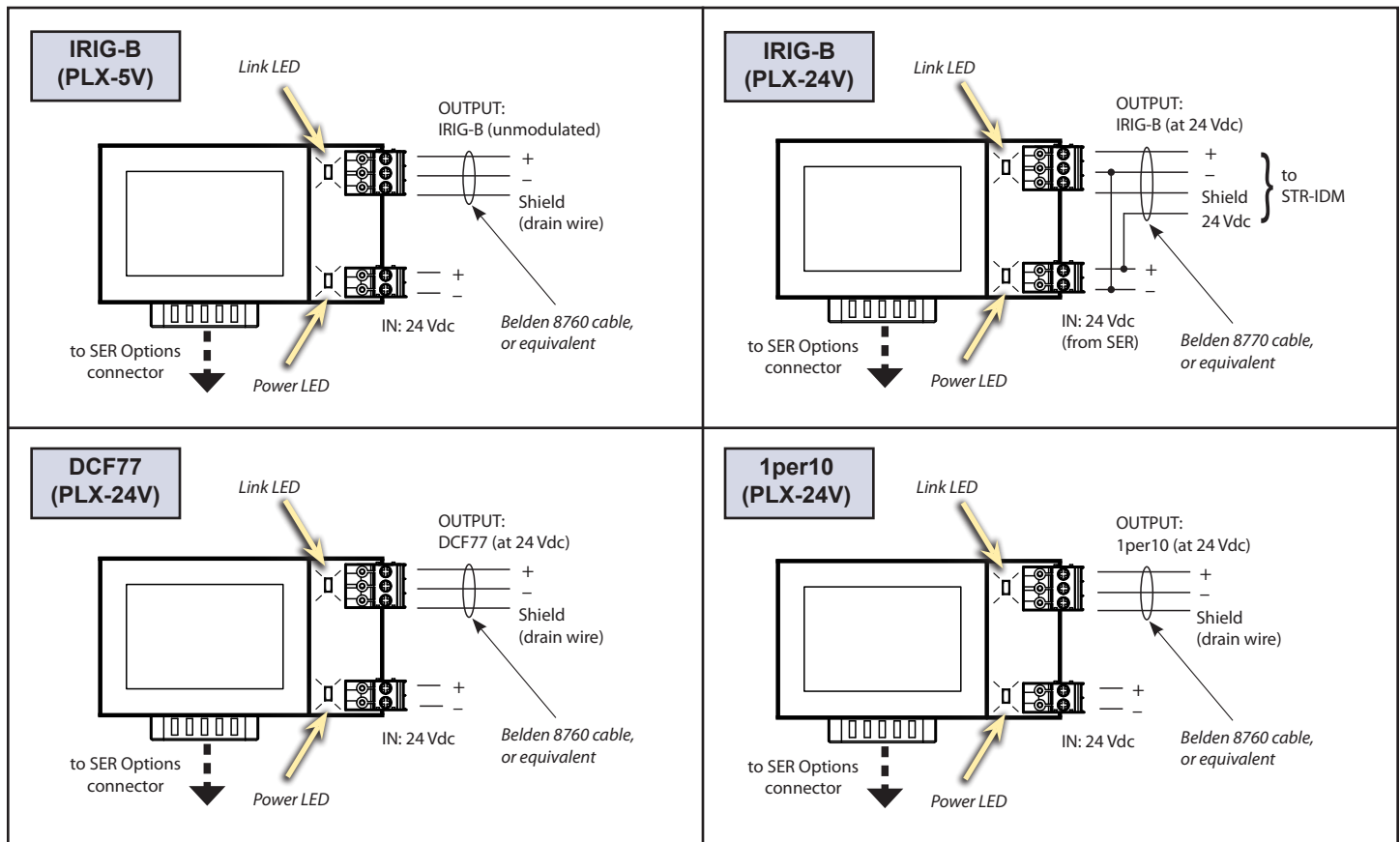


Figure 3-9. CyTime SER uses PLX-5V or PLX-24V to output legacy protocols (IRIG-B, DCF77 or 1per10) at 5V or 24V, respectively.

RS-485 Time Sync IN/OUT (Inter-SER or ASCII OUT)

The CyTime SER inter-device time-sync (RS-485) can be wired to one device or daisy-chained to multiple devices. This is also used to output ASCII/RS-485: an ASCII string originally defined by Arbiter Systems called "ASCII + QUAL" (9600 bps). This consists of an on-time mark (OTM) once per second followed by ASCII representation of the date/time and time-quality as follows:

<soh>ddd:hh:mm:ssQ where: soh = Hex 01 (start bit = OTM) and Q = time quality (space = locked, ? = unknown)

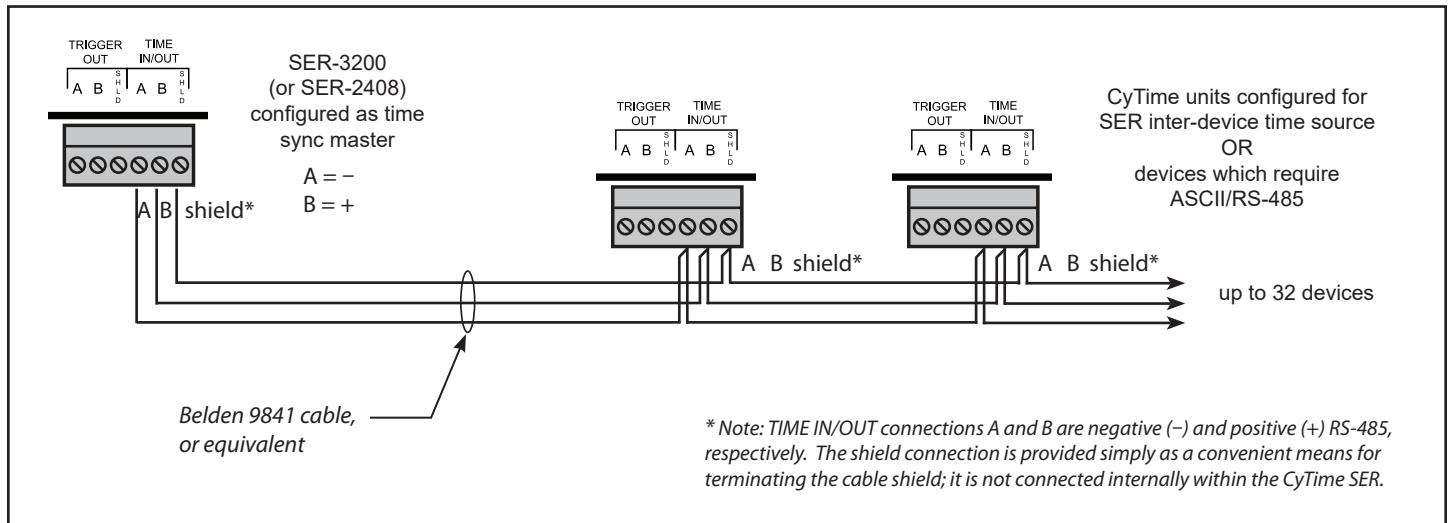


Figure 3-10 SER inter-device (RS-485) time sync input/output or ASCII/RS-485 time-sync output.

Trigger Output (to One or More Devices)

The Trigger Output can be wired to a single device or in parallel to multiple devices as shown in the figure below. (Note: trigger output is available with all models.)

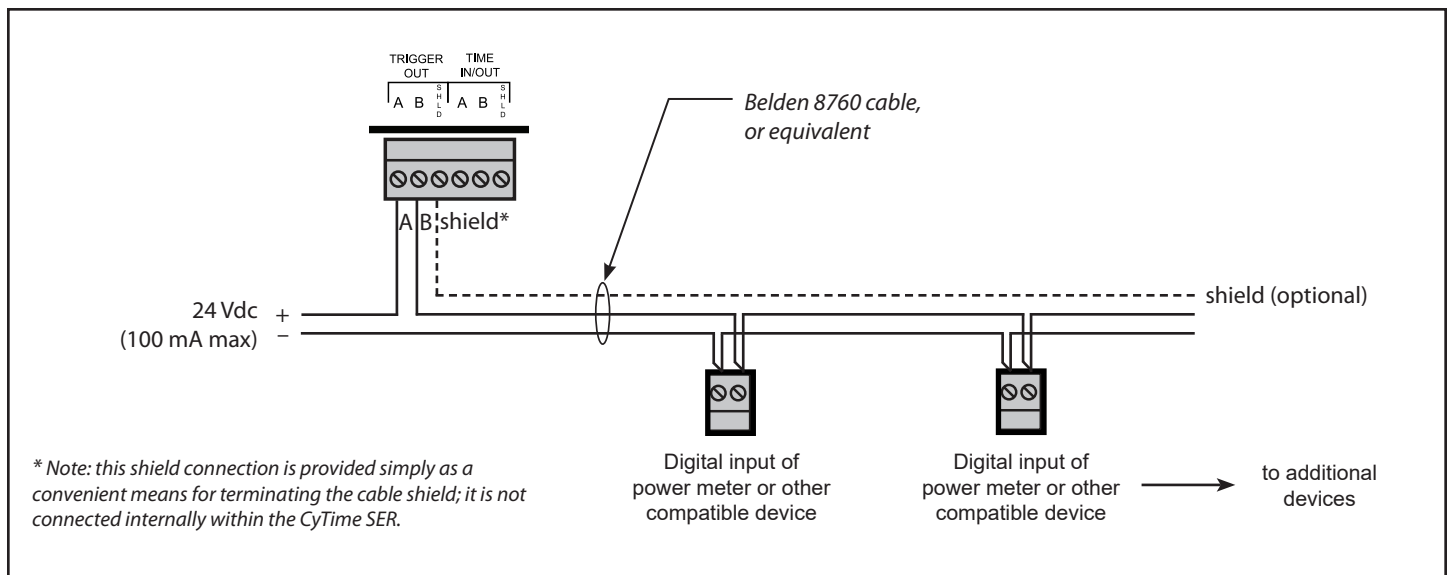


Figure 3-11. Trigger output connection to multiple devices

4—OPERATION

Local Display and Keypad

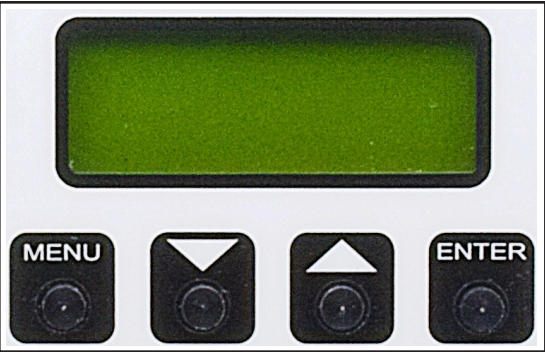


Figure 4-1. LCD display and keys

The CyTime Event Recorder features a 4-line by 20-character, backlit LCD display to provide local access to status and setup parameters.

The main menu screen displays viewing options to verify correct operation, including current date/time, time quality and time zone offset. In addition, communications parameters (DHCP, IP address, subnet mask, and default gateway) can be set or modified via “Setup-Comms”. Use the UP- and DOWN-arrow keys (▼ ▲) followed by the **ENTER** key to select an option. Touching the **MENU** key at any time returns to the main menu screen.

Menu structure and sample screens are shown below. Note: if any channel status is “forced” OFF or ON (manual test mode) this is indicated by a flashing character. Inverted states are indicated by a slash (“/” = OFF/inverted) or an asterisk (“*” = ON/inverted). In addition, if a relay output is commanded open or closed but does not change to the desired state, this error condition is indicated by a flashing lower-case “e”. These are all summarized in the legend below.

LCD Menu Structure

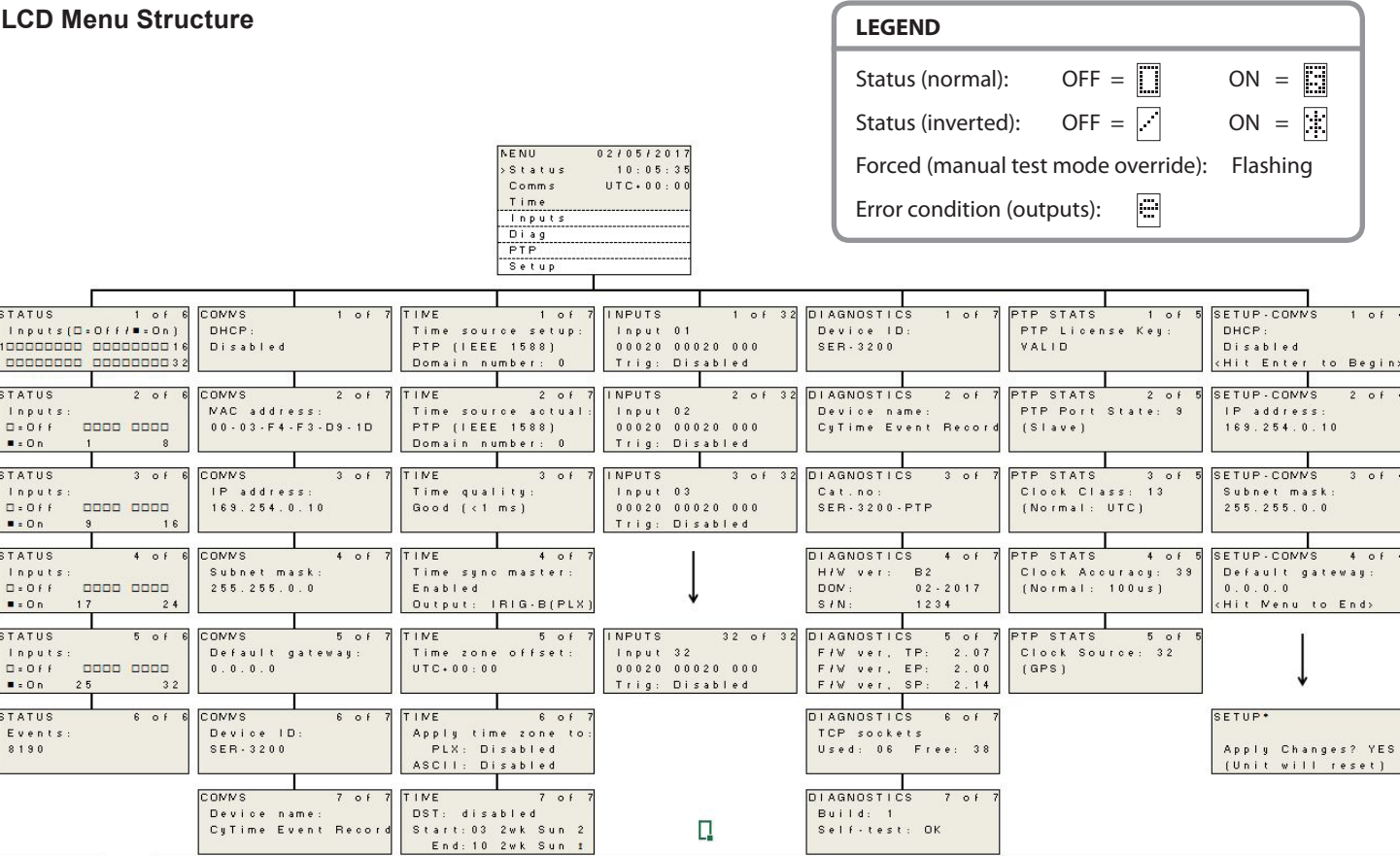


Figure 4-2. LCD display menu structure (model SER-3200-PTP example shown)

Initial Setup via LCD/Keypad

To change COMMS settings from the SER front panel main menu, use the DOWN-ARROW key (▼) to select the SETUP option, then press **ENTER**. To make a change to any of the four settings screens, perform the following:

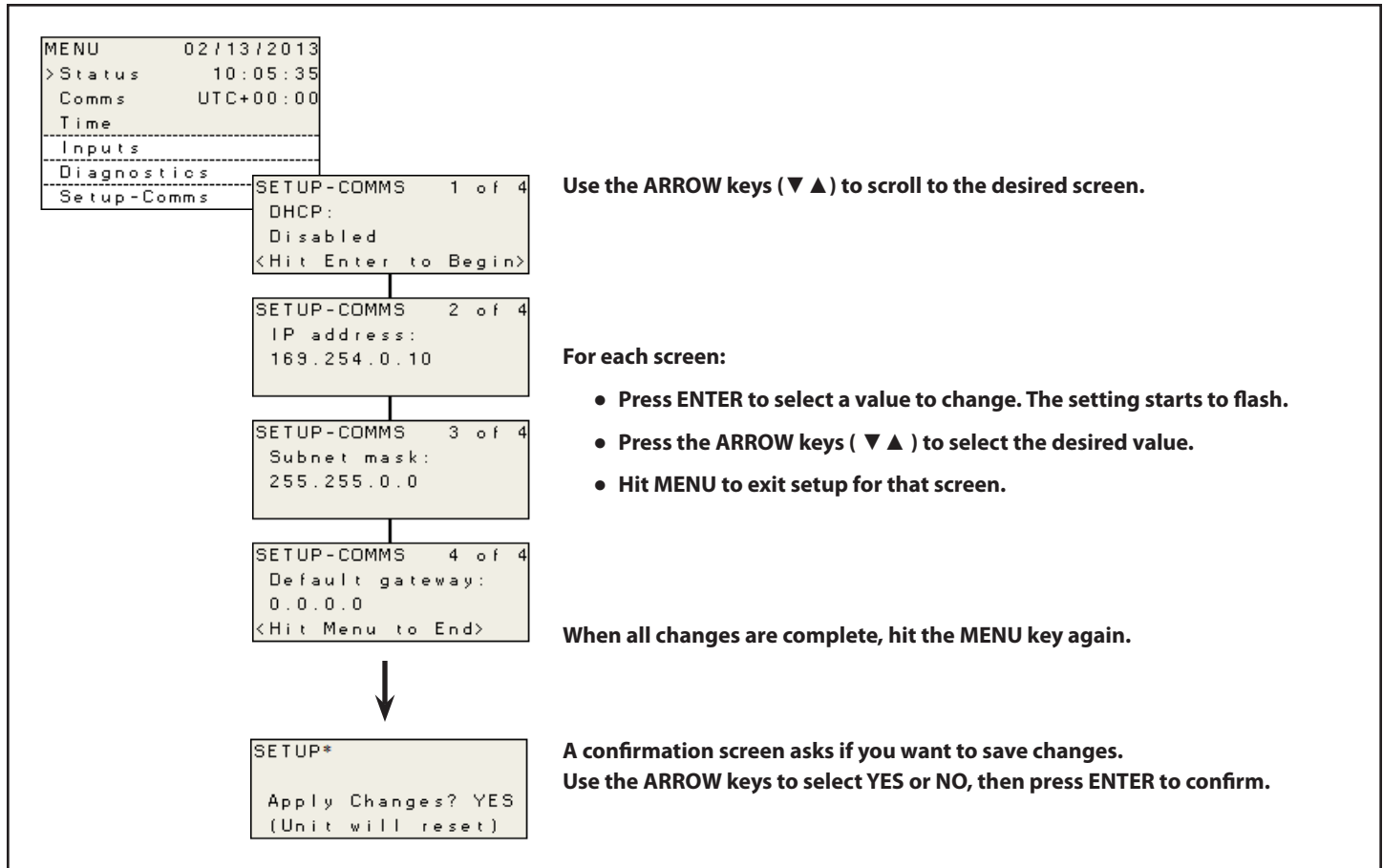


Figure 4-3. Initial setup via LCD/keypad

Table 4-1— Initial communications settings

Option	Description	Available values	Default
DHCP enabled	When enabled, the SER automatically obtains an IP address from a DHCP server at startup. ①	enabled or disabled	disabled
IP address	The network (IP) address of the SER. ①	0.0.0.0 to 255.255.255.255	169.254.0.10
Subnet mask	The Ethernet IP subnet mask of your network. ①	0.0.0.0 to 255.255.255.255	255.255.0.0
Default gateway	The IP address of the gateway (router) serving the SER. ①	0.0.0.0 to 255.255.255.255	0.0.0.0

① If setting is changed, the unit will restart automatically.

5—SETUP (WEB SERVER)

Initial Setup via Web Page (Direct-connect)

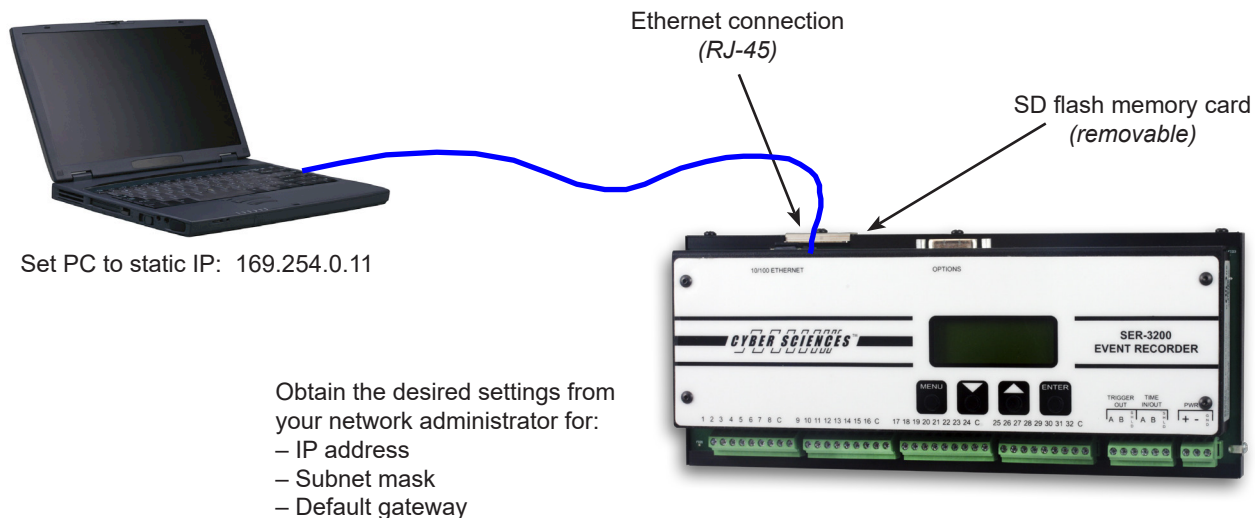


Figure 5-1. Initial setup connection

Note: Initial setup of communications parameters can also be done via the front LCD and keypad. See previous page.

Direct connection to PC.

1. Connect the SER to your PC using a standard Ethernet patch cable. (The SER auto-detects wiring polarity— a special crossover cable is not required.)
2. Set PC to use static IP address of 169.254.0.11.
3. Apply power to the SER.
4. Open a standard web browser, such as Internet Explorer (version 9 or later is recommended).
5. Type the default IP address (169.254.0.10) into your web browser.
6. Enter the default user name (admin) and password (admin) and click "Login" to access the home page.
7. Click the Setup tab, then change the network settings to those provided by your network administrator and click "Update" to save.
8. Disconnect the Ethernet patch cable and connect the SER to your local area network. Continue to the next section for additional setup.
9. Restore your PC to its previous network settings. (e.g., "Obtain IP address automatically.")

Setup via Web Page (Over a Network)

Setup can be accomplished over an Ethernet network using a standard web browser.

At the login screen, enter user name (default = admin) and password (default = admin).

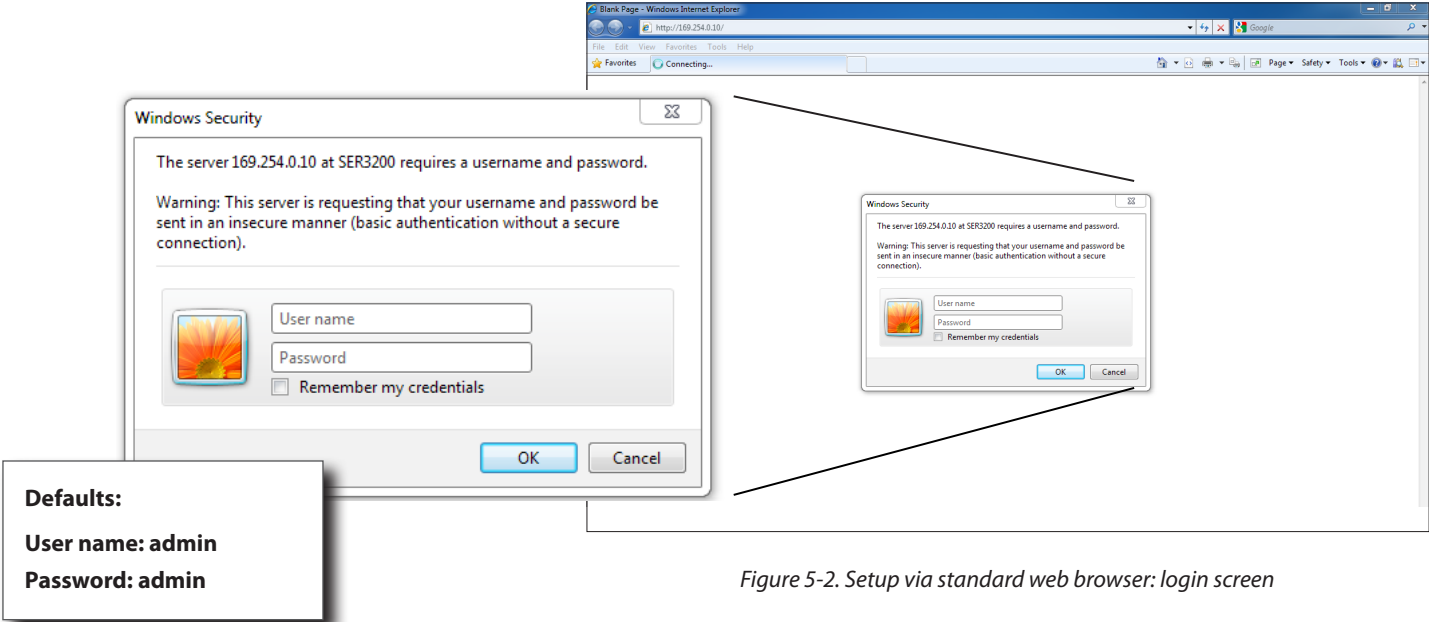


Figure 5-2. Setup via standard web browser: login screen

As shown below, the monitoring screen appears. Clicking the setup tab provides access to setup parameters.

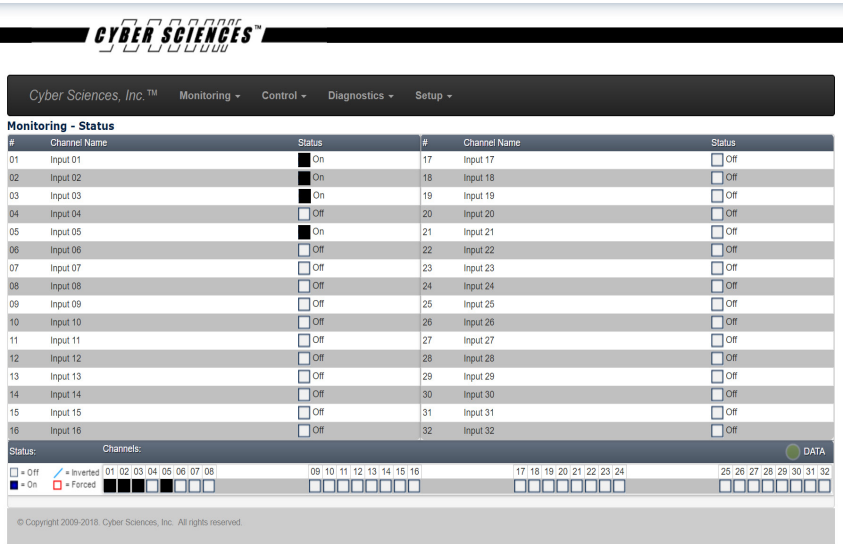


Figure 5-3. SER home page (Monitoring screen)

Communications Setup

The SER features a standard Ethernet interface (10/100BaseTx) for connection to a local area network (LAN). The device auto-detects wiring polarity and network speed (10 or 100 Mbps). To change other parameters, clicking setup brings up the communications setup page:

Note: The "Defaults" button loads default settings for the displayed page only, and changes are not saved until the user hits "Apply" and confirms. To set all setup values to default settings, visit all setup pages and click "Defaults" (followed by "Apply" to save changes.)

Figure 5-4. Communications setup web page

Table 5-1— Communications settings

Option	Description	Available values	Default
MAC Address	The physical address of the SER Ethernet port (unique value assigned at factory).	hh-hh-hh-hh-hh-hh (read-only)	assigned at factory
Media Type	The Ethernet network speed of the SER. ① (The frame type is Ethernet II.)	10 or 100 Mbps, half- or full-duplex, or auto	10/100BaseTx Auto
DHCP Enabled	When enabled, the SER automatically obtains an IP address from a DHCP server at startup. ①	enabled or disabled	disabled
IP Address	The network (IP) address of the SER. ①	0.0.0.0 to 255.255.255.255	169.254.0.10
Subnet Mask	The Ethernet IP subnet mask of your network. ①	0.0.0.0 to 255.255.255.255	255.255.0.0
Default Gateway	The IP address of the gateway (router) serving the SER. ①	0.0.0.0 to 255.255.255.255	0.0.0.0
FTP Server Enabled	When enabled, allows FTP access to the SER file system stored on the SD memory card. ①	enabled or disabled	enabled
Device ID	ID assigned to the SER (used by some PLCs and application software)	UTF-8 text string, ② 12 characters max	CyTime SER
Device Name	Descriptive name assigned to the SER (used by SER web pages and some application software)	UTF-8 text string, ② 32 characters max	CyTime Event Recorder

① If this setting is changed by the user, the unit will restart automatically.

② The following special characters are excluded: \ / : * ? " , < > |

Time Setup

Clicking “Time” under the setup tab brings up the time setup web page:

Note: Only one protocol can be selected for output via the PLX connector (IRIG-B, DCF77 or 1per10). However, for maximum flexibility, the ASCII / RS-485 output is enabled by default any time an SER is set to use PTP for time source (IN) or time-sync (OUT).

The screenshot displays the 'Setup - Time' web page for Cyber Sciences. The interface includes a navigation bar with 'Monitoring', 'Control', 'Diagnostics', and 'Setup' tabs. The 'Setup' tab is active, showing the 'Time' configuration section. Key settings include: Date and Time (04/12/2018 20:01:29 UTC+0:00), Time Source (IN) set to PTP (IEEE1588), Time Sync Master (OUT) disabled, Time Zone Offset set to UTC+00:00, and Daylight Saving Time (DST) disabled. A PTP License status box on the right indicates 'Valid' with a green checkmark. Other settings like NTP Polling Interval (1 hour), Primary NTP Server (24.56.178.140), and Secondary NTP Server (129.6.15.39) are also visible. The page footer shows '© Copyright 2009-2018. Cyber Sciences, Inc. All rights reserved.'

Figure 5-5. Time setup web page (with PTP time source setting shown)

Table 5-2— Time settings

Option	Description	Available values	Default
Time Source (IN)	Specifies the time source input: – IRIG-B (unmodulated, 5V DCLS) – DCF77 – SER inter-device (IRIG-B or DCF77 over RS-485) – PTP (per IEEE 1588) – NTP (network time server) – Manual time set (external time-sync)	IRIG-B, DCF77 Inter-SER (IRIG-B), Inter-SER (DCF77), PTP (slave), NTP (client), or Manual (external)	IRIG-B
Time Sync Master (OUT)	Indicates if this SER also serves as the master time source for other devices. (Not applicable if time source is RS-485).	enabled or disabled	disabled
Time-sync Output	Specifies the output protocol (if time-sync master enabled): – PTP master (over Ethernet); – IRIG-B or DCF77 or 1per10 (via PLX adapter); – IRIG-B or DCF77 or ASCII (over RS-485)	PTP, IRIG-B, DCF77, 1per10, IRIG-B (RS-485), DCF77 (RS-485), or ASCII (RS-485)	none
Time Zone Offset	Offset in hours and minutes from Coordinated Universal Time (UTC) to adjust time for local time zone.	-12:00 to +13:00	0 (UTC+00:00)
Apply Offset to: PLX ①	Apply time zone offset to IRIG-B or DCF77 output via PLX	enabled or disabled	disabled
Apply Offset to: ASCII ①	Apply time zone offset to ASCII output (RS-485)	enabled or disabled	disabled
Hourly Test Event	Record an event each hour to confirm proper operation.	enabled or disabled	disabled
Alternate Date Format	The default date format for all display is mm/dd/yyyy When alternate date format is enabled, dd/mm/yyyy is used	enabled or disabled	disabled

① Firmware version v. 2.12 or later. ② Firmware version v. 2.14 or later.

Time Setup (cont.)

Clicking “Time” under the setup tab brings up the time setup web page:

Note: The ASCII (RS-485) time-sync output option generates a proprietary code defined by Arbiter Systems called “ASCII + QUAL.” Typically, this is used to synchronize PowerLogic ION7550/7650 and PM8000 meters from Schneider Electric or 9510/9610 meters from Siemens. Set the meter's time-sync protocol to “GPS:ARBITER” and COM port baud rate to 9600 bps.

Figure 5-6. Time setup web page (with DST settings shown)

Table 5-2— Time settings (cont.)

Option	Description	Available values	Default
Daylight Saving Time (DST)	Apply DST adjustment (+1 hour) during specified period	enabled or disabled	disabled
DST Start and End ②	Starting and Ending Date/Time to apply DST if enabled	Month: Jan - Dec Week: 1st - 5th (last) Day: Sun - Sat Time: 00:00 - 23:00	US defaults (shown above)
NTP Polling Interval	Interval used to update device clock from a network time server via NTP protocol	1, 2, 5, 10, 15, 30 min, 1, 2, 4, 8, 12 hours, 1 day, or 1 week	1 hour (60 minutes)
NTP Time Server IP (Primary and Secondary)	IP addresses of NTP time servers. (If sync via primary time server fails, device tries secondary time server IP address)	0.0.0.0 to 255.255.255.255	25.56.178.140 (www.nist.gov) 129.6.15.30 (time-c.nist.gov)
Last NTP Sync	Date/time of last successful NTP time sync, as well as the IP address of the NTP time server used	Jan 01, 2000 through Dec 31, 2120	(read-only)
PTP Domain Number	PTP slaves must use same domain number as PTP master	0 to 127	0
PTP Priority 1 ②	For multiple PTP masters, best master clock algorithm uses this value as first “tie-breaker” to select grandmaster	0 to 255	128
PTP Priority 2 ②	For multiple PTP masters, best master clock algorithm uses this value as second “tie-breaker” to select grandmaster	0 to 255	128
Manual Time Set	Allows the date/time to be set manually (external or copy from the PC clock's current date and time)	Jan 01, 2000 through Dec 31, 2120	Jan 01, 2000 00:00:00

① Firmware version v. 2.12 or later. ② Firmware version v. 2.14 or later.

Inputs Setup

Clicking "Inputs" brings up the inputs setup web page:

Enabled	Input Name	Filter	Debounce	Chatter	Off Text	On Text	Trigger	Inverted	Data Log Group
<input checked="" type="checkbox"/>	Input 01	20	20	0	Off	On	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Group 1
<input checked="" type="checkbox"/>	Input 02	20	20	0	Off	On	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Group 1
<input checked="" type="checkbox"/>	Input 03	20	20	0	Off	On	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Group 1
<input checked="" type="checkbox"/>	Input 04	20	20	0	Off	On	<input type="checkbox"/>	<input type="checkbox"/>	Group 2
<input checked="" type="checkbox"/>	Input 05	20	20	0	Off	On	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Group 2
<input checked="" type="checkbox"/>	Input 06	20	20	0	Off	On	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Group 2
<input checked="" type="checkbox"/>	Input 07	20	20	0	Off	On	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Group 3
<input checked="" type="checkbox"/>	Input 08	20	20	0	Off	On	<input type="checkbox"/>	<input type="checkbox"/>	Group 3
<input checked="" type="checkbox"/>	Input 09	20	20	0	Off	On	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	None
<input checked="" type="checkbox"/>	Input 10	20	20	0	Off	On	<input type="checkbox"/>	<input type="checkbox"/>	None
<input checked="" type="checkbox"/>	Input 11	20	20	0	Off	On	<input checked="" type="checkbox"/>	<input type="checkbox"/>	None
<input checked="" type="checkbox"/>	Input 12	20	20	0	Off	On	<input type="checkbox"/>	<input checked="" type="checkbox"/>	None
<input checked="" type="checkbox"/>	Input 13	20	20	0	Off	On	<input checked="" type="checkbox"/>	<input type="checkbox"/>	None
<input checked="" type="checkbox"/>	Input 14	20	20	0	Off	On	<input type="checkbox"/>	<input type="checkbox"/>	None
<input checked="" type="checkbox"/>	Input 15	20	20	0	Off	On	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	None
<input checked="" type="checkbox"/>	Input 16	20	20	0	Off	On	<input type="checkbox"/>	<input type="checkbox"/>	None

Figure 5-7. Inputs setup web page

Table 5-3— Inputs settings

Option	Description	Available values	Default
Input	Each input can be enabled for event recording. This does not affect status monitoring—only recording of state changes.	enabled or disabled	enabled
Input Name	Text string (UTF-8) to describe a given input.	32 characters max ①	Input nn
Filter	Filter time is the minimum time that an input must remain in its new state before it is recorded as an event. This helps eliminate false events due to noise, transients, etc.	0 to 65535 ms ②	20
Debounce	Debounce time is the period that event processing is suspended for a given input after an event has been recorded. This prevents recording multiple events for a single state change.	0 to 65535 ms ②	20
Chatter	Chatter count is the maximum number of events recorded for a given input per minute. If the number of events per minute exceeds the setpoint, the input will be disabled for further event processing until the number of events per minute drops below the setpoint. This prevents recording an excessive number of events due to a faulty input. Events are also generated to indicate the time event processing was suspended / resumed.	0 to 255 (0 = disabled)	0 (disabled)
Off Text and On Text	Customized label to describe an input's "off" state and "on" state	UTF-8, 16-char. ①	Off
High-speed Trigger Output	Any input can be configured to close the "Trigger Out" contact on status change. This is typically used to trigger a compatible power meter to capture current and voltage waveforms coincident with an event to aid analysis and troubleshooting.	enabled or disabled	disabled
Inverted	Any input can be designated as "inverted" and status reported opposite of its sensed state	normal or inverted	normal
Group Assignment (for Data Logs)	Each input can be assigned to a data log group for reporting purposes	None, or Group 01 to Group 16	None

① The following special characters are excluded: \ / : * ? " , < > |

② Setting this time too low (e.g., < 5 ms) can cause unwanted events to be recorded; setting too high (e.g., > 100 ms) can result in missed events.

Outputs Setup (SER-2408 only)

Clicking “Outputs” under the setup tab brings up the Outputs setup web page:

Note: Assigning an output to a group allows status recording of ALL members of a group coincident with any group member’s change of state. To enable EPSS data logs for a group, you must ALSO enable the group and allocate records—via the “Groups” setup page.

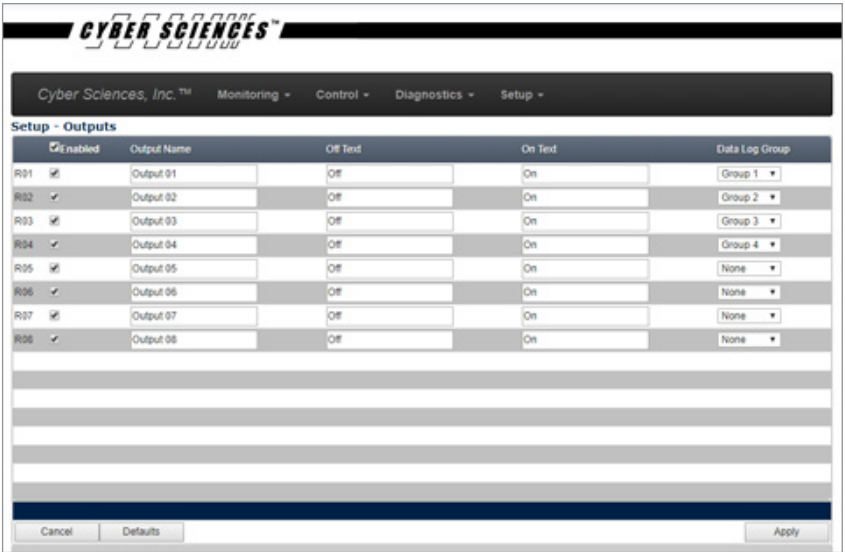


Figure 5-8. Outputs setup web page (SER-2408 only)

Table 5-4— Outputs settings

Option	Description	Available values	Default
Output	Each Output can be enabled for event recording. This does not affect status monitoring—only recording of state changes.	enabled or disabled	enabled
Output Name	Text string (UTF-8) to describe a given output.	32 characters max ①	Output R1, etc.
Off Text	Customized label to describe an Output’s “off” state.	UTF-8 text string, ① 16 characters max	Off
On Text	Customized label to describe an Output’s “on” state.	UTF-8 text string, ① 16 characters max	On
Group Assignment (for Data Logs)	Each output can be assigned to a data log group for reporting purposes	None, or Group 01 to Group 16	None

① The following special characters are excluded: \ / : * ? " , < > |

Groups Setup

Clicking “Groups” brings up the Groups setup web page:

Note: To activate EPSS data logging, a group must be enabled, at least one group member defined (via Inputs or Outputs Setup page) and sufficient space (records) allocated.

Note: Click the “Auto-Allocate” check box to have the system calculate the optimal number of records (equal allocation across all enabled groups). To return to previously saved values, click “Cancel.”

Figure 5-9. Group setup web page (SER-2408 shown)

Group assignments are used to establish an association among two or more inputs or outputs. For example, three inputs may be assigned to the group representing the normal, emergency and test states of an ATS, along with one relay output to initiate switching. Enabling groups, assigning members, and allocating records causes the SER to log the status of all group members in a contiguous set of Modbus registers. This is used by some report modules, such as EPSS test reports, to confirm regulatory compliance. If logging has begun and then a group is disabled, data logging for this group is suspended. However, changes to any group’s members or allocated records causes all data logs to be cleared and restarted.

Table 5-5— Groups settings

Option	Description	Available values	Default
Group	Each group can be enabled for data logging in the expanded Modbus register area. This does not affect status monitoring—only recording of state changes in the expanded memory area.	enabled or disabled	disabled
Group Name	Text string (UTF-8) to describe a given data log group.	32 characters max ①	Group nn
Group Members	Inputs and/or outputs assigned to this group (from previous setup pages)	Inputs 01 to 32 (or 24) and Outputs R1 to R8 (read-only)	----
No. of Records (Log File Depth)	Number of records to be allocated to each group’s data log, (up to 56000 registers maximum for all records).	0 to 16000	0
No. of Registers	This is calculated as the product of “1 + number of records” times the record length (4 + the number of group members)	0 to 56000 (read-only)	----
Starting Register	Starting register designated for a given group’s data log, based on the number of registers allocated.	409501 to 465500 (read-only)	----
Ending Register	Ending register designated for a given group’s data log, based on the number of registers allocated.	409501 to 465500 (read-only)	----

① The following special characters are excluded: \ / : * ? " , < > |

Administration Setup

Clicking “Administration” brings up the administration setup web page:

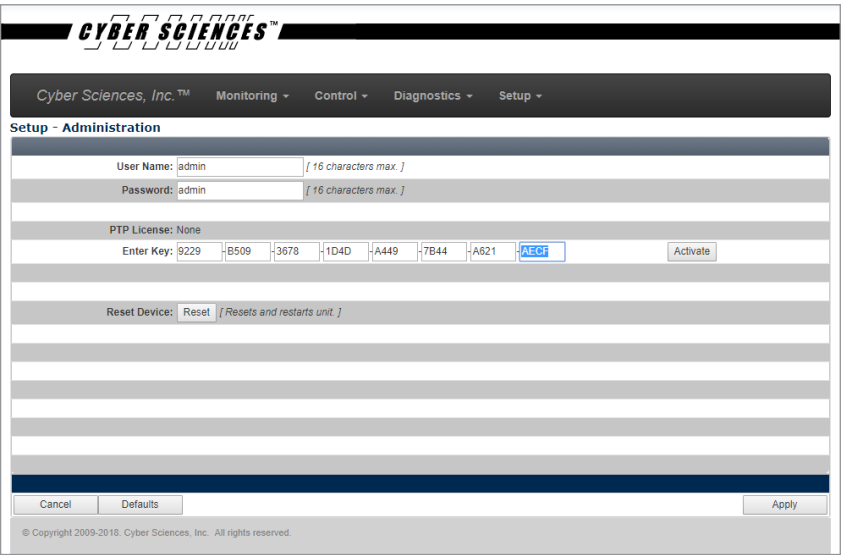


Figure 5-10. Administration setup web page (example shows entering PTP license key)

Table 5-6— Administration settings

Option	Description	Available values	Default
User Name	User name used to log in to the CyTime SER.	UTF-8 text string, ① 16 characters max	admin
Password	Password used to log in to the CyTime SER.	UTF-8 text string, ① 16 characters max	admin
PTP License Key	Alphanumeric key provided by Cyber Sciences to activate PTP (IEEE 1588) master/slave precision time protocol	8 fields of 4 characters, separated by dashes	none
Reset Button	Resets unit. (Note: event recording is suspended momentarily while the device restarts)		

① The following special characters are excluded: \ / : * ? " , < > |

Alternate Setup: Editing XML File on SD Card

Note: the XML setup file should only be modified by advanced users who are familiar with XML syntax, since errors may cause the unit to malfunction. Please refer to the CyTime SER Reference Guide (IB-SER-02) for additional details.

Setup data is stored in non-volatile memory on its SD flash memory card in an XML file format. Setup changes can therefore be made simply by editing this file using a text editor, such as Windows Notepad. Standard setup templates can be created and replicated quickly across multiple units.

The setup file can be accessed over a network via an FTP connection or by removing the SD card from the unit and accessing its file system directly using an SD card reader.

To preserve a backup copy of the setup file, copy the file called “_SETUP.XML” to a local directory on a PC. To restore these settings, simply copy the file back to the device (overwrites existing _SETUP.XML file). Caution: before restoring the settings, be careful to note any changes to network settings (IP address, subnet mask, etc.).

6—MONITORING (WEB SERVER)

Monitoring: Status

The CyTime SER-3200 Event Recorder monitors the status of 32 high-speed input channels (SER-2408: 24 inputs and 8 relay outputs). Data is available via the Ethernet communications interface using Modbus TCP protocol or its embedded web server using a standard web browser.

To view status using a standard web browser, open the browser and type the IP address of the SER and press Enter. The unit's home page is the "Monitoring" web page called "Status." Sample channel status details are shown:

All of these fields can be customized:

- Channel name ("Main CB")
- Off/On text ("Open"/"CLOSED")

#	Channel Name	Status	#	Channel Name	Status
01	Input 01	On	17	Input 17	Off
02	Input 02	On	18	Input 18	Off
03	Input 03	On	19	Input 19	Off
04	Input 04	Off	20	Input 20	Off
05	Input 05	On	21	Input 21	Off
06	Input 06	Off	22	Input 22	Off
07	Input 07	Off	23	Input 23	Off
08	Input 08	Off	24	Input 24	Off
09	Input 09	Off	25	Input 25	Off
10	Input 10	Off	26	Input 26	Off
11	Input 11	Off	27	Input 27	Off
12	Input 12	Off	28	Input 28	Off
13	Input 13	Off	29	Input 29	Off
14	Input 14	Off	30	Input 30	Off
15	Input 15	Off	31	Input 31	Off
16	Input 16	Off	32	Input 32	Off

Figure 6-1. Monitoring: status web page

The Status page provides real-time status of all 32 channels, refreshed about once per second. The green "LINK" light flashes with each set of new data to confirm ongoing connection with the SER. Default values for channel names and off/on states are shown in the example above. In an actual application, user-configured labels can greatly enhance the readability of the information. For example, input 01 could be labeled "Main breaker" and OFF/ON states labeled "Open/Closed."

In addition to normal status reporting, the following are supported:

Inverted. Any input can be configured with inversion "enabled." This inverts the state of a monitored input for reporting or logging purposes. For example, a normally-closed contact can be set to "inverted" and its status reported OFF when in normal mode.

Forced OFF or ON. The SER supports a simulation TEST mode (via the Control web page or via Modbus command register), and all channels are initialized to OFF. Auto-test mode simulates closing all external contacts sequentially ("Forced ON") and then back off again ("Forced OFF"). Manual-test mode starts with all channels Forced OFF, and then the user can simulate the closing of each channel individually or in groups ("Forced ON"). If an input is also set to inverted, then its reported state will be opposite to the forced (simulated) condition.

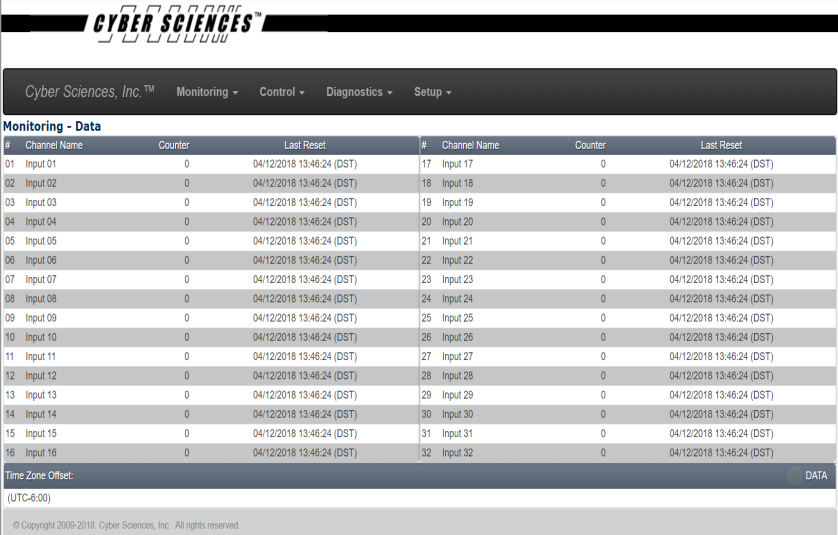
Note: The "Forced OFF" and "Forced ON" TEST functions refer to an override of the external monitored signals connected to each channel, and "forcing" these OFF or ON for reporting or logging by the SER. This simulation allows testing of host software without the need to physically open/close the connected equipment.

Data Page (Counters)

Note: Counters are subject to filter, debounce and chatter functions used for event recording. Therefore, counter values only increment when a corresponding status-change event is recorded for a given channel (input or output).

The Data page displays operations counters and the last reset date and time. If a channel is enabled for event recording, each status change (transition from Off-to-On or On-to-Off) increments its counter value.

Clicking “Data” under the monitoring tab brings up the following web page:



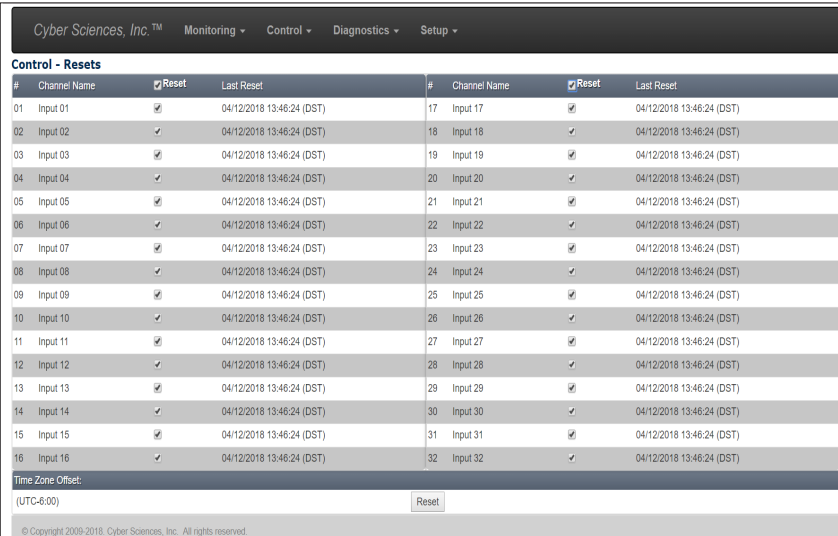
The screenshot shows the 'Monitoring - Data' web page. It features a navigation bar with 'Monitoring', 'Control', 'Diagnostics', and 'Setup' tabs. The main content is a table with 32 rows, each representing an input channel. The table has columns for Channel Name, Counter, and Last Reset. All counters are currently at 0, and the last reset time for all channels is 04/12/2018 13:46:24 (DST). A 'Time Zone Offset: (UTC-6:00)' is displayed at the bottom left, and a 'DATA' button is at the bottom right.

#	Channel Name	Counter	Last Reset	#	Channel Name	Counter	Last Reset
01	Input 01	0	04/12/2018 13:46:24 (DST)	17	Input 17	0	04/12/2018 13:46:24 (DST)
02	Input 02	0	04/12/2018 13:46:24 (DST)	18	Input 18	0	04/12/2018 13:46:24 (DST)
03	Input 03	0	04/12/2018 13:46:24 (DST)	19	Input 19	0	04/12/2018 13:46:24 (DST)
04	Input 04	0	04/12/2018 13:46:24 (DST)	20	Input 20	0	04/12/2018 13:46:24 (DST)
05	Input 05	0	04/12/2018 13:46:24 (DST)	21	Input 21	0	04/12/2018 13:46:24 (DST)
06	Input 06	0	04/12/2018 13:46:24 (DST)	22	Input 22	0	04/12/2018 13:46:24 (DST)
07	Input 07	0	04/12/2018 13:46:24 (DST)	23	Input 23	0	04/12/2018 13:46:24 (DST)
08	Input 08	0	04/12/2018 13:46:24 (DST)	24	Input 24	0	04/12/2018 13:46:24 (DST)
09	Input 09	0	04/12/2018 13:46:24 (DST)	25	Input 25	0	04/12/2018 13:46:24 (DST)
10	Input 10	0	04/12/2018 13:46:24 (DST)	26	Input 26	0	04/12/2018 13:46:24 (DST)
11	Input 11	0	04/12/2018 13:46:24 (DST)	27	Input 27	0	04/12/2018 13:46:24 (DST)
12	Input 12	0	04/12/2018 13:46:24 (DST)	28	Input 28	0	04/12/2018 13:46:24 (DST)
13	Input 13	0	04/12/2018 13:46:24 (DST)	29	Input 29	0	04/12/2018 13:46:24 (DST)
14	Input 14	0	04/12/2018 13:46:24 (DST)	30	Input 30	0	04/12/2018 13:46:24 (DST)
15	Input 15	0	04/12/2018 13:46:24 (DST)	31	Input 31	0	04/12/2018 13:46:24 (DST)
16	Input 16	0	04/12/2018 13:46:24 (DST)	32	Input 32	0	04/12/2018 13:46:24 (DST)

Figure 6-2. Data web page

Resets Page

The Resets page allows reset of operations counters, either individually or all at once. From the Control tab, clicking “Resets” brings up the following web page:



The screenshot shows the 'Control - Resets' web page. It features a navigation bar with 'Monitoring', 'Control', 'Diagnostics', and 'Setup' tabs. The main content is a table with 32 rows, each representing an input channel. The table has columns for Channel Name, a checkbox for 'Reset', and Last Reset. All 'Reset' checkboxes are checked, and the last reset time for all channels is 04/12/2018 13:46:24 (DST). A 'Time Zone Offset: (UTC-6:00)' is displayed at the bottom left, and a 'Reset' button is at the bottom right.

#	Channel Name	Reset	Last Reset	#	Channel Name	Reset	Last Reset
01	Input 01	<input checked="" type="checkbox"/>	04/12/2018 13:46:24 (DST)	17	Input 17	<input checked="" type="checkbox"/>	04/12/2018 13:46:24 (DST)
02	Input 02	<input checked="" type="checkbox"/>	04/12/2018 13:46:24 (DST)	18	Input 18	<input checked="" type="checkbox"/>	04/12/2018 13:46:24 (DST)
03	Input 03	<input checked="" type="checkbox"/>	04/12/2018 13:46:24 (DST)	19	Input 19	<input checked="" type="checkbox"/>	04/12/2018 13:46:24 (DST)
04	Input 04	<input checked="" type="checkbox"/>	04/12/2018 13:46:24 (DST)	20	Input 20	<input checked="" type="checkbox"/>	04/12/2018 13:46:24 (DST)
05	Input 05	<input checked="" type="checkbox"/>	04/12/2018 13:46:24 (DST)	21	Input 21	<input checked="" type="checkbox"/>	04/12/2018 13:46:24 (DST)
06	Input 06	<input checked="" type="checkbox"/>	04/12/2018 13:46:24 (DST)	22	Input 22	<input checked="" type="checkbox"/>	04/12/2018 13:46:24 (DST)
07	Input 07	<input checked="" type="checkbox"/>	04/12/2018 13:46:24 (DST)	23	Input 23	<input checked="" type="checkbox"/>	04/12/2018 13:46:24 (DST)
08	Input 08	<input checked="" type="checkbox"/>	04/12/2018 13:46:24 (DST)	24	Input 24	<input checked="" type="checkbox"/>	04/12/2018 13:46:24 (DST)
09	Input 09	<input checked="" type="checkbox"/>	04/12/2018 13:46:24 (DST)	25	Input 25	<input checked="" type="checkbox"/>	04/12/2018 13:46:24 (DST)
10	Input 10	<input checked="" type="checkbox"/>	04/12/2018 13:46:24 (DST)	26	Input 26	<input checked="" type="checkbox"/>	04/12/2018 13:46:24 (DST)
11	Input 11	<input checked="" type="checkbox"/>	04/12/2018 13:46:24 (DST)	27	Input 27	<input checked="" type="checkbox"/>	04/12/2018 13:46:24 (DST)
12	Input 12	<input checked="" type="checkbox"/>	04/12/2018 13:46:24 (DST)	28	Input 28	<input checked="" type="checkbox"/>	04/12/2018 13:46:24 (DST)
13	Input 13	<input checked="" type="checkbox"/>	04/12/2018 13:46:24 (DST)	29	Input 29	<input checked="" type="checkbox"/>	04/12/2018 13:46:24 (DST)
14	Input 14	<input checked="" type="checkbox"/>	04/12/2018 13:46:24 (DST)	30	Input 30	<input checked="" type="checkbox"/>	04/12/2018 13:46:24 (DST)
15	Input 15	<input checked="" type="checkbox"/>	04/12/2018 13:46:24 (DST)	31	Input 31	<input checked="" type="checkbox"/>	04/12/2018 13:46:24 (DST)
16	Input 16	<input checked="" type="checkbox"/>	04/12/2018 13:46:24 (DST)	32	Input 32	<input checked="" type="checkbox"/>	04/12/2018 13:46:24 (DST)

Figure 6-3. Resets web page

Events Page

The SER records the date and time of all events, such as the change of state of an input channel. Event data is accessible via Modbus TCP registers or may be viewed by clicking the link for the "Events" web page:

The screenshot shows the 'Monitoring - Events' web page. The table displays the following data:

Event	Date and Time	Channel	Event Type	Status	Time Quality	Delta Time
75	04/16/2018 14:29:52.198	Input 01	Input Status Change	On --> Off	0: Good (< 1ms)	7.851
74	04/16/2018 14:29:44.347	Input 01	Input Status Change	Off --> On	0: Good (< 1ms)	57.48.891
73	04/16/2018 13:31:55.456	System	PTP/NTP Time-sync Lock	---	0: Good (< 1ms)	7.596
72	04/16/2018 13:31:47.860	System	Setup Changed	---	1: Fair (< 50ms)	08.18.752
71	04/16/2018 13:23:29.108	System	Power On	---	3: Bad (no sync)	40.107
70	04/16/2018 13:22:49.000	System	Power Fail	---	1: Fair (< 50ms)	7.541
69	04/16/2018 13:22:41.458	System	Reset	---	1: Fair (< 50ms)	20.2
68	04/16/2018 13:17:33.665	System	PTP/NTP Time-sync Fail	---	3: Bad (no sync)	24.260
62	04/16/2018 13:17:09.404	System	PTP/NTP Time-sync Lock	---	0: Good (< 1ms)	7.533
61	04/16/2018 13:17:01.871	System	Setup Changed	---	1: Fair (< 50ms)	28.780
60	04/16/2018 13:16:33.091	System	Setup Changed	---	0: Good (< 1ms)	01.38.305
59	04/16/2018 13:14:54.786	System	PTP/NTP Time-sync Lock	---	0: Good (< 1ms)	12.143
58	04/16/2018 13:14:42.643	System	PTP/NTP Time-sync Fail	---	3: Bad (no sync)	01.30.043
57	04/16/2018 13:13:12.600	System	PTP/NTP Time-sync Lock	---	0: Good (< 1ms)	0.999
56	04/16/2018 13:13:11.601	System	PTP/NTP Time-sync Fail	---	3: Bad (no sync)	50.280
55	04/16/2018 13:13:11.601	System	PTP/NTP Time-sync Lock	---	0: Good (< 1ms)	6.553

At the bottom of the page, there are controls for displaying events:

- Displaying Events: 1 to 75
- ☐ Load All Events
- Export
- Total Events: 75
- ☒ Hide Seq #
- ☒ Auto

Figure 6-4. Monitoring: events web page

The SER stores up to 8192 events, after which only the latest 8192 events are stored. Each event record contains:

- date and time of the event (adjusted for local time, if applicable)
- channel (input or output name)
- event type
- channel status
- time quality at time of the event
- delta time (elapsed time in seconds from previous event)
- sequence number (unique serial number, column hidden by default)

When the page is first accessed, the last 100 events are loaded and the 20 most recent are displayed, starting with the most recent event at the top.

Click any column heading to sort events. Sorting does not affect the database storage of events. Only the events currently loaded for display are sorted. Click the "Load all events" check box to display all stored events.

By default, the page checks for new events in the background and automatically adds them to the display. To prevent automatic update, deselect the "Auto" check box. The page will still check for new events but they will not be shown until "Auto" is checked again. Any recent events added can be identified in the "Events" and "Date and Time" columns.

Finally an Export button allows the user to export (save) all displayed event data to a csv file for further analysis in Microsoft Excel or other software. This feature is included in firmware version 2.02 and later. Please see Cyber Sciences Tech Note TN-201 for more details on exporting SER data to csv, as well as how to format the date/time cells in Excel for proper display with ms resolution.

Note: The accuracy of NTP time sync depends on external factors; therefore, when the SER time source is NTP, the SER uses only two states for Time Quality as follows: Time Quality = "2:OK (NTP)" if locked to a server, or "3: Bad (no sync)" if no NTP server is found.

Control: Test

Note: While operating in test mode, the SER suspends normal event recording. In addition, counters are not affected by test events.

The test function simulates status changes to facilitate testing of application software. Each status change is reflected in Modbus TCP status registers and recorded as a test event in the event log. Test events are also recorded to mark the start and end of test mode.

Clicking the “Control” tab brings up the following web page:

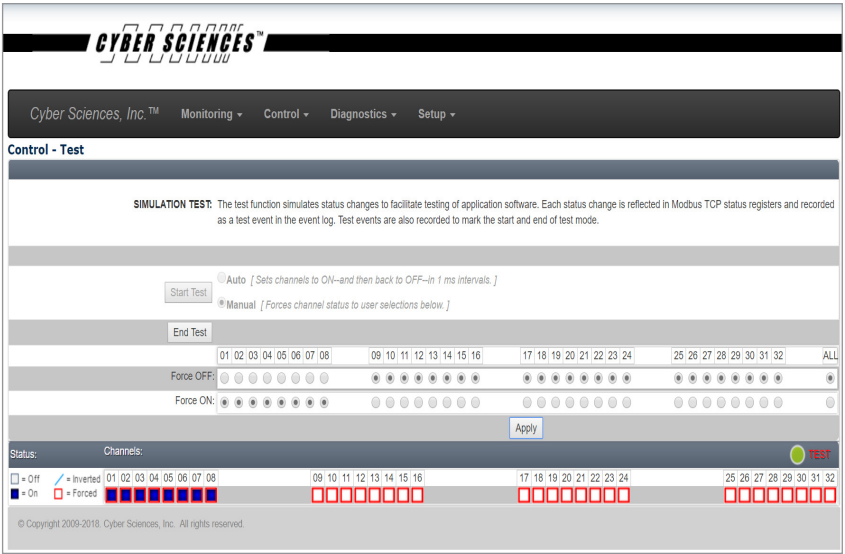


Figure 6-5. Control: Simulation test page (Manual mode shown)

Choose one of two test modes, then click the “Start Test” button to begin:

- **Auto**— Sets channels to ON and then back to OFF, automatically.
- **Manual**— Forces channel status to user selections.

Auto test mode simulates automatic sequencing of inputs off-to-on and back to off in 1 ms intervals. Each status change is recorded as an event in the event log, along with events designating the start and end of test mode.

In **Manual test mode**, channels can be “forced” OFF or ON (overriding normal status). Click the desired check box(es) and then click the “Apply” button to simulate the selected states. Status registers (Modbus TCP) and test event records in the event log can be used to verify proper operation with application software. Finally, click the “End Test” button to return to normal operation. After 10 minutes of inactivity, the SER will revert automatically back to normal operation.

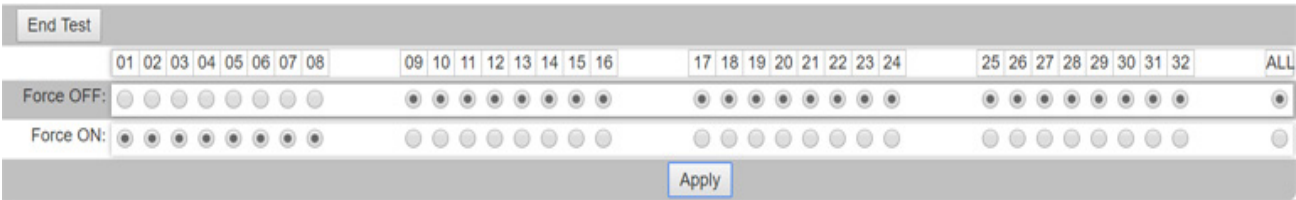


Figure 6-6. Test page—Manual test mode (close-up)

Diagnostics Page

Use the Diagnostics page to verify device data such as MAC address, serial number, hardware and firmware versions, available memory on SD card, time-sync values (including PTP attributes if applicable), available TCP sockets, and self-diagnostics.

Note: The accuracy of NTP time sync depends on external factors; therefore, when the SER time source is NTP, the SER uses only two states for Time Quality as follows: Time Quality = “2:OK (NTP)” if locked to a server, or “3: Bad (no sync)” if no NTP server is found.

Self-Diagnostics: Details			
Any Failure	OK	Any Relay Failure	OK
Event Processor	OK	Command--Relay R1	OK
Time Processor	OK	Command--Relay R2	OK
System Processor	OK	Command--Relay R3	OK
DHCP Failure	OK	Command--Relay R4	OK
NTP Server Failure	OK	Command--Relay R5	OK
SD Card Not Installed	OK	Command--Relay R6	OK
Invalid XML Setup	OK	Command--Relay R7	OK
PTP License Key Invalid	OK	Command--Relay R8	OK
(reserved)	---	24V (R1-R4)	OK
(reserved)	---	24V (R5-R8)	OK
(reserved)	---	Relay Load	OK
(reserved)	---	Relay Over-Temp	OK
(reserved)	---	(reserved)	---
(reserved)	---	(reserved)	---
(reserved)	---	(reserved)	---
Close			

Figure 6-8. Self-diagnostics details (model SER-2408 shown)

Cyber Sciences, Inc.™ Monitoring Control Diagnostics Setup	
Diagnostics - Device	
Device Name: CyTime Event Recorder	Date / Time: 05/18/2018 01:13:17 PM (UTC-6:00) (DST)
Device ID: CyTime SER	Time Source (Setup): PTP
MAC Address: d4 6a 6a 4f 19 01	Time Source (Actual): PTP
Catalog No: SER-3200-P2X2	Time Quality: 0 Good (<= 1ms)
Date of Manufacture: 5-2018	PTP License: Valid ✓
Serial Number: 100	PTP Domain Number: 0
	PTP Port State: 9 (Slave)
Hardware Version: B2	PTP Clock Class: 255 (Slave-Only)
Firmware Version: 2.16 (Build: 9)	PTP Clock Accuracy: 33 (100 ns)
Time Processor: 2.08	PTP Clock Source: 32 (GPS)
Event Processor: 2.00	PTP GM Clock ID: 0x002132FFFE017B1F (Masterclock, Inc.)
	TCP Sockets: 44
SD Card, Flash Memory: 2,885,267,456	Used: 6
Total Capacity: 2,885,267,456	Free: 38
Used: 139,218,944	Self-Diagnostics: OK Details
Free: 2,746,048,512	Support: www.cyber-sciences.com/support
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Figure 6-7. Diagnostics web page

Click the “Details” link to view an expanded list of diagnostics values, as shown.

PTP Domain Number: 0
PTP Port State: 6 (Master)
PTP Clock Class: 13 (Normal: UTC)
PTP Clock Accuracy: 39 (100 µs)
PTP Clock Source: 32 (GPS)
PTP GM Clock ID: 0x0003F4FFFE07FAAE (Cyber Sciences, Inc.)

Figure 6-9. Typical PTP values (PTP master)

PTP Domain Number: 0
PTP Port State: 9 (Slave)
PTP Clock Class: 255 (Slave-Only)
PTP Clock Accuracy: 33 (100 ns)
PTP Clock Source: 32 (GPS)
PTP GM Clock ID: 0x002132FFFE017B1F (Masterclock, Inc.)

Figure 6-10. Typical PTP values (PTP slave)

PTP Attributes—PTP Master

Shown at left are typical PTP diagnostics values under normal operating conditions for an SER configured as a PTP master.

PTP Attributes—PTP Slave

Shown at left are typical PTP diagnostics values under normal operating conditions for an SER configured as a PTP slave.

Custom Page(s)

To enable user extensions, the SER provides a means for integrating custom web pages into its standard navigation structure. Clicking the “Monitoring” tab, then the “Custom” link brings up the following web page:

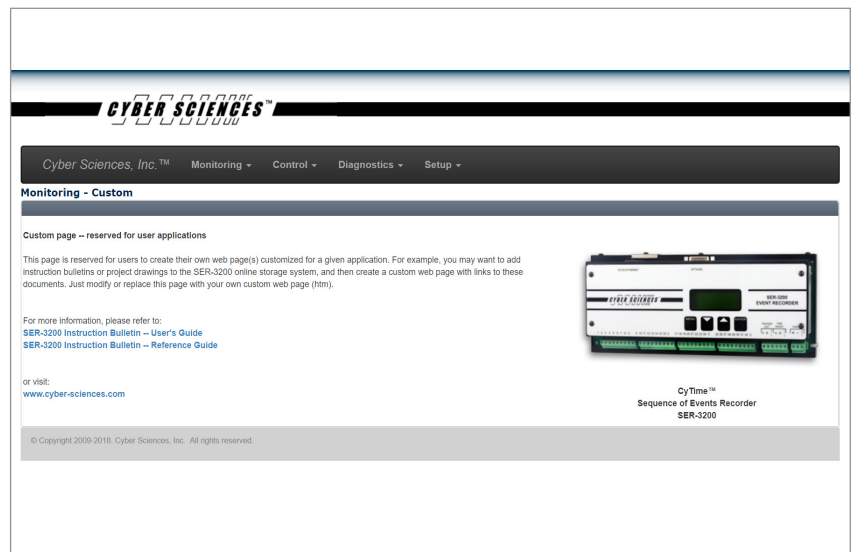


Figure 6-9. Custom web page

The custom page is a placeholder to allow users to create their own web page(s) customized for a given application. For example, you can add instruction bulletins or project drawings to the SER online storage system, and then create a custom web page with links to these documents.

The default custom page is named “_CUSTOM.HTM” and is stored on the removable SD card. This file can be modified or replaced to add customized functionality. Users can leverage the HTML5 web interface based on a “REST-ful” API to create these custom pages.

For more information, contact Cyber Sciences at sales@cyber-sciences.com or at 615-890-6709.

7—PRODUCT SPECIFICATIONS

Electrical		
Digital inputs	Number of inputs	32 (SER-3200) or 24 (SER-2408)
	Voltage, operating	24 Vdc (-15% to +10%)
	Input impedance / current draw (max.)	10K ohms resistive / 1 mA
	Must turn on/off voltage	turn on: 20 Vdc / turn off: 9 Vdc
	Turn on time / turn off time (max.)	0.5 ms
	Isolation	Each input is optically isolated
Relay Outputs (SER-2408)	Number and type of outputs	8 Form A, solid-state relays (two groups of four)
	Signal type	Normally open, true high
	Voltage operating range	16 to 30 Vdc (24 Vdc nominal)
	Current capacity	2.0 A per relay output (8.0 A per group, 16 A total)
	Maximum current (surge current)	2.8 A for 10 seconds, max.
	Leakage current	< 1 mA at 24 Vdc
	On-state voltage drop	< 0.5 volts at 2.0 A
	Response time	< 0.1 ms OFF to ON, < 0.1 ms ON to OFF (not including Modbus)
	Fault sensing	Overload and over-temperature. (Upon removal of fault, output returns to operating state.)
	Fault reporting	Fault status available via LCD, Modbus TCP and Web page.
High-speed Trigger Output	Isolation	Output group to output group: 500 Vac Input(s) to output group: 500 Vac Output to Earth ground: 500 Vac Output to comms interface 500 Vac
	Relay type	Form A relay
	Maximum current	100 mA at 24 Vdc nominal
Control Power	Contact closure characteristics	Momentary contact closure, duration of 100 ms
	Voltage, operating	24 Vdc ($\pm 10\%$)
	Burden, steady state (max.)	10 VA (10 watts)
	Burden, momentary (max.)	Inrush current: 0.8 A for 5-8 ms
Time Synchronization		
Time Source (IN) Protocols Supported	PTP slave (requires license key)	IEEE 1588-2008 (v2), E2E Default Profile, per Annex J.
	IRIG-B (via optional EZC-IRIG-B connector)	Unmodulated IRIG-B (5V DCLS) types B004 - B007 (with year) ①
	DCF77 (via optional EZC-DCF77)	DCF77 (24 Vdc)
	SER inter-device time sync (legacy)	RS-485 (IRIG-B or DCF77 time code)
	NTP (SNTP) client	User-configurable NTP primary/secondary servers and update interval
Time-sync Output Protocols Supported	PTP master (requires license key)	IEEE 1588-2008 (v2), E2E Default Profile, per Annex J.
	IRIG-B (via optional PLX-5V connector)	Unmodulated IRIG-B (5V DCLS) type B006
	IRIG-B (via optional PLX-24V)	IRIG-B (24V DCLS) type B006, compatible with STR-IDM
	DCF77 or 1per10 (via optional PLX-24V)	DCF77 (24 Vdc) or 1 pulse per 10 seconds (24 Vdc)
	RS-485	ASCII / RS-485 (ASCII + Quality) or Inter-SER time sync (legacy)
Clock	Accuracy	< 100 μ s (with time source = PTP, IRIG-B or DCF77)
	Holdover (after initial time sync lock)	5 min. (remains within 100 μ s even after loss of sync for up to 5 min.)

PRODUCT SPECIFICATIONS (CONT.)

Communications	
Ethernet port (10/100 Mbps)	Modbus TCP, PTP, NTP, HTTP, FTP
Serial port (time-sync IN/OUT)	RS-485 (2-wire plus shield)
Web server (for setup and monitoring)	HTML5, JQuery, JQuery UI, Bootstrap, JSON, CSS3, JavaScript, and AJAX
Simultaneous TCP connections	44 (32 max allocated to Modbus TCP sockets, port 502)
Memory (user-accessible)	SDHC card, 8GB (32GB when ordered with -32GB option)
Mechanical	
Mounting	Standard DIN rail (EN 50022, 35 mm x 15 mm)
Wire sizes supported	#24 to #12 AWG (#26 to #14 AWG for 3-position EZC connectors)
Dimensions (W x H x D)	11.25 x 4.75 x 3.13 inches (286 x 121 x 79 mm)
Dimensions (W x H x D), in carton	12.50 x 6.50 x 4.50 inches (318 x 165 x 114 mm)
Weight (product alone / in carton)	3.0 lbs. (1.4 kg) / 3.5 lbs. (1.6 kg)
Environmental	
Operating temperature	-25 to +70 C
Storage temperature	-40 to +85 C
Humidity rating	5% to 95% relative humidity (non-condensing) at 40 C
Altitude rating	0 to 3000 meters (10,000 feet)
Sustainability	RoHS-compliant, lead-free
Regulatory	
Safety, USA	UL Listed (UL-508 / NRAQ-cULus, UL 61010-1, UL 61010-2-201)
Safety, Canada	cUL (CSA C22.2, 61010-1, UL 61010-2-201)
Safety, Europe	CE mark (EN 61010-1, EN 61010-2-201)
Safety, International	IEC 61010-2-201:2013
Compliance, Australia	RCM mark
Conducted emissions - voltage	EN 55022 (CISPR 22:2008) Class A
Conducted disturbance at telecom ports	EN 55022 (CISPR 22:2008) Class A
Radiated emissions	EN 55022:2010 (CISPR 22:2008) Class A / FCC Class A
Harmonic current emissions	EN 61000-3-2: 2006 + A1:2008 + A2:2009 / FCC Class A
Voltage fluctuations / flicker	EN 61000-3-3:2008
Electrostatic discharge immunity	EN 61000-4-2:2009
Radiated electromagnetic field immunity	EN 61000-4-3:2006 + A1:2008 + A2:2010
Electrical fast transient / burst immunity	EN 61000-4-4:2004
Surge immunity	EN 61000-4-5:2006
Conducted radio frequency immunity	EN 61000-4-6:2009
Magnetic immunity	EN 61000-4-8:2010
Voltage dips, interruptions and variations	EN 61000-4-11:2004
W3C web standards	W3C-validated (standards-compliant for browser-independence)

① The Unmodulated IRIG-B signal must include the year (B004 - B007), also known as enabling "IEEE-1344 extensions." For more information on IRIG-B, please refer to Cyber Sciences [Tech Note TN-102](#), "Overview of IRIG-B Time Codes."

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Cyber Sciences, Inc. (CSI)
229 Castlewood Drive, Suite E
Murfreesboro, TN 37129 USA
Tel: +1 615-890-6709
Fax: +1 615-439-1651



Doc. no: IB-SER-01 May-2018
(supersedes doc. dated Jan-2018)