



TRYSTAR®

DIGITAL INPUT MODULE

OWNERS MANUAL

DIGITAL INPUT MODULE

eXM-DI-08

(for use with SER-32e)

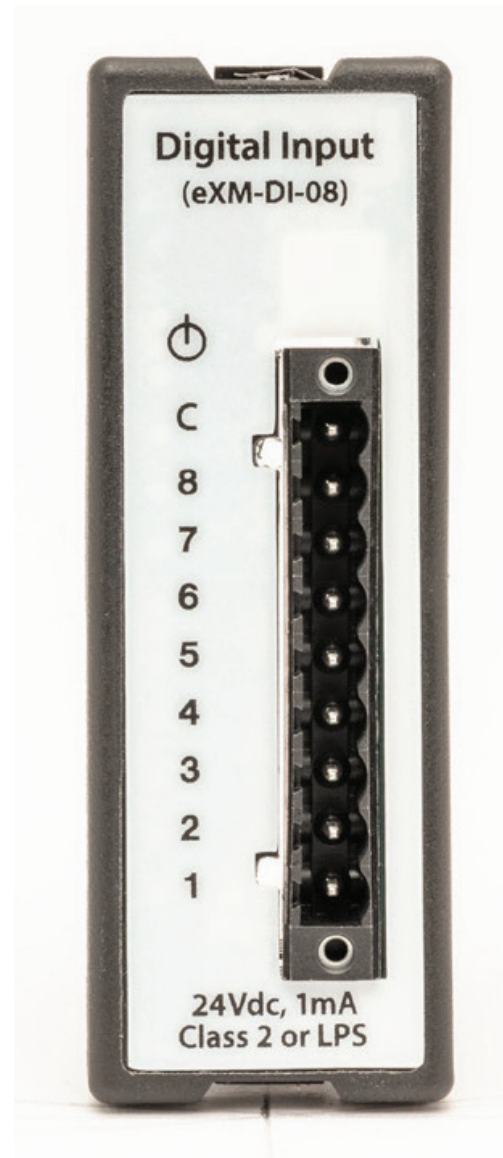


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NOTICE

FCC (Federal Communications Commission)

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense. The user is cautioned that any changes or modifications not expressly approved by Trystar LLC, may void the user’s authority to operate the equipment.

The Class A digital apparatus complies with CISPR 11, Class A, Group 1 (EN 55011) and Canadian ICES-003. (EN 61326-1) L’appareil numérique de classe A est conforme aux normes CISPR 11, classe A, groupe 1 (EN 55011) et à la norme Canadienne ICES-003. (EN 61326-1)

SAFETY

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.

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



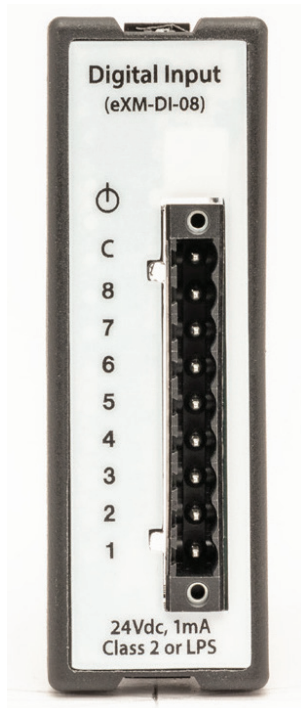
DANGER

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.
- 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 serious injury or death.

INTRODUCTION



Introduction Digital Input Module

The Digital Input Module is an optional accessory for the SER-32e Sequence of Events Recorder. Each Input Module provides eight (8) high-speed digital inputs with millisecond time stamping. The SER-32e Sequence of Events Recorder provides two (2) option slots allowing its native 32 high-speed inputs to be expanded to a maximum of 48 inputs, all with millisecond time stamping to enable root-cause analysis and advanced system diagnostics.

Configurable event recording: Each output on the SER and the option modules are individually configurable with digital filter, debounce and contact chatter functions to ensure reliable operation through the SER's web interface.

Event log: The 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, a unique sequence number and delta time between recorded events.

EPSS data log groups: Inputs and outputs are assigned to user defined groups for data logging purposes. If any input or output in a group changes state, the states of all group members are recorded in its EPSS (Group) 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 input and output channels, with date/time of last reset. Each channel can be reset individually.

Key features: The Digital Input Module provides the ability to expand the native 32 high-speed inputs native to the SER-32e to 40 or 48 inputs without the need for additional space or control power.

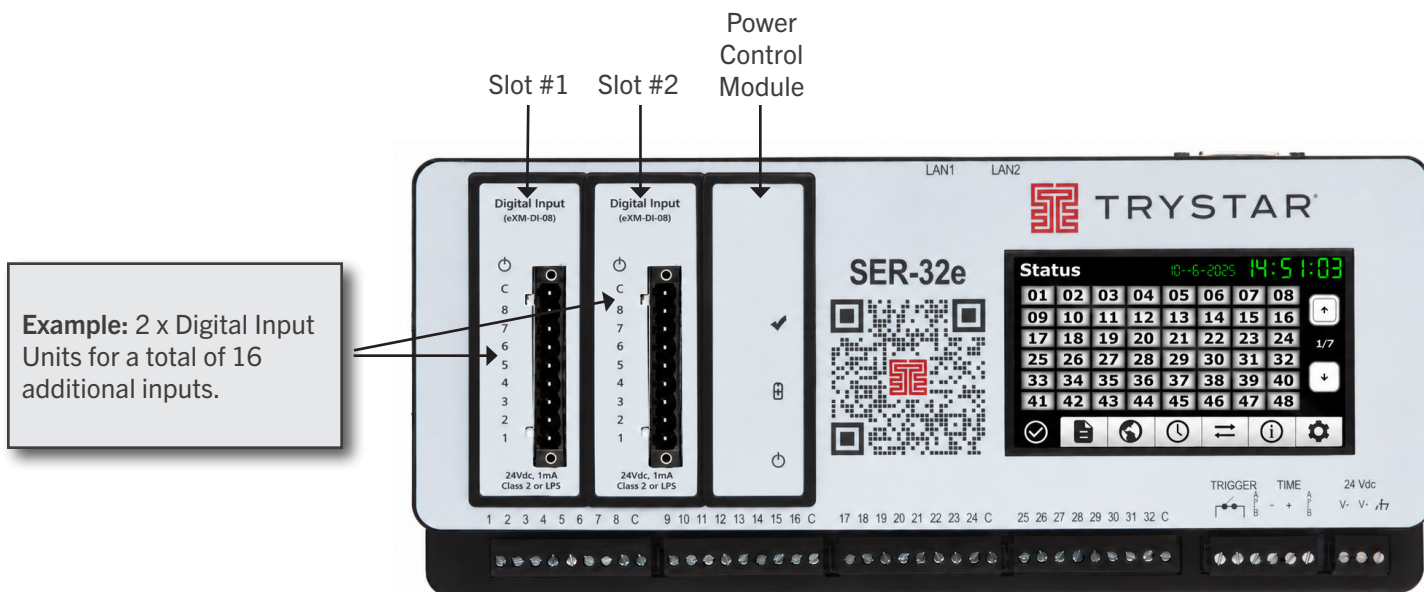


Figure 1-1. SER-32e with 2 Input Modules

Digital Input Module Overview

The Digital Input Module provides 8 high-speed inputs, input status indicators, and an indicator for the presence of control power and module status. Control power for the Input Module is provided by the SER-32e. Inputs on the Digital Input Module provide the same high-speed performance and features as the inputs native to the SER.

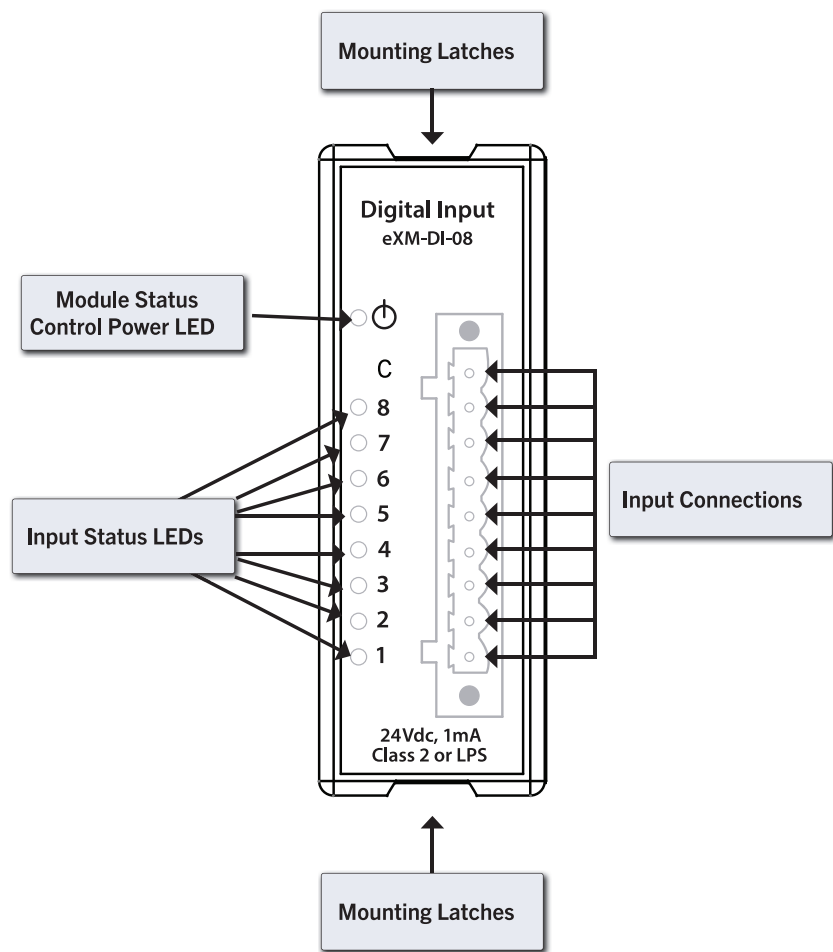


Figure 1-2. eXM-DI-08

Table 1-1. Ordering Information

Catalog Number	Description
SER-32e	Trystar Event Recorder, 32-input, PTP, secure web, 2x option slots, control power ride-thru
eXM-RO-08	8-output option module, 24 Vdc, pluggable screw terminal connector
eXM-DI-08	8-input option module, 24 Vdc, pluggable screw terminal connector
EZC-IRIG-B	EZ connector for SER (input: IRIG-B time source)
EZC-DCF77	EZ connector for SER (input: DCF77 time source)
PLXe-5V	PTP Legacy Interface, Self-Powered (5V DCLS, for unmodulated IRIG-B output)
PLX-5V	PTP Legacy Interface (5V DCLS, for unmodulated IRIG-B output)
PLX-24V	PTP Legacy Interface (DCF77, 1per10 or 24V IRIG-B output to STR-IDM)
ADK-125V	125 Vdc to 24 Vdc Input voltage adapter kit

INSTALLATION

Installing the Digital Input Module

The Digital Input Module does not require any additional space or power, it is installed by inserting it into either of the two (2) option slots on the SER-32e (slot 1 or slot 2). See Figure 1-1.

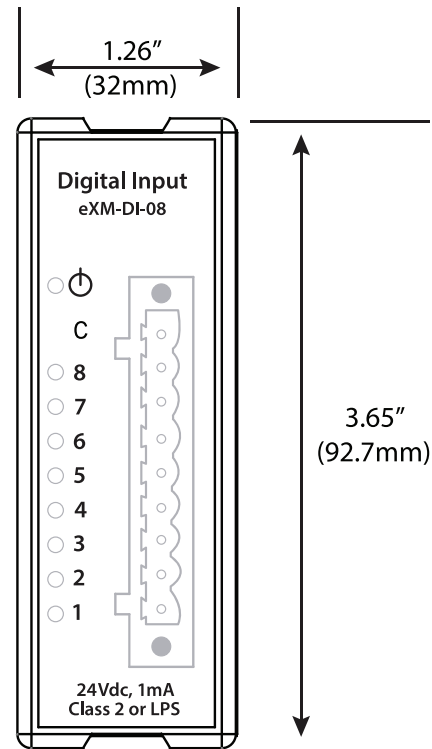


Figure 2-1. Digital Input Module Dimensions

Note: It is recommended to retain the cover for future use.

Installation Procedure

1. Refer to Safety Precautions for electrical safety guidance.
2. Remove control power from the SER and monitor the LED indicators on the Power Control module until they are all OFF.
3. Remove the blank cover from the desired option module slot by pressing the latches on the top and bottom and pull out.
4. Align the module in the guide rails with the connector on the right.
5. Insert the module into the option slot by pressing it into the SER until the latches click into place.
6. Reapply control power to the SER and confirm the SER recognizes the option module by viewing the Monitoring Status screen on either the SER display or web page.

WIRING

Wiring Connections for the Digital Input Module

The Digital Input Module has 8 isolated digital inputs, each sharing a common return. Control power for the module is provided by the SER the module is mounted in. Recommended wiring for digital inputs is Belden 8760 (18 AWG, shielded, twisted pair) cable, or equivalent.

Input connections are made via a removable screw terminal plug equipped with locking screws for mounting. It is recommended the locking screws be secured to ensure retention of the plug-in connector.

Refer to Safety Precautions for electrical safety guidance, proper PPE and procedures before wiring the Input Module.

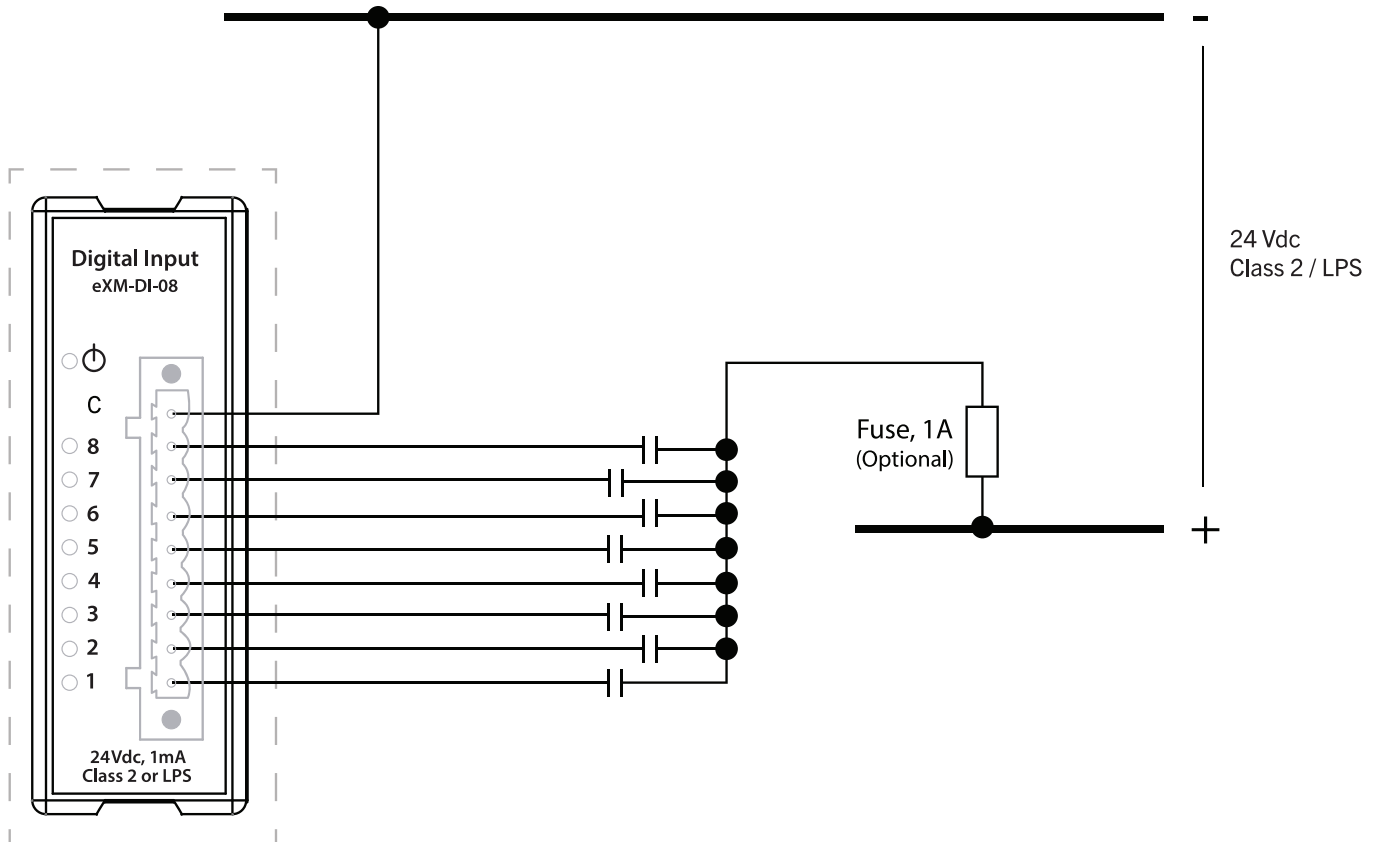


Figure 3-1. Digital Input Module Wiring

OPERATION

The inputs are reported based on the option slot in which they are installed.

Table 4-1. Input Channels

Module(s) Installed		Channels
Slot #1	Slot #2	
Yes	No	33 - 40
No	Yes	41 - 48
Yes	Yes	33 - 48

Note: If an Input Module is installed in option slot #2, but not option slot #1, channels 33 - 40 will be reported as disabled.

The status can be viewed on the SER’s display and web interface on the Monitoring - Status screen. The additional 16 (up to 16) inputs are shown at the bottom of the display screen.



Figure 4-1. Monitoring - (on SER) Status screen.

Note: Refer to SER-32e Instruction Manual for additional information on display screen and web client.

Additional inputs (up to 16) are shown on the right side of the Monitoring - Status web page.

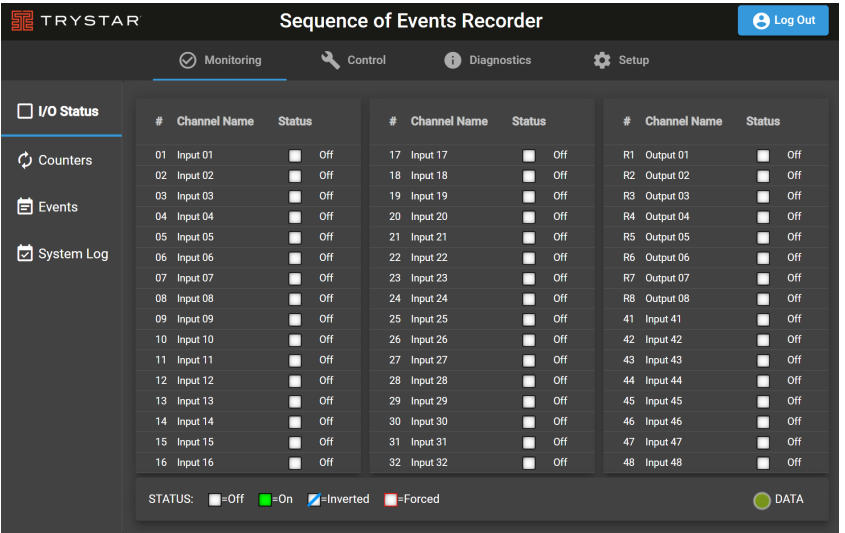


Figure 4-2. Monitoring - Status web page (SER-32e)

SETUP (WEB SERVER)

Input(s) Setup

Clicking Inputs under the Setup tab brings up the Input's setup page:

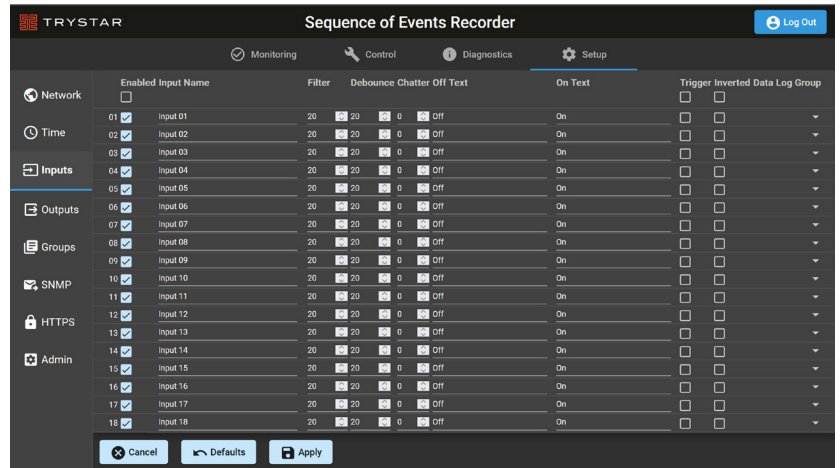


Figure 5-1. Input Setup web page (SER-32e)

This web page allows the configuration of each individual input.

Table 5-1. Initial Configuration Settings

Option	Description	Available values	Default
Input	Each input can be enabled for event recording. This only affects recording of state changes, not status monitoring.	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.	0 to 65535 ms ⁽²⁾	20ms
Debounce	Debounce time is the period that event processing is suspended after an event has been recorded. This prevents recording multiple events for a single state change.	0 to 65535 ms ⁽²⁾	20ms
Chatter	Chatter count is the maximum number of events recorded per minute. If this number exceeds the setpoint, the input is disabled for further event processing until it 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 and ON Texts	Customized label describes an input's OFF and ON state.	UTF-8, 16-char. ⁽¹⁾	ON / 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.	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.	None, or Group 01 to Group 16	None

⁽¹⁾ Only the following special characters are available: ! @ # \$ % * () _ - + = { } [] ; , ~ ' `

⁽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.

PRODUCT SPECIFICATIONS

Electrical		
Digital Inputs	Number of inputs	8
	Voltage, operating	24 Vdc (-15% to +10%), Class 2 / LPS
	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 isolated to 2.5 KV

Mechanical		
	Mounting	Option slot on SER-32e Sequence of Events Recorder
	Wire sizes supported	#24 to #12 AWG
	Dimensions (W x H x D)	1.26" x 3.65" x 1.71" (32mm x 92.7mm x 43.5mm)
	Dimensions (W x H x D) in packaging	8.0" x 3.0" x 8.0" (203.2mm x 76.2mm x 203.2mm)
	Weight (product alone / product packaged)	0.375 lbs. (0.17kg) / 0.75 lbs. (0.34kg)

Environmental		
	Operating Temperature	-25 to +70 OC
	Storage Temperature	-40 to +85 OC
	Humidity Rating	5% to 95% relative humidity (non-condensing) at +40 oC
	Altitude Rating	0 to 3000 meters (10,000 feet)
	Sustainability / Compliance	RoHS 2 (2011/65/EU), RoHS 3 (2015/863/EU), Pb free California Proposition 65, Low Halogen, Conflict Minerals

Regulatory		
	Safety, USA	UL listed (NRAQ-cULus, UL 61010-1, UL 61010-2-201)
	Safety, Canada	CAN/CSA-C22.2 (61010-1-12, 61010-2-201)
	Safety, Europe	CE Mark (EN 61010-1 : 2010, EN 61010-2-201 : 2017)
	Emissions / Immunity	EN 61326-1 (IEC 61326-1 : 2012)
	Radiated emissions	CISPR 11, Class A, Group 1 (EN 55011) / FCC Part 15B, Class A
	Electrostatic discharge	EN 61000-4-2
	Radiated immunity	EN 61000-4-3
	Electrical fast transient / burst immunity	EN 61000-4-4
	Surge immunity	EN 61000-4-5
	Conducted radio frequency immunity	EN 61000-4-6

TROUBLESHOOTING

Symptom	Possible Cause	Suggested Action(s)
Module status LED not ON	Connection issue with SER.	Remove power from SER. Remove Input Module. Examine the edge connector for damage. Re-insert Input Module.
Input(s) not functioning	Wetting voltage or common connection issue or missing. Input connector dislodged.	Confirm wetting voltage (24 Vdc) and common connections. Ensure Input connector is secured.
Input status for Inputs 33-40 is reporting as disabled	No Input Module installed in option slot #1.	There is no issue using option slot #2 and not using option slot #1. For sequential input numbering, move the Input Module to option slot #1. NOTE: you will need to reconfigure the Input Module when moving it from option slot #2 to slot #1.

