



Sequence of Events Recording (SER)

Know what happened and when—to 1ms!

The Trystar Sequence of Events Recorder monitors the status of 32 channels and records state changes with 1ms accuracy.

An embedded web server enables setup and monitoring over an Ethernet network using a standard web browser. Flexible time synchronization and Modbus TCP communications enable easy integration with supervisory systems such as an electrical power management system (EPMS).

Key Functions

-  Status monitoring (32 digital inputs)
-  Event recording (1-ms time-stamp accuracy)
-  Stopwatch function, elapsed time (to 1 ms)
-  Operations counters (with individual reset)
-  Control power (24 Vdc)
-  Trigger output for Waveform Capture
-  Time-sync output for PTP devices

Ethernet (Modbus TCP) for system integration:

- EPMS
- SCADA
- BMS
- DCIM

Time source (IN):

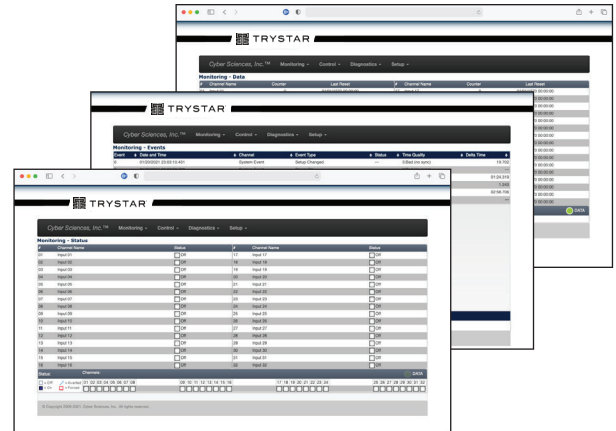
- PTP (Ethernet)
- IRIG-B, 5V (via EZC)
- DCF77, 24V (via EZC)
- NTP (Ethernet)
- Modbus TCP (Ethernet)
- Manual (web interface)
- Inter-SER IRIG
- Inter-SER DCF

Color Touchscreen:

- Input status
- Events
- Communication Info
- Device Setup
- Time Info
- Diagnostics

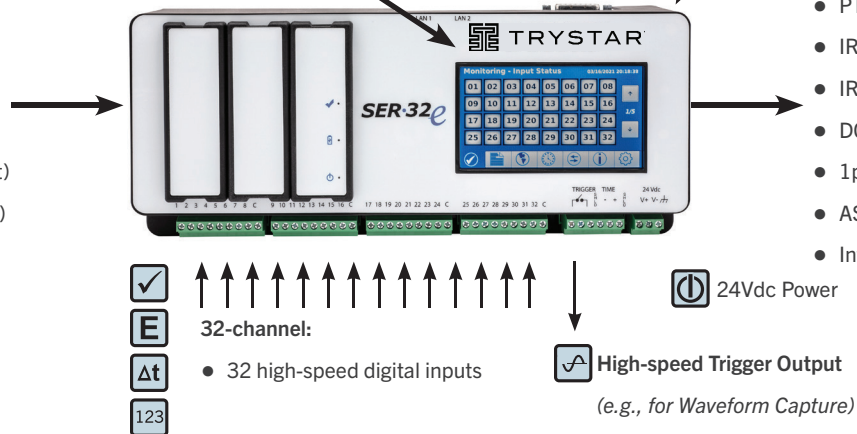
Secure Web interface:

- Events
- Status
- Counters
- Controls
- Diagnostics
- Setup



Time source outputs:

- PTP (Ethernet) 1588
- IRIG-B, 5V (via PLX-5V)
- IRIG-B, 24V (via PLX-24V)
- DCF77, 24V (via PLX-24V)
- 1per10, 24V (via PLX-24V)
- ASCII (RS-485)
- Inter-SER (RS-485)



Setup and Monitoring Using any Web Browser

Customize

Trystar Event Recorders offer simple setup using a web browser—no proprietary software required. An embedded web server hosts user-friendly pages for setup and monitoring. Digital inputs have user-configurable filter, debounce and chatter functions. Each input can be customized with descriptive name (32-char. max.), and assigned text to describe on and off states.

SER 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

Enabled	Input Name	Filter	Debounce	Chatter	Off Text	On Text	Trigger	Inverted	Data Log Group
☒	Input 01	20	20	0	Off	On	☐	☐	None
☒	Input 02	20	20	0	Off	On	☐	☐	None
☒	Input 03	20	20	0	Off	On	☐	☐	None
☒	Input 04	20	20	0	Off	On	☐	☐	None
☒	Input 05	20	20	0	Off	On	☐	☐	None
☒	Input 06	20	20	0	Off	On	☐	☐	None
☒	Input 07	20	20	0	Off	On	☐	☐	None
☒	Input 08	20	20	0	Off	On	☐	☐	None
☒	Input 09	20	20	0	Off	On	☐	☐	None
☒	Input 10	20	20	0	Off	On	☐	☐	None
☒	Input 11	20	20	0	Off	On	☐	☐	None
☒	Input 12	20	20	0	Off	On	☐	☐	None
☒	Input 13	20	20	0	Off	On	☐	☐	None
☒	Input 14	20	20	0	Off	On	☐	☐	None
☒	Input 15	20	20	0	Off	On	☐	☐	None
☒	Input 16	20	20	0	Off	On	☐	☐	None

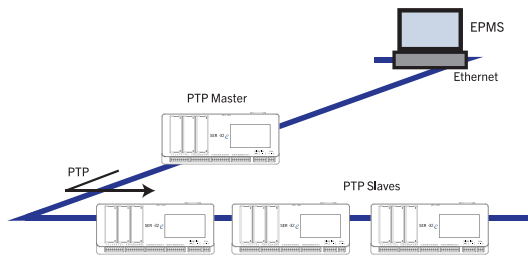
View Events, Export to Excel, Access via Modbus TCP

The Trystar Event Recorder's Events web page displays detailed information for all event records, sortable by any field. An Export button makes it easy to save data to Excel for further analysis or reports. These tools are useful during commissioning or troubleshooting, even if the same data is also integrated into a comprehensive power monitoring system, building management system or other host software.

Event	Date and Time	Channel	Event Type	Status	Time Quality
8192	05/12/2021 19:27:24.358	Input 03	Input Status Change	Off -> On	0: Good (< 1ms)
8191	05/12/2021 19:27:24.233	Input 01	Input Status Change	Off -> On	0: Good (< 1ms)
8190	05/12/2021 19:27:24.107	Input 02	Input Status Change	Off -> On	0: Good (< 1ms)
8189	05/12/2021 19:27:23.982	Input 03	Input Status Change	On -> Off	0: Good (< 1ms)
8188	05/12/2021 19:27:23.856	Input 01	Input Status Change	On -> Off	0: Good (< 1ms)
8187	05/12/2021 19:27:23.731	Input 02	Input Status Change	On -> Off	0: Good (< 1ms)
8186	05/12/2021 19:27:23.605	Input 04	Input Status Change	Off -> On	0: Good (< 1ms)
8185	05/12/2021 19:27:23.480	Input 03	Input Status Change	Off -> On	0: Good (< 1ms)
8184	05/12/2021 19:27:23.354	Input 01	Input Status Change	Off -> On	0: Good (< 1ms)
8183	05/12/2021 19:27:23.229	Input 02	Input Status Change	Off -> On	0: Good (< 1ms)

Displaying Events: 8093 to 8192
☐ Load All Events

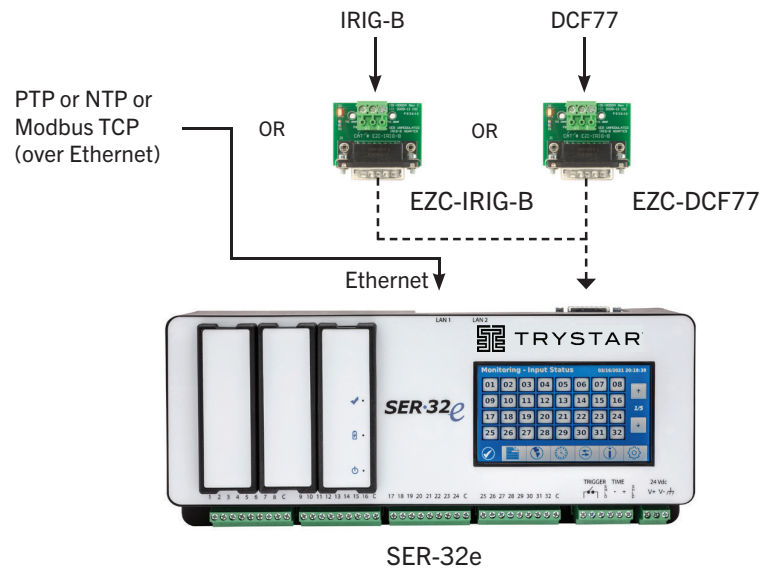
Total Events: 8192
☒ Hide Seq # ☒ Auto



Time Synchronization Made Simple

Automatic Time Sync (within 100 microseconds)

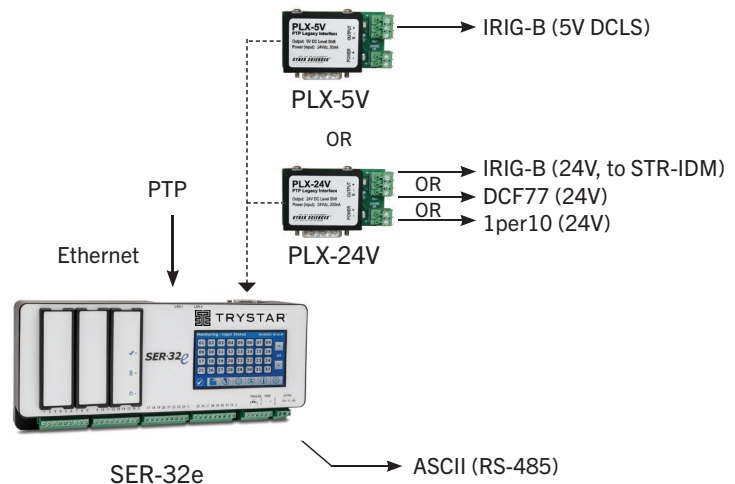
Trystar enables hi-res (sub-millisecond) time synchronization over the same Ethernet network used for the Electrical Power Monitoring System (EPMS). Set the time in the first Trystar Event Recorder, and all other SER devices sync automatically over Ethernet. The breakthrough technology: PTP (Precision Time Protocol), per IEEE Std 1588. Time-sync input (time source) options are shown below:



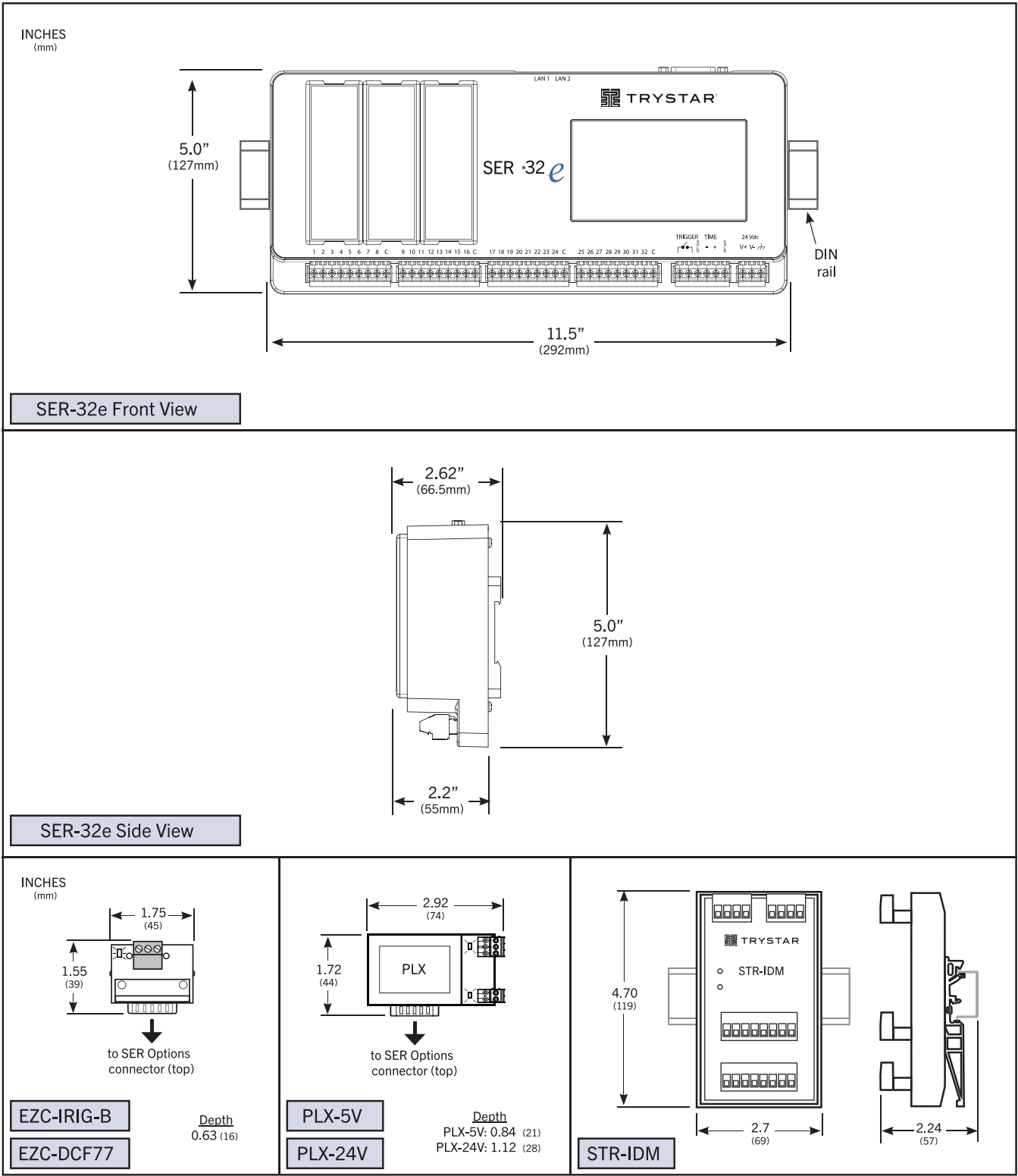
No PTP? No Problem.

Trystar SER Output Legacy Protocols

Trystar Event Recorders don't simply leverage the power of PTP for themselves. Any SER-32e configured to accept PTP or NTP as its time input can in turn output the legacy protocol required by complementary devices, such as relays or meters. IRIG-B, DCF-77, 1 per 10 or ASCII time outputs are available directly from the SER through a small wiring adapter, PTP Legacy Interface (PLX-5V or PLX24V), according to the required protocol and voltage supported by the target device.



Dimensions



Specifications

Electrical		
Digital inputs	Number of inputs	32
	Voltage, operating	24 Vdc (-15% to +10%)
	Must turn on/off voltage	20 Vdc (on) / 9 Vdc (off)
	Input impedance	10K ohms resistive, 1 mA
High-speed Trigger Output	Relay type	Form A relay
	Maximum current	100 mA at 24 Vdc nominal
	Contact closure characteristics	Momentary contact closure, duration of 100 ms
Control Power	Voltage, operating	24 Vdc ($\pm 10\%$)
	Burden, steady state (max.)	7 VA
	Burden, momentary (max.)	Inrush current 0.8 A for 5-8 ms
	Ride-thru	> 10 seconds

Time Synchronization		
Time Source (IN) Protocols Supported	PTP slave	IEEE 1588-2019 (v2.1), E2E Default Profile, per Annex I.
	IRIG-B (via optional EZC-IRIG-B connector)	Unmodulated IRIG-B (5V DCLS) types B004 or B007 (with year)
	DCF77 (via optional EZC-DCF77 connector)	DCF77 (24 Vdc)
	SER inter-device time sync (legacy applications)	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	IEEE 1588-2019 (v2.1), E2E Default Profile, per Annex I.
	IRIG-B (via optional PLX-5V connector)	Unmodulated IRIG-B (5V DCLS) type B007
	IRIG-B (via optional PLX-24V connector)	IRIG-B (24V DCLS) type B007, compatible with STR-IDM
	DCF77 or 1per10 (via PLX-24V connector)	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.)

Communications		
Ethernet Interface	Ethernet Ports (10/100 Mbps)	Modbus TCP, PTP, NTP, HTTPS, RESTful API
	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)

Mechanical / Environmental / Regulatory		
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)	11.5 x 5.0 x 2.62 inches (292 x 127 x 66.5 mm)
	Dimensions (W x H x D), in carton	12.5 x 6.5 x 4.5 inches (318 x 165 x 114 mm)
	Weight (Device / Device in package)	2.4 lbs. (1.1 kg) / 3.5 lbs. (1.6 kg)
Environmental	Temperature	-25° to +70° C (Operating) / -40° to +85° C (Storage)
	Humidity rating	5% to 95% relative humidity (non-condensing) at 40° C
	Altitude rating	0 to 3000 meters (10,000 feet)
	Sustainability	RoHS 3 (EU Directive 2015/863), REACH (EC 1907/2006)

Electrical		
Regulatory Compliance	UL Listing	(NRAQ-cULus, UL 61010-1, UL 61010-2-201)
	Global standards	CE Mark, RCM Mark, EN standards
	Emissions / Immunity	EN 61326-1 / IEC 61326-1 : 2012, CISPR 11 Class A (EN 55011) FCC Part 15B Class A
	Country of Origin	USA

The following models and accessories are available for the Trystar SER-32e

Ordering Information		
	Catalog no.	Description
Trystar Sequence of Events Recorder (SER)	SER-32e	Trystar Event Recorder, 32-inputs
Digital Output Module	eXM-RO-08	Option Module adds 8-outputs to SER-32e, 24 VDC, pluggable screw terminal connector
Digital Input Module	eXM-DI-08	Option Module adds 8-inputs to SER-32e, 24 VDC, pluggable screw terminal connector
Accessories (for SER)	EZC-IRIG-B	EZ connector for SER (IRIG-B input)
	EZC-DCF77	EZ connector for SER (DCF77 input)
	PLX-5V	PTP Legacy Interface (5V DCLS, for unmodulated IRIG-B output)
	PLX-24V	PTP Legacy Interface (24V DCLS, for DCF77, 1per10 or 24V IRIG-B output to STR-IDM)
	STR-IDM	IRIG-B Distribution Module (requires STR-100/IRIG-B or PLX-24V)

