

**SER<sup>NET</sup>**

**Web based Sequence of Events Recorder.**

**Installation & Operation Manual**

**1087-147**

Revision C

## Scope

This manual describes the functions, features, installation, and configuration of SER<sup>NET</sup>. This includes usage of the Web browser interface.

## Product Overview

SER<sup>NET</sup> is an advanced alarm management system that captures critical alarms with 1 ms precision in the sequence they occur for quick determination of the root cause. The SER<sup>NET</sup> can display your alarms in a WEB Browser for easy analysis and provides real time data outputs via serial and Ethernet ports, making it ideal for monitoring your critical alarms from substation switchgear, transformers, turbines, boilers, pumps, motors, UPS, HVAC, building security and more.

Each SER<sup>NET</sup> product can work as a stand-alone system monitoring up to 48 digital inputs or multiple SER<sup>NET</sup> units can be networked together to form a larger system with all events consolidated in one chronological list as they occur.

### Model Number Codes / Ordering Information

	# Inputs and Mounting		Power	Field Contact Voltage (FCV)	Options
	Code	Description			
SER <sup>NET</sup>	48-RK	48 input 19" Rack	1F = 24 Vdc	X = 24 Vdc Internally provided	MOD = Modbus Protocol  DNP = DNP Protocol
	16-SD	16 input Surface/ DIN Rail mounting	1U = Universal AC/DC 120/240 Vac or 125 Vdc	D = 125 Vdc Externally provided	MWEB = Alarms from multiple units (max 24) can be collected on one SERNET for common display, event log, printing
	32-SD	32 input Surface/ DIN Rail mounting			
	48-SD	48 input Surface/ DIN Rail mounting			
	32-RK1	32 input 19" Rack mount, 1 ½ term/input	2F = Dual 24 Vdc	C = 24-125 Vdc Customer specified	
	32-RK2	32 input 19" Rack mount, 2 term/input (AC Input)			
	32-RK3	32 input 19" Rack mount, 2 term/input (DC Input)			
	32-ICR1	32 input ISM Card Rack, 1 ½ term/input	2U = Dual AC/DC	Y = 120 Vac Customer supplied	
	32-ICR2	32 input ISM Card Rack, 2 term/input (AC Input)			
	32-ICR3	32 input ISM Card Rack, 2 term/input (DC Input)			
	32-SD1	32 input Surface/DIN Rail mount, 1 ½ term/input	UF = AC/DC & 24 Vdc	Option X on Models: RK, SD, RK1, ICR1, SD1	
	32-SD2	32 input Surface/DIN Rail mount, 2 term/input (AC Input)			
	32-SD3	32 input Surface/ DIN Rail mount, 2 term/input (DC Input)			

## Sample Model Number

SER<sup>NET</sup> - - - - -  
# of Inputs    Mounting    Power    FCV    Options

### Typical Model Number for a Single Unit

SER<sup>NET</sup> - 48-RK-2U-C-MOD-DNP

- 48 Inputs
- 19" Rack
- Dual AC/DC Power Supply
- 20-150 Vdc FCV
- Modbus Protocol
- DNP Protocol

### Typical Model Number for 256 Point System

(5) SER<sup>NET</sup> - 48-SD-2U-C-MOD-DNP-MWEB

(1) SER<sup>NET</sup> - 16-SD-2U-C-MOD-DNP-MWEB

- 256 Inputs
- Surface or Din Rail Mounting
- Dual AC/DC Power Supply
- 20-150 Vdc FCV
- Modbus Protocol
- DNP Protocol
- Multiple WEB Browser Display

## Features

### Inputs

Each SER<sup>NET</sup> unit can accommodate 16 to 48 digital contact inputs and can be configured via the Web Browser for N.O. (Normally Open – contact closes on alarm) or N.C. (Normally Closed – contact opens on alarm). The digital contact inputs can be *dry* (voltage free) using AMETEK supplied Field Contact Voltage (FCV Options X, D) or can be *wet* using customer supplied voltages between 20-150Vdc (FCV Option C).

The SER<sup>NET</sup> will log all alarms with 1 ms resolution and can be filtered (to prevent false alarms or multiple occurrences) please refer to the section about the Web Browser Interface for details.

### Alarm Memory

Each SER<sup>NET</sup> unit can store 40,000 events in non-volatile memory. The oldest events will be overwritten once the memory is full (First In, First Out). The following types of events are stored in memory:

Event Types	Event Descriptor	Event Description
Alarm Event	A N	Input goes into the Alarm State Input Returns to Normal State
Diagnostic Event	D	System Diagnostic for: -Unit Configuration -Disabled Alarms (Manual or Automatically) -Acknowledged Alarms -System Watchdog Fault -Communication Errors -Power Supply Failure
Time Event	T	Event associated with Time Clock -Time Sync enabled -Time sync lost -Time Reset

Each event will be stored with its own Event Descriptor, date and time stamp to the millisecond, Station ID, Device ID, Input Channel Number and text Description. The Alarm Event Description can be configured for separate Alarm Text and Return to Normal text.

## Alarm Indicators

Each Alarm input has a corresponding LED indicator that will flash for a point that is in alarm and turn off when the point returns to normal. On the *Active Alarms* page of the Web browser there is an *Acknowledge Alarms* button, which changes the flashing LED indicator to solid on. This is explained later.

## Alarm Outputs

SER<sup>NET</sup> has two configurable Form C contact outputs to indicate various alarm conditions. Each output can be configured with an energized or de-energized coil in the alarm state. The alarm can be configured for:

- Activate when any alarm is active
- Activate when any alarm is active and de-activate for ½ second for new alarms (re-flash)
- Activate for an internal system error (watchdog)

## Time Synchronization

The SER<sup>NET</sup> can be synchronized externally via:

- IRIG-B (BNC Connector provided)
- NTP (via RJ45 Ethernet Port)
- Manually (via WEB Browser connected to Ethernet Port)
- Other SER<sup>NET</sup> unit (via RS-485 output)

There is an internal Real Time Clock (RTC) accurate to 1 second per day (0.69msec/minute) in cases where there is no external time sync present.

### **IRIG-B**

Accuracy to +/- 1 ms of UTC time when connected to a high accuracy GPS Clock.

### **NTP (Network Time Protocol)**

NTP can have an accuracy up to +/- 1 ms of UTC time when connected to a Quantum 2 NTP Time Server. The NTP time sync is provided via the Ethernet port, which is configured, to connect to up to three IP addressable high accuracy GPS clocks installed on the network LAN. The GPS clocks query the NTP host and through several transmissions, it is able to synchronize the time. Overall accuracy is dependent on where the NTP Time Server is located on the LAN, number of hops, etc and network traffic. Typical accuracies can be +/- 2msec of UTC time when located in the same LAN as the SER<sup>NET</sup>.

### **Manual Time Set**

Accuracy to the same specifications as the PC clock and long term accuracy is maintained via the internal RTC.

**Other SER<sup>NET</sup> Unit**

A SER<sup>NET</sup> unit connected to IRIG-B or NTP can be designated as a 'Master' for interconnection to up to 24 'Slave' SER<sup>NET</sup> units via a RS-485 serial output. The last slave in the string must be terminated. Please refer to the section on Web Browser Interface. The slave SER<sup>NET</sup> units will synchronize to +/- 2msec of the Master.

## Power Supply Options

The SER<sup>NET</sup> operates from a variety of power inputs: 24 Vdc, 125 Vdc, 120/240 Vac, 50/60Hz. The SER<sup>NET</sup> can be equipped with a single power supply or a dual redundant power supply using the same or different power inputs.

There are two power supply versions available for SER<sup>NET</sup>.

- 24 Vdc
- 120/240 Vac or 125 Vdc Universal

The power supplies are removable from the front of the unit with power connections at the back. Each power supply slot is keyed per order, preventing a 24 Vdc power supply from being inserted into a universal 120 Vac/240 Vac/125 Vdc power supply slot.

When the 24 Vdc Power Supply is specified, it will always be installed in PS1, the first Slot (to the left, when viewed from the front) using power supply terminal block connections TB3 (9, 10). The second slot, PS2 and terminal block connections TB3 (7, 8), is reserved for dual power options using whatever power option is selected. The wiring diagrams can be found later in this manual.

The power supplies are hot-swappable. There is no need to power down a system for power supply maintenance. Each supply has a bi-color LED to indicate the power supply status:

Green – the power supply is functioning correctly.

Red – the supply should be replaced as soon as possible.

*Note: Red LED only operates when using the dual power options*

## Field Contact Voltage Power Supply

The SER<sup>NET</sup> can internally generate 24 Vdc Field Contact Voltage (FCV) or can accept any voltage between 20 and 150 Vdc. There are four terminals provided for FCV connection to the field contact inputs. The wiring diagrams can be found later in this manual.

The unit is factory configured for one of the following options:

- Internally supplied, 24 Vdc FCV
- Externally supplied, 125 Vdc FCV
- Customer supplied 20 to 150 Vdc FCV

The field contact inputs operate over the range of 20 to 150 Vdc, and thus require no hardware configuration.

## Status Indicators

Two status indicators, adjacent to the Alarm Input Indicators, are provided:

Time Sync:

Green – a valid Time Synchronization (either IRIG-B or NTP) is present

Red – no Time Sync.

System Status:

Green – system is functioning normally

Red – problem detected

## Serial Port

The serial port is a DB-9 female connector. It can be configured for either RS-232 or RS-485 mode. Mode selection is done on the *Serial Communications* page of the Web browser interface. RS-485 termination is internal, and is selected on the same page. Details can be found later in this manual.

## Ethernet

Ethernet communication is provided by an RJ-45 connector. SER<sup>NET</sup> supports 10 Mbps and 100 Mbps. It also provides support for fixed and DHCP IP addresses.

The following Ethernet communications are supported:

- Web browser (configuration and display of alarms)
- Modbus TCP/IP (alarm status, time stamp)
- DNP (alarm status, time stamp)
- NTP (time sync)
- Bacnet (alarm status, time stamp)
- SNMP (Ethernet status)

The Ethernet port allows up to 10 simultaneous connections.



## Safety and Agency Approvals

### Symbols



Caution, risk of danger. Refer to the Instruction Manual



Caution, risk of electric shock.



Protective Earth Conductor Terminal

### Approvals

SER<sup>NET</sup> is CE certified for operation under the following conditions:

#### Indoor Use

Altitude: Up to 2000 m

Operating Temperature: -20 to 60 °C (-4 to 140 °F)

Relative Humidity: 20 – 95 % non-condensing

Transient Over-Voltages 2500 V (Installation or Measurement Category II)

Pollution Degree 2

Equipment Category Permanently Connected

Operating Voltage Ranges 120/240 Vac, 50/60 Hz

125 Vdc

24 Vdc

# Installation & Setup

## Safety

### Safety related installation instructions

Installation and start-up must be performed by trained and qualified personnel.

If the unit is not installed and operated as specified, the protection provided by the unit may be impaired.

Before start-up it is important to ensure that:

The unit can be powered down by a switch, or a circuit breaker, clearly marked as the disconnecting device for the unit. The maximum rating of the disconnecting device is 20 A.

The disconnecting device is located in close proximity to the unit.

The equipment is not in a position so that it is difficult to operate the disconnecting device.

The protective earth terminal is properly connected to protective earth ground.

The line(s) have been connected properly and protection is provided against electric shock.

## Mounting

The unit is available in two versions, DIN Rail/Surface (Wall) Mount, and Rack Mount. The DIN Rail/Surface Mount unit is shipped with the DIN Rail mounting installed. Please refer to Figures 2–1a & b. For surface or wall mounting, it must be adapted, using the provided mounting hardware.

### Mounting for UL :

For UL listing the unit must be installed in a suitably rated UL Listed fire/enclosure

### Mounting for CE certification:

If either of the following options are used:

120 Vac/ 240 Vac /125 Vdc power supply

External FCV supply > 48 Vdc

The installation must shield the user from high voltage terminals.

**Note:** RS-232, Ethernet and IRIG-B connectors are on the front of units equipped for DIN Rail/Surface mounting. On rack-mounted units, they are on the rear of the unit.

There are no special ventilation requirements for either version. Maximum ambient temperature of +60 °C (+140 °F) must not be exceeded upon final installation.

Use caution when installing this, or any other type of equipment, into racks or panels. Ensure that all equipment is properly secured using the specified hardware in accordance with the Original Equipment Manufacturer's (OEM) specifications.

### DIN Rail Mounting

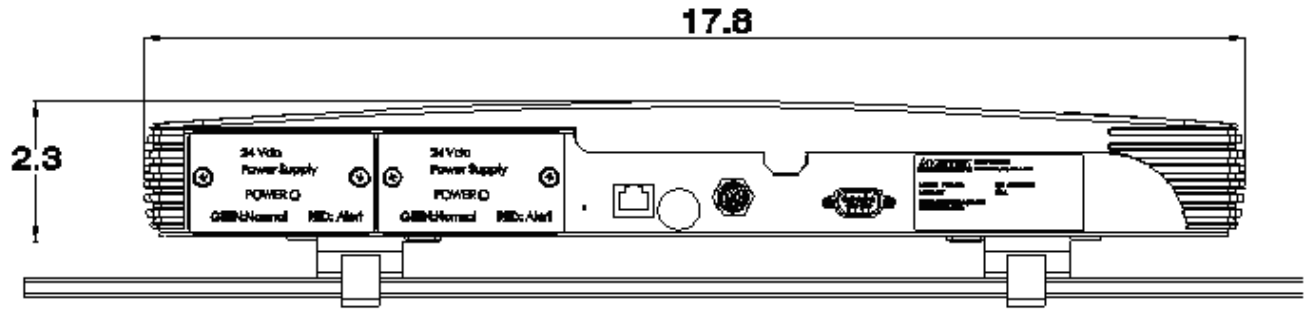


Figure 2-1a DIN Rail Mount (Front View)

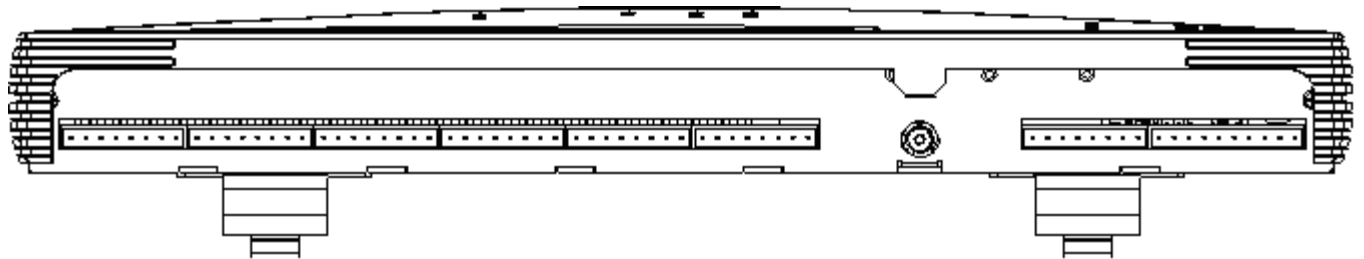


Figure 2-1b, DIN Rail Mount (Rear View)

## Surface (Wall) Mount

To convert from DIN rail mount to surface mount:

Remove rail mount screws and brackets from bottom of unit.

Fasten the wall mounting plates onto the bottom ends of the unit. Secure the wall plates to the unit with four screws provided for each mounting plate.

**Note:** Ensure there is proper wall anchoring in the mounting location. After attaching the brackets to the bottom of the unit, hold it in place and mark the holes on the wall, using the brackets as templates. Hang the unit vertically on the wall with two screws in the holes in each wall plate.

## Wiring

### Terminal Blocks

Pluggable terminal blocks are used for the power supplies, Field Contact Supply, Field Contact Inputs, and Contact Outputs.

The torque rating for the terminal block is as follows:

Manufacturer PCD (PCD molded in the plastic): 7 Lb.-In.

Manufacturer Excel (Excel or ECE molded in the plastic): 5 Lb.-In.

The Wire size is 12 to 24 AWG for a single wire. When 2 wires are inserted into a single terminal the wire gauge is limited to 16 AWG

### Protective Earth Connection

As shown in the following figures, the Protective Earth Terminal must be connected to protective earth ground. For proper EMC protection, this connection should be made using a minimum 1/4" braided conductor or 12 AWG copper wire. For UL listing this connection must be a minimum 12AWG copper wire.

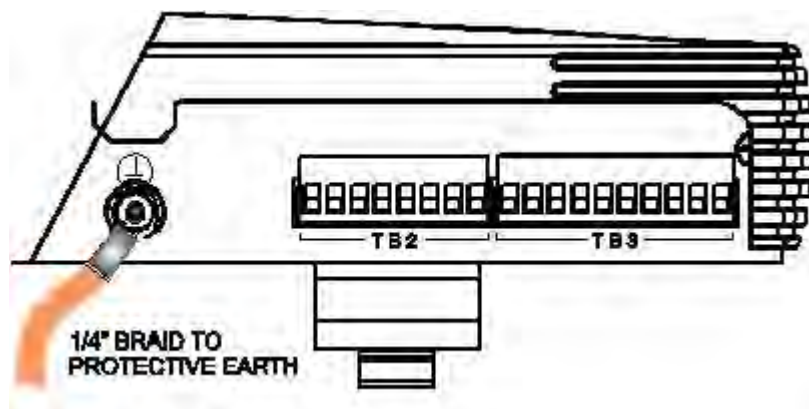


Figure 2-2, DIN and Surface (Wall) Mount — Protective Earth Connection.

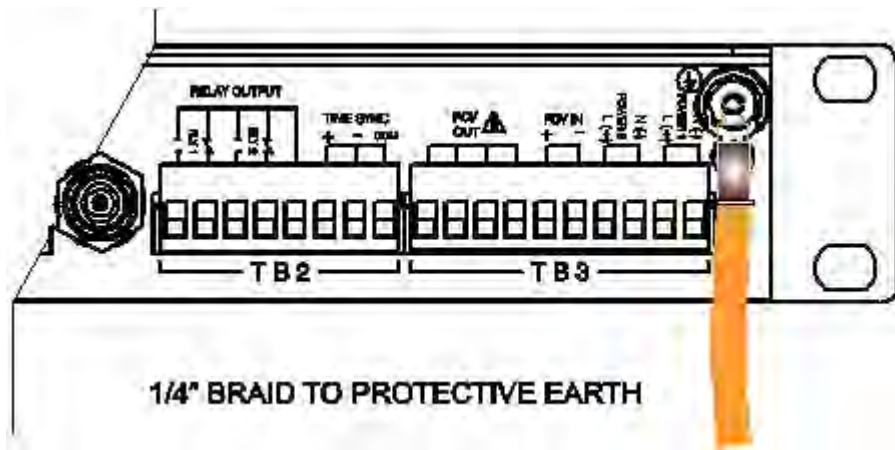


Figure 2–3, Rack Mount — Protective Earth Connection

### Power Supplies and Field Contact Supply

There are two power supply versions available for SER<sup>NET</sup>, 120 Vac/240 Vac/125 Vdc, and 24 Vdc.

Either power supply version can be specified for either of the two power supply slots. Refer to the product label, and ensure that the proper voltage is connected to the proper power supply input. The following figures show wiring for a rack-mounted unit.

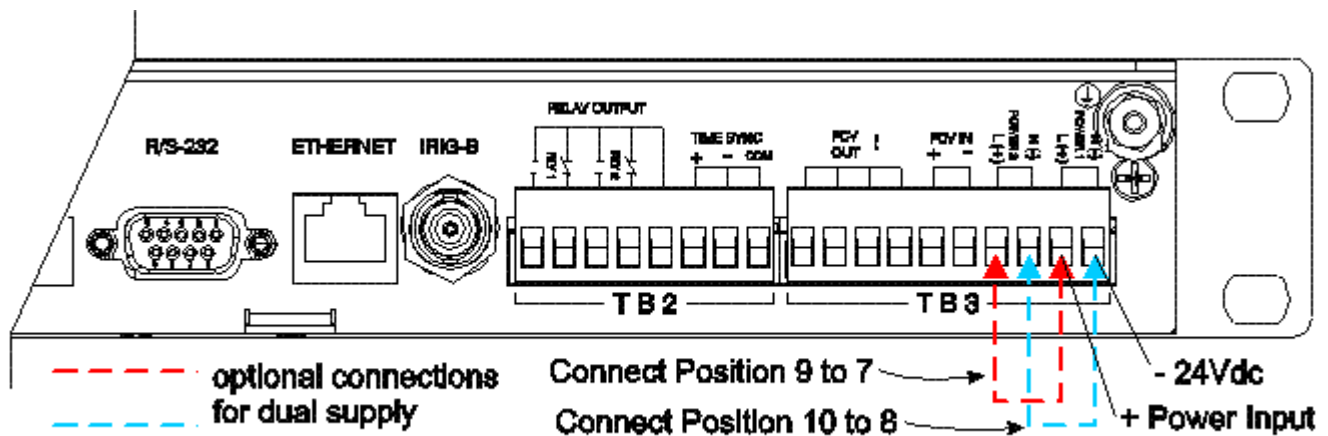


Figure 2–4a, Single or dual 24 Vdc with internal FCV

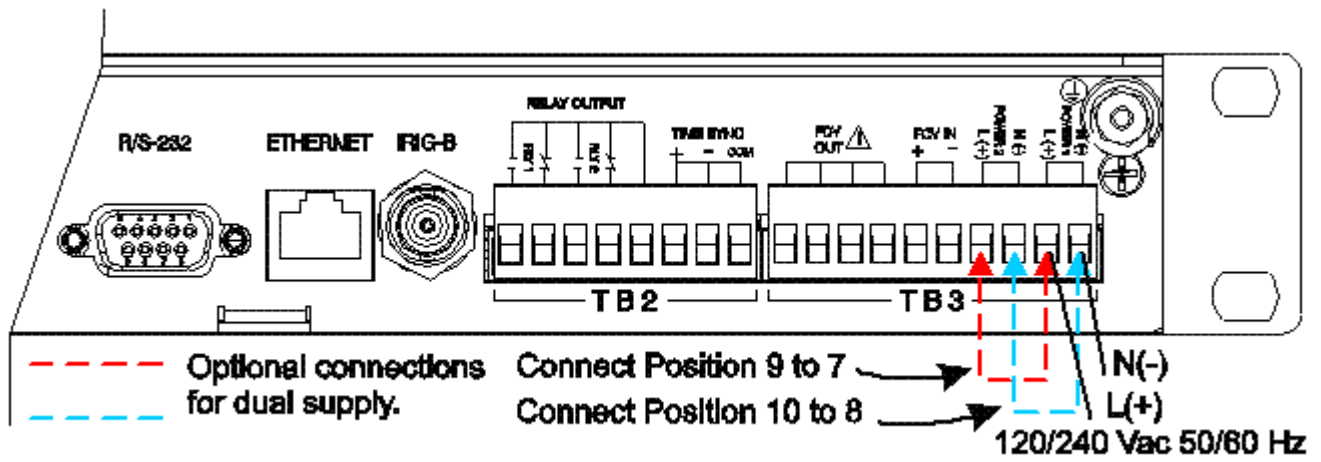


Figure 2-4b, Single or dual 120 Vac or 240 Vac with internal FCV

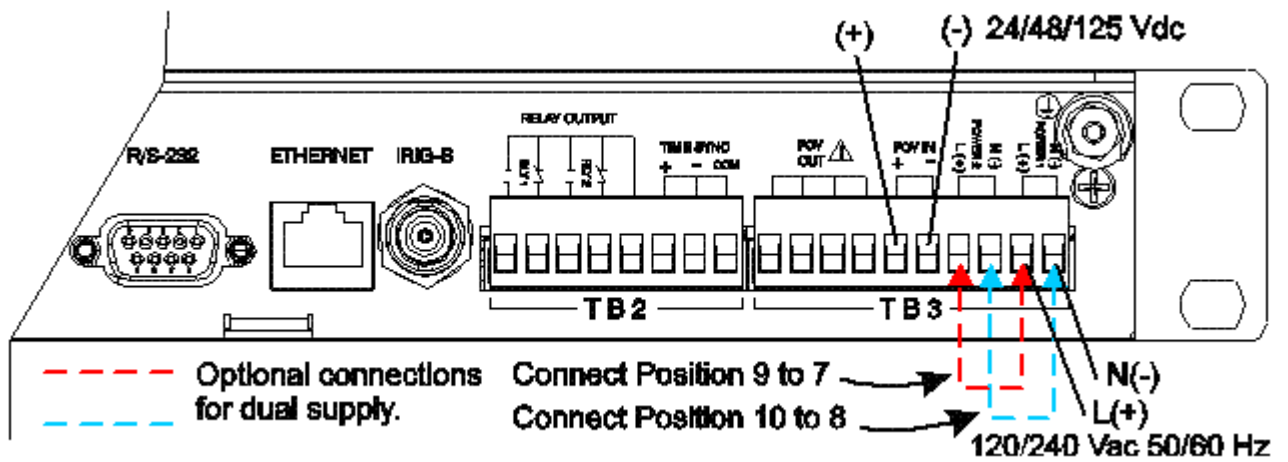


Figure 2-4c, Single or dual 120 Vac or 240 Vac with external FCV

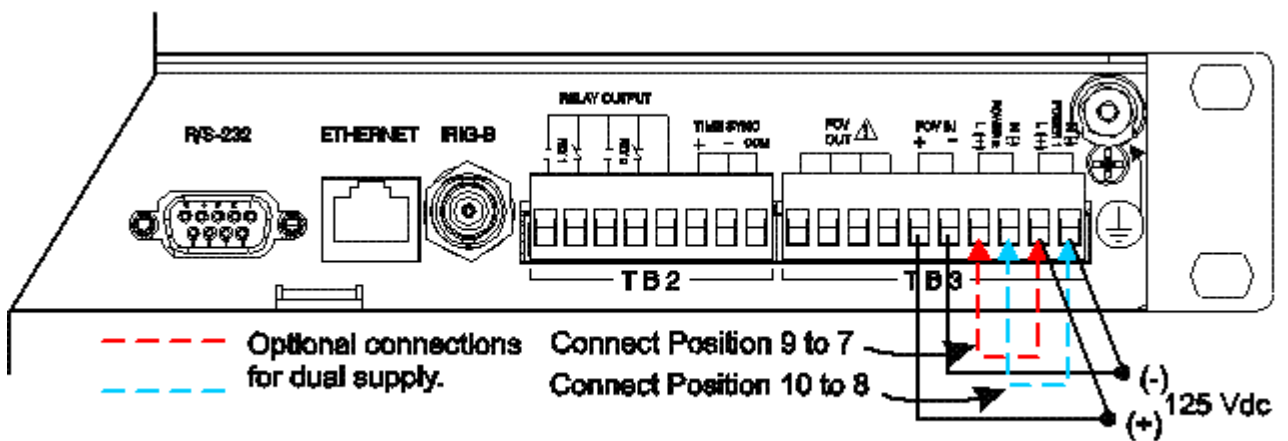


Figure 2-4d, Single or dual 125 Vdc with external 125 Vdc FCV

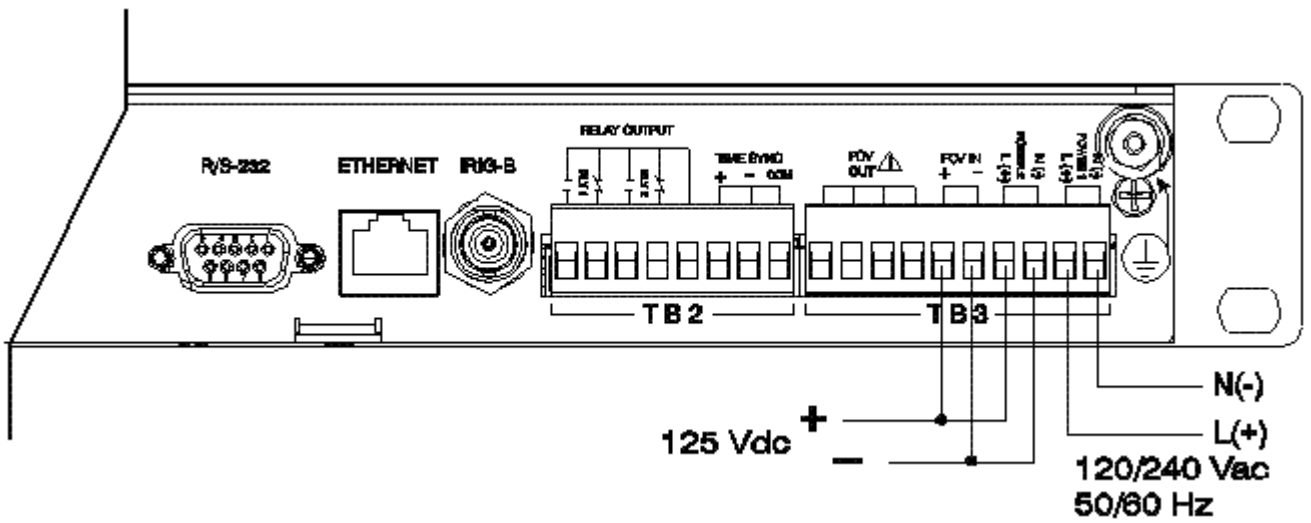


Figure 2-4e, Primary 120 Vac or 240 Vac, with backup 125 Vdc external FCV

### Field Contact Inputs

The unit is factory configured for one of the following two options:

Internally supplied, 24 Vdc FCV

Externally supplied 24 to 125 Vdc FCV

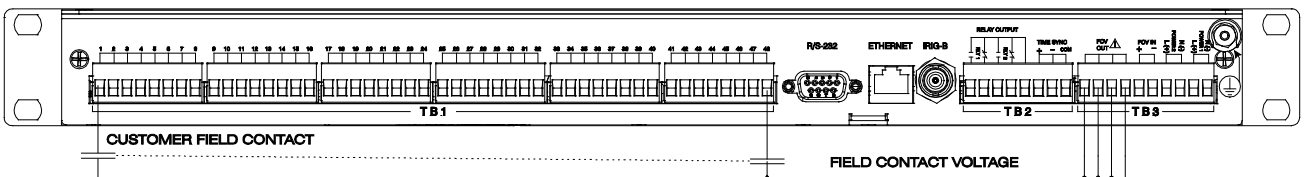


Figure 2-5, Field Contact Input Connections (Rack Mount)

### Relay Outputs

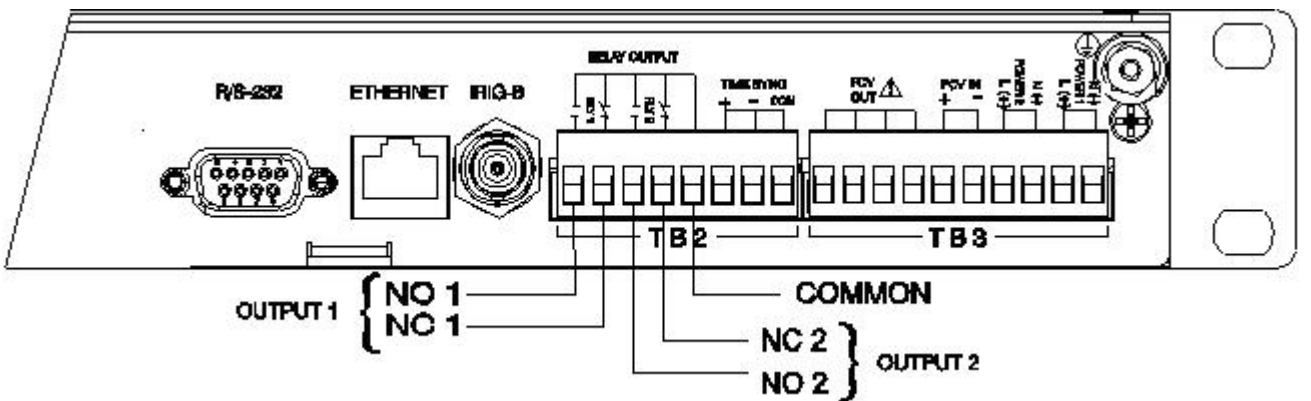


Figure 2-6, Relay Outputs Connections

## Serial Port, RS-232 / RS-485

On the *Serial Communications* page of the Web browser interface, the serial port can be configured for either RS-232 or RS-485 mode. In addition, the termination for the RS-485 mode is internal.

### RS-232 mode

The RS-232 connection is a standard DB-9 female connector. The port can be connected directly to the DB-9 male (AT) connector on a PC. Use a straight cable.

SERNET Signal	SERNET pin	PC pin	PC signal
TX	2	2	RX
RX	3	3	TX
COM	5	5	COM

### RS-485 mode

The following are the connections for RS-485 mode

SERNET Signal	SERNET pin
TX/RX +	9
TX/RX -	1
COM	5

## Ethernet

For Direct PC connection use a CAT 5 crossover cable; for network connection use a standard CAT 5 cable.

## IRIG-B

The IRIG-B signal connects to a standard BNC connector on SER<sup>NET</sup>. Modulated or Demodulated mode must be selected via DIP switches, which are accessible from the front of the unit. Remove the round plastic cover for access.



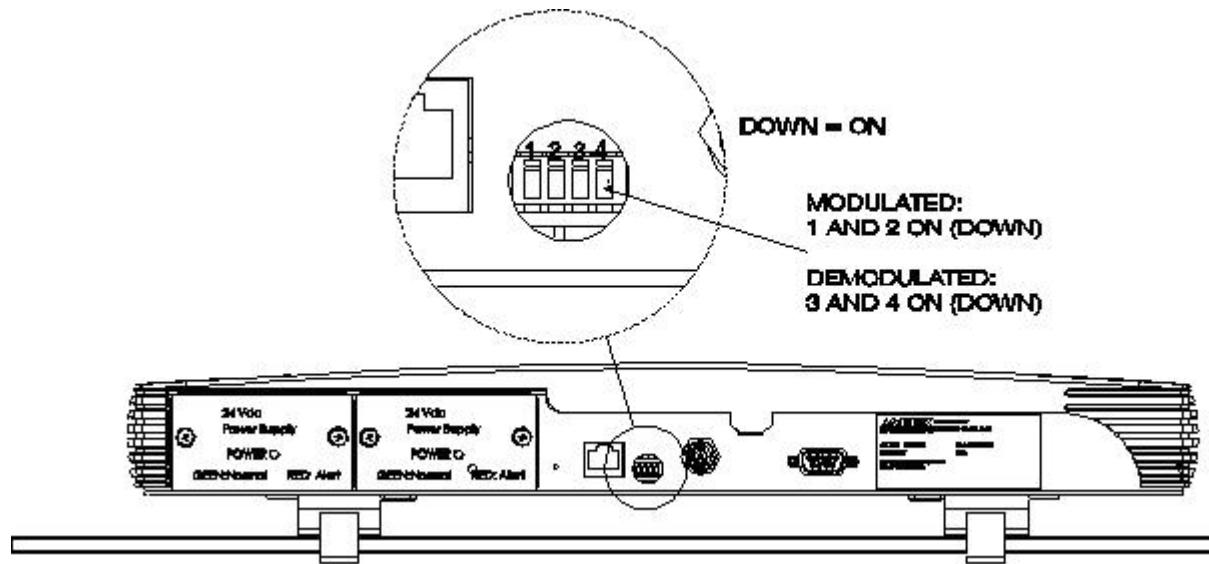


Figure 2–7, IRIG-B Modulated/Demodulated Selection

Selection	1	2	3	4
Modulated	ON	ON	OFF	OFF
Demodulated	OFF	OFF	ON	ON

#### External Serial Time Sync (unit to unit)

This selection is made on the *Date/Time* page of the Web browser interface. One SER<sup>NET</sup> may be designated as a Time Sync Master. All other units must be configured for Time Sync Slave.

## SER<sup>NET</sup> Web Browser Interface

The SER<sup>NET</sup> has a built-in WEB server that can be used with your Web browser such as Internet Explorer or Firefox for displaying your alarms and for configuration of the unit. Refer to Appendix F for compatibility requirements and browser configuration. Launch your browser and type in your unit's IP address. The SER<sup>NET</sup> is shipped with a default address of <http://192.168.250.100>. A User ID/Password dialog box will pop up. The SER<sup>NET</sup> has two levels for access. The default username is: admin with password: admin and user:user. The unit's home page will be displayed where you can view and access all the features of the unit, depending on your user account rights.

**Note:** Your system or network administrator must set up the user accounts. There are two basic types, Admin and User. An Administrator account has full rights and can change anything. The User account has limited rights and cannot change passwords, apply or discard changes. Some action buttons will be grayed out under a User account.

## SER<sup>NET</sup> Home Page

The top bar of the home page displays the current date/time (in UTC and local time), Station ID, Device ID and latest alarm that is not acknowledged. The check box – *Enable 30 second auto-refresh*, when checked, will refresh the page every 30 seconds.

A graphic display of the SER<sup>NET</sup> is provided with active alarms shown in RED with their alarm legend. Inputs in their normal state will be shown with a clear background and their normal legend. When the alarm clears, the display automatically refreshes itself to the normal state. Alarm inputs that have been disabled will have a yellow background to highlight the disabled state.

The remaining links in the side-bar are used for displaying the alarms and for system configuration.

### Systems with MWEB Option (Combined Master)

The Master SER<sup>NET</sup> equipped with the MWEB option will include a graphic showing every Slave SERNET unit connected. The MWEB graphic will include the Slave Station ID, Device ID and Input numbers assigned to the slave unit. When an alarm is present on that slave unit, it will have a red backfill. For any point in alarm (red) the master will continually attempt to connect to a slave every 15 seconds.

## Unit Identification

In this section, please refer to the links centered below the top bar. The items, *Serial and Model Numbers*, *Number of Device Inputs* and *Software/Firmware Version*, are configured at the factory.

Links that you can edit are underlined. When you click on a link in this section, a small dialog box will be initiated where you can type in the appropriate information. After typing in a name, for instance, you simply click the save button. All editable fields, i.e. Station ID, can contain up to 32 alphanumeric characters.

### Station ID

Click this link to type a specific location name for the unit. i.e. Green St. Substation 16. This name will be reported in the Alarms and Events list, event download, ASCII output and printouts.

### Device ID

This name is more specific, i.e. to identify a single unit in a substation containing many units. It should be used to identify a SER<sup>NET</sup> unit or group of alarms connected to the unit, i.e. SER<sup>NET</sup> device 1 or Breaker XYZ. The device ID will be reported in the Alarms and Events list, event download, ASCII output and printouts.

### Who to Contact

This field is used to identify a contact such as in case of emergency.

### Customer

Here is where you type in the customer's name.

## Alarms and Events

The side-bar on the home page contains links to all of the pages for unit access and configuration. Near the top of the side-bar you'll find two links labeled *Active Alarms* and *Events*. The Active Alarm screen is used to display inputs that are in the alarm state only. The event screen is used as a historical display showing active and cleared alarms, system status and diagnostics.

### Active Alarms (#)

The Active Alarm screen is used as a 'heads-up display' for identifying all inputs that are currently in the alarm state. When equipped with the MWEB option, the Master SER<sup>NET</sup> will display alarms from itself as well as every slave SER<sup>NET</sup> connected to it, in chronological order. The Active Alarm screen provides the ability to latch alarms until acknowledged and includes various color coding features to distinguish new alarms.

The Active Alarm page displays all active alarms in chronological order as they occur. The active alarms can be latched by selecting the 'latched alarms' box or unlatched. When equipped with the MWEB option, the Master SER<sup>NET</sup> will display active alarms from itself as well as every slave SER<sup>NET</sup> connected to it, in chronological order. The alarms are color coded to show the various alarm states.

### Unlatched Alarms

New alarms will be colored red and displayed in chronological order. They will automatically clear from this screen and be saved in memory when they return to the normal state. Active alarms that have been acknowledged will change from red to green.

### Latched Alarms

New alarms will be colored red and displayed in chronological order. Active alarms that have been acknowledged will change from red to green. If an alarm returns to normal before it has been acknowledged, it will change to a black color. After an alarm has been acknowledged and the input has returned to normal, it will clear from this screen and be saved in memory.

Some SER<sup>NET</sup> models have an LED indicator provided for every input. New alarms will flash the LED indicator. When the alarms are acknowledged, the LED will go from flashing to steady on. Alarms that return to normal will turn the LED off.

## Event Log


The Event log is used to view, sort, filter, print and download all alarms in memory. Each SER<sup>NET</sup> unit can store up to 40,000 events. When equipped with the MWEB option, the Master SER<sup>NET</sup> will display events from itself as well as every slave SER<sup>NET</sup> connected to it, in chronological order, An event can be an input going into alarm, returning to normal, diagnostic message and time synchronization status.

The event log is used to perform alarm management by filtering the list to a specific date and timeframe, sorting them by chronological order to determine the exact sequence of events for root cause analysis. In addition, events can be filtered to a specific input number or group of numbers to trend the number of occurrences within a given time frame. The event log can be downloaded for further analysis and data manipulation.

The Event Log displays all archived alarms, system status and diagnostics. The different types of events are identified with a descriptor as shown below.

Event Types	Event Descriptor	Event Description
Alarm Event	A N	Input goes into the Alarm State Input Returns to Normal State
Diagnostic Event	D	System Diagnostic for: -Unit Configuration -Disabled Alarms (Manual or Automatically) -Acknowledged Alarms -System Watchdog Fault -Communication Errors <i>*refer to Appendix I for a complete list</i>
Time Event	T	Event associated with Time Clock -Time Sync enabled -Time sync lost -Time Reset

Maximum events to retrieve for display

The SER<sup>NET</sup> Event Buffer can store 40,000 events. The number of events displayed at any one time can be selected by entering the number in this text box, (top right), followed by clicking the  icon to refresh the page with the desired number of events. A range of 1 – 1000 of the most recent events are allowed in this entry. Depending on how you sort and filter the list of events, it could be the most recent group of events or oldest alarms stored in memory.

## Event Sorting

The column headings are active elements, meaning you can click on one to change the sorted order of the events. It works similar to the column headings in Windows explorer. An arrow will appear, next

to the heading title, toggling up and down each time you click the heading. For example, each time you click the Date column heading, the events are resorted chronologically or in reverse.

## Event Filters

The Event Log can be filtered to only show alarms within a given data and time, specific event types and specific inputs.

You can combine 2 filters at one time to obtain an even more selective set. The following combinations of filters can be entered:

- Date & Time and Descriptor
- Date & Time and Point Number

When a filter is active, the filter criteria are displayed above the events table. Events are filtered by Data & Time and by Descriptor(s) T, D & A.

**Date & Time:** click the Date & Time button to set date & time filter parameters as shown in the dialog box. This displays the events according to your selection criteria.

**Descriptor:** In this dialog box you can set what descriptors you want to display in the event log. Place a check in the appropriate check box to enable that option.

**Point Number(s):** Here you can set which points you want displayed in the events list. For multiple input channels, use a comma between point numbers.

The *Clear Filters* button will remove the event filters that you configured and display the latest events.

Events that are logged by date, time (to millisecond), point #, event descriptor and description:

## Download File (.csv)

If you want to save a copy of the events log to your pc, click this button. Afterward you will be prompted whether you want to download ALL events, up to 40,000 stored in memory, or only the events currently displayed. Type yes to download all events or no to download the events currently displayed. Next, you will be presented with a dialog box. Either open the file to view it, or select a folder where to save it.

## Erase the log

Use caution, as this will permanently wipe out all events in the log. Under a User login, this option is grayed out. The event buffer stores a maximum of 40,000 events in non-volatile RAM. Events are automatically deleted on a FIFO basis (First In, First Out).

## **Print Events**

Click this to make a printout of the events in the current view. To print all the events, you must output all the events to file and then print them via the application, which opens the file. See the Download File (.csv) selection above.

# System Configuration

The SER<sup>NET</sup> is configured through the web browser. The configuration consists of setting up the alarm inputs and outputs, setting the time and date and the device communications. All configuration items require a log-in of administrator. A user log-in will let you view the configuration, but not make any changes. Following is information on the configuration pages.

## Alarm Inputs Configuration

This configuration screen will display the quantity of input channels in your SER<sup>NET</sup> model from 16 to 48 inputs..The configuration allows you to configure the contact alarm state for: NO (Normally Open, Customer contact closes on alarm) or NC (Normally Closed, Customer contact opens on alarm). In addition, you can configure a filter for each input and a unique legend that is used to describe the alarm or normal state.

### Input

The input number is included with every alarm and return to normal event. The default input number will start at 1. It can be changed to start on any input and will automatically increment all subsequent input numbers.

When multiple SER<sup>NET</sup> units are used in a system, it may be necessary to increment the input numbers, so you don't end up with the same input number on different systems. When the MWEB option is used (allows you to collect alarms from up to 24 SER<sup>NET</sup> units and display them on a single SER<sup>NET</sup> unit) the unit with the MWEB feature is designated as a Master and must start the input numbering at 1. The first slave unit would then start after these input numbers.

Example: 1-48 on Master SER<sup>NET</sup>, 49-96 on Slave SER<sup>NET</sup> Unit 1, 97-144 on Slave SER<sup>NET</sup> Unit 2, etc.

Note: Before enabling the MWEB feature on the Master, the Slave unit input numbers must be assigned.

### Nuisance Alarms

False alarms can fill up the event buffer and get in the way of critical alarms that need to be acted upon quickly. Several tools are provided to eliminate these false alarms and keep the list of archived events more manageable.

### Input Enabled

You have the ability to disable alarms that may be out for service. Once disabled, they will no longer indicate an alarm regardless of the input state. Disabling and re-enabling alarms will be noted in the event log.

### Filter Mode of Operation:

Input Filters are typically used to screen out momentary (false) alarms and Debounce Filters are used to eliminate repetitive alarms from a chattering contact. The Automatic Delete from Scan function is



used to disable a repetitive alarm for a period of time until it settles down and then records it when it finally stays in the alarm state.

### **Filter or Debounce Time:**

Values can be 0-65535ms. 0 defaults to 1ms input response if the filter mode is "Filter Time". This value is the time that the alarm must be present before an alarm is registered. For example, if you set the time to 200ms, then the contact must stay in alarm for 200ms before it is registered. Once it exceeds the filter time, the alarm will be recorded using the time stamp when it first went into the alarm state. If the filter mode is set to "Debounce", active alarms will be prevented from multiple occurrences for the set time period. For example, if you set the Debounce time to 200 ms and the contact goes in alarm but toggles on and off 100 ms apart for several seconds before eventually staying in the alarm state, only one alarm will be recorded with a timestamp when it first went into the alarm state.

### **Auto DFS (Delete From Scan):**

Values can be from 0-255 per minute. 0 = no delete from scan. For example if a contact toggles on and off X or more times per minute (depending on your setting) it is deleted from the scan. And that contact will not be registered. Once a contact toggles on/off below the set rate, it will be automatically re-inserted into scan.

### **Contact State:**

Set the contact for NO (Normally Open) or NC (Normally Closed).

### **Alarm Legend:**

You may identify each input with a specific description, i.e. Fire, Wind etc. If no description is entered, the default will be Input # is in Alarm. The Alarm Legend will be displayed on the SER<sup>NET</sup> Home Page Annunciator Graphic, Active Alarm Page, Event Log page, event download, ASCII output and printouts.

### **Normal Legend:**

The Normal Legend will be displayed when the input has cleared. The Normal Legend will be displayed on the SER<sup>NET</sup> Home Page Annunciator Graphic, Active Alarm Page, Event Log page, event download, ASCII output and printouts. If you click the *Same as the Alarm Legend* check box, the description will mirror the Alarm Legend.

### **Set all Inputs... :**

(at bottom) To set an entire column to the same setting, enter the value and press the tab key. You will be prompted to set all settings to the same value. This can save you time rather than setting each input individually.

### **Import / Export Legends**

The legend import / export allows you to upload or download legends from a csv file. To see the csv file format, refer to Appendix J. Or, simply export the default legends configured into the SER<sup>NET</sup> and

you will see the required format in your csv file. Also, the instructions are included in the csv export file for reference.

Note: The legend format matches the ISM SER format for legends. When transferring the legends from an ISM system, export the legends from the ISM and then import that file into the SER<sup>NET</sup>.

Once you are finished with the settings, click *Apply* (must be logged in as Administrator)

## **Alarm Outputs Configuration**

SER<sup>NET</sup> has two Form C Relay outputs, Alarm Output 1 & 2.

Coil State – The Alarm Output Relay Coil can be configured to be energized or de-energized in the normal state.

- Energized – The Relay coil is energized with power when normal and de-energizes when it is activated. This is most often used in fail-safe applications, where a loss of power will de-energize the relay coil and transfer the contacts.
- De-energized – The Relay coil is de-energized when normal and energizes when it is activated.

Relay Function can be set to:

- Alarm – Activate when any alarm is active
- Reflash – Activate when any alarm is active and pulse for ½ second for new alarms
- Watchdog – Activate for an internal system error.

After selecting your options click *Apply*.

## Serial Communications Configuration

On this page, you configure the unit's Serial communications parameters. Those settings are dependent on the device to which you will connect. The serial port supports a single connection of either the optional Modbus RTU, optional DNP and standard Serial ASCII protocol. After you make your selections, click *Apply*.

### Communication Set-up:

Select the Baud Rate, Parity and communication delays to match your application.

The SER<sup>NET</sup> has a single DB9 serial port that can be configured for RS-232 or RS-485

Communication Mode. Refer to the section on wiring for RS-232 and RS-485 connections. When using RS-485 to connect multiple devices together, the last unit must be configured with the RS-485 Terminator selection.

Once your communications parameters are set you can choose the type of output desired. They are:

### Modbus

The SER<sup>NET</sup> Modbus port will transmit the status and timestamp of each alarm. The transmitted alarms can be used to drive an AMETEK Annunciator, RTU, SCADA, PLC or other device. Refer to Appendix A for detailed Modbus operation and mapping. The Modbus port supports device addresses of 1-255, a maximum Baud Rate of 115,200 and odd, even or no parity.

**Modbus Master:** The Modbus Port can be configured as a Master, with connection to up to 3 Modbus Slave devices. In this mode, you enter the Slave Address for each device you wish to connect to.

Select 'Alarms' to provide Alarm Status (On/Off status per input). Alarm Status is provided by reading 16-bit holding registers with a single bit designated per input. You can select all or specific inputs by checking the input number box. The Modbus Start address can be configured based on the application. The ending address will automatically be presented based on the number of inputs selected. Example: If all 48 alarms are selected, it will require three 16 bit registers, 32 alarms will require 2 registers, 20 alarms will require 2 registers, etc.

### Modbus Alarm Mapping

Starting Register address: 40001, inputs 1-32 selected, inputs 1,15,18 on alarm

Register	Bit 15	Bit 14	Bit 13	Bit 12	Bit 11	Bit 10	Bit 9	Bit 8	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
40001	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1
40002	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0

Starting Register address: 40001, inputs 1,5,9,12,21-48 selected, inputs 5, 12,48 on alarm

Register	Bit 15	Bit 14	Bit 13	Bit 12	Bit 11	Bit 10	Bit 9	Bit 8	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
40001	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0
40002	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Select 'Events' to provide alarm status with a time and date stamp. The Modbus interface requires six 16-bit registers for each event. 10 events are returned per poll for a total of 60 registers. The Modbus Start address can be configured based on the application. The ending address will automatically be calculated for the 60 registers required. Refer to Appendix A for complete details.

### Systems with MWEB Option

With MWEB enabled, Modbus alarms will be sent for all inputs of the master, followed by all inputs of each remote SER<sup>NET</sup>. Modbus will not operate before MWEB has made all possible connections to remote SER<sup>NET</sup> units.

---

Warning: Modbus Communications will not start until all remote devices have connected. Ending addresses will be calculated after the total number of points is determined. Refresh this page to update status and ending addresses.

---

With the Modbus & DNP protocols, all point numbers throughout the network are contiguous and unique. Note that all remote devices must respond before the point numbers are assigned at each SER<sup>NET</sup> slave unit. For example, with a 48-point master and two 48-point slave devices; points will be numbered 1–48 (Master), 49–96 (slave 1) and 97–144 (slave 2).. For the example case with 3 SER<sup>NET</sup> units, the page will give you the following message.

---

Modbus for MWEB is enabled and ready.  
A total of 144 Points in 9 registers will be sent for alarm data.

---

Note: When you disable MWEB, the number of registers will change and you may receive Modbus exceptions.

You can also view the MWEB point numbering scheme any time from the Combined SER (MWEB) configuration page. The MWEB page shows all point assignments for the entire network.

## **DNP**

The SER<sup>NET</sup> DNP port will transmit the status and timestamp of each alarm. The transmitted alarms can be used to drive an RTU, SCADA, PLC or other device. Refer to Appendix B for detailed DNP operation and mapping.

## **ASCII**

This protocol will output the event log in the same order as the event log display. It is used for direct connection to a serial printer or hyper terminal. The output will resemble the Web browser display by order, columns etc.

None – disables communications protocol.

## **Ethernet Communications Configuration**

The Ethernet port supports 10Mbps or 100Mbps using simultaneous Modbus TCP/IP and DNP communication protocols. The Modbus TCP/IP set-up is similar as the serial Modbus, except the Modbus TCP Port is entered and when in Master Mode, the IP addresses of the slave ports are entered. After making your changes, click *Apply*.

### Modbus

1. Set Modbus TCP Port.
2. Choose which protocol you want to use.
3. Set the Mode (Master / Slave).
4. Configure the Destination IP Address.
5. Send Alarms and/or Events
6. Configure the Start and End Addresses.
7. Choose which Alarm Inputs you want to send (points).

Repeat for each slave.

## **DNP**

1. Check the DNP checkbox
2. Set the device address
3. Type in the IP Address
4. From the pull-down menu, select the method for Data Link confirmation.

## Combined SER (MWEB)

The Combined SER MWEB option (firmware 1.01+) enables a single SER<sup>NET</sup> master to manage and collect alarms from up to 24 slaves in one browser window.

Before a SER<sup>NET</sup> master is enabled with the MWEB option, you must first configure each SER<sup>NET</sup> slave device with unique input numbers. The master SER<sup>NET</sup> will start with input number 1 and the slave units will be numbered in succession. For example, if the master unit has 48 channels, the inputs will be numbered 1-48 and the first slave unit with 48 channels would be numbered 49-96, etc.

Note: If the slave unit inputs are not numbered in succession or if the input numbers overlap, the master SER<sup>NET</sup> will not allow you to enable the MWEB option.

Once enabled, the master's pages will have "*Combined SER Master Unit*" in the top bar of each page, as shown in the following figure. The default state of a Combined SER MWEB unit is slave. The SER<sup>NET</sup> unit must be enabled as a master by checking the enable checkbox on this page, then clicking the apply button. At the time the master is enabled, slave units will immediately send the current input states and all further changes to the master. In addition, the slave sends its active alarm states to the master every 2 minutes. If the master does not receive this periodic update from the slave, it will query the slave unit to determine if it has gone off-line. When a slave stops responding, the MWEB master removes all active alarms for this slave and re-attempts a new connection. Slaves may report to no more than 3 masters. For example, in a network of 20 units, one SER<sup>NET</sup> unit can be master for all 20 units. One of the 20 units can be a master for 10 of the slaves. And a third master can show alarms from the remaining 10 units. This would require 3 browser windows, one window for each group of 10 units and one window for all 20.

You must enter the IP addresses of all the slaves into the fields on this page.

### MWEB Operation – Connection Status

The MWEB Master communicates to the SER<sup>NET</sup> slaves to retrieve events as they occur via Ethernet communications. The SER<sup>NET</sup> slave units initiate continuous communications to the MWEB Master.

The colored Annunciator box around the device number indicates:

- White – a connection not yet attempted.
- Green – a slave is connected
- Red – the slave did not connect within the initial 2 minutes  
Note: No further connection attempts, to this unit, will occur unless the MWEB master is disabled then re-enabled.
- Orange – The MWEB master will attempt to reconnect to this unit every 15 seconds

**Warning:** When using Combined SER MWEB:  
ALL SER<sup>NET</sup> units must have the same firmware revision for proper operation.

## **TCP/IP Port:**

All units in the network must have the same TCP/IP Port number. The default is 61000.

To change the port number, Disable the Master, Log on to each unit and change the port number. Re-enable the Master.

## **Combined SER (MWEB) Application Notes**

### **Alarm Acknowledgement**

Alarms can be acknowledged at either the master or slave unit. In the case where alarms are acknowledged at a master but the slave is connected to more than 1 master, the stored event indicates where the event was acknowledged.

For example: In a network where a slave has two masters, i.e. Master 1 with Slave 1 & 2 and Master 2 with Slave 2 & 3, alarm acknowledgement works as follows.

#### Alarm Events Acknowledged at Master 1:

- Master 1: Remote Alarm Acknowledged
- Master 2: Alarm Acknowledged at Remote Master
- Slave 2: Alarm Acknowledged at Master

#### At Slave 2 (which has 2 Masters):

Master 1: Alarm Acknowledged at Remote Site

Master 2: Alarm Acknowledged at Remote Site

Slave 2: Alarm Acknowledged

## Event Overload and/or Missing Events

In the case of an extremely high number of events, there may be a rare case where events are missing from the log or the log overflows. If this occurs, an event, "SER Buffer Overflow" is reported. Typically this may occur only after sustaining approximately 80 or more events/second for several minutes and beyond with 35 or more inputs.

An invalid IP address or an off-line slave should be removed from the MWEB configuration as it can degrade the master's performance.

The following Use Cases offer possible scenarios for MWEB and the effect on Modbus Alarm Points.

**Use Case 1:** MWEB is started and all slaves are present and connect immediately. The Modbus Map is locked in as displayed below on the MWEB page. The alarm points for Modbus in this case will always be sent in 9 registers (144/16).

Master				Remote Device #			
IP Address	Station ID Device ID	Start/End (Total) Point Numbers	Device #	IP Address	Station ID Device ID	Start/End (Total) Point Numbers	Device #
10.14.3.62	ser 62 Slave1	1/16 (16)	1	10.14.3.64	Station 64 Device Identification 64	17/48 (32)	2
			3	10.14.3.72	Sbest Prince 72 10.14.3.72	97/144 (48)	4
			5				6

**Use Case 2.** MWEB is started and all slaves are present and connect immediately. Some time after the initial connection to all slaves, one of the Slaves is powered off. In this case the Modbus map remains fixed as it was after initial connection. (alarm points for Modbus will remain at 9 registers).

**Once it has been detected that a slave has gone off-line, the alarm points for this unit will be forced to all zeros.** The MWEB display will indicate a SER<sup>NET</sup> is off-line by displaying the remote Device # in an **Orange** background as follows:

Master				Remote Device #			
IP Address	Station ID Device ID	Start/End (Total) Point Numbers	Device #	IP Address	Station ID Device ID	Start/End (Total) Point Numbers	Device #
10.14.3.62	ser 62 Slave1	1/16 (16)	1	10.14.3.64	Station 64 Device Identification 64	17/48 (32)	2
			3	10.14.3.72	Sbest Prince 72 10.14.3.72	97/144 (48)	4
			5				6

Note: when a Slave goes Off-line, the MWEB software does not detect this immediately. The logic in detecting that a slave has gone Off-line is as follows.



MWEB software expects to receive a message from each slave (containing its LED states) every 120 seconds

If MWEB has not received this message within 130 seconds then a special request is sent to the slave

If the Slave does not respond to the request within 30 seconds, it is assumed the slave is Off-line and then; its LED states are cleared, the socket connection is closed, and its state goes to Off-line as shown by the orange background.

This process can take up to 2.6 minutes. **During this time, the Modbus data sent for alarms will equal the last valid state and these will not change to 0's until the unit is declared Off-line.** (as indicated with the Orange background on the MWEB page). Additionally an Event "Slave at xxx.xxx.xxx.xxx no longer communicating" will be logged.

Once a slave is in the Off-line state, every 15 seconds an attempt will be made to re-connect to this unit. If it comes back on-line it will pick up just where it left off, the background for this slave will return to green and an event, "Connected to remote device at xxx.xxx.xxx.xxx" will be logged.

**Use Case 3:** MWEB started up and 3 of the four slaves were connected within the first 2 minutes of enabling MWEB. The Modbus Map is locked in as displayed below on the MWEB page. The alarm points for Modbus in this case will always be sent in 9 registers (144/16). **The red background indicates that this unit was not found and it is important to note, that NO further attempt will be made to connect to this unit, unless MWEB is disabled and then re-enabled.** This is a change from the way MWEB worked in version 1.01.

Enabled (Master)				Enabled (Slave)				Disabled (Slave)			
Remote Device #	IP Address	Station ID Device ID	Start/End (Total) Point Numbers	Remote Device #	IP Address	Station ID Device ID	Start/End (Total) Point Numbers	Remote Device #	IP Address	Station ID Device ID	Start/End (Total) Point Numbers
	10.14.3.62	ser 62 Slave1	1/16 (16)	1	10.14.3.64	Station 64 Device Identification 64	17/48 (32)	2	10.14.3.68	Station 68 Device Identification 68	49/96 (48)
				3	10.14.3.3			4	10.14.3.72	Sbest Prince 72 10.14.3.72	97/144 (48)
				5				6			

**Use Case 4:** MWEB started up and 3 of the four slaves were connected within the first 2 minutes of enabling MWEB, so all their points are set for the Modbus Map. Some time after the initial 2 minutes, slave 4 goes down. Since it is already included in the Modbus Map it will continue to be represented in the Modbus Alarms. BUT its LED states will be forced to all 0's. And no more events will be sent for this unit as it has been turned off. This Slave is now in the "Off-Line" state represented by an Orange background.

Slave devices with the red background have a state of "Not Connected" and will never be included in the Modbus map.

Additionally, connection to it will not even be attempted again (after the first 2 minutes of enabling MWEB). (Note no point information is displayed for them).

Note: when a Slave goes Off-line, the MWEB software does not detect this immediately. The logic in detecting that a slave has gone Off-line is as follows.

MWEB software expects to receive a message from each slave (containing it's LED states) every 120 seconds

If MWEB has not received this message within 130 seconds then a special request is sent to the slave

If the Slave does not respond to the request within 30 seconds, it is assumed the slave is Off-line and then; its Led states are cleared, the socket connection is closed, and its state goes to Off-line as shown by the orange background.

This process can take up to 2.6 minutes. **During this time the Modbus data sent for alarms will equal the last valid state and these will not change to 0's until the unit is declared Off-line.** (as indicated with the Orange background on the MWEB page). Additionally an Event "Slave at xxx.xxx.xxx.xxx no longer communicating" will be logged.

Once a slave is in the Off-line state, every 15 seconds an attempt will be made to re-connect to this unit. If it comes back on-line it will pick up just where it left off, the background for this slave will return to green and an event, "Connected to remote device at 10.14.3.72" will be logged.

Remote Device #	IP Address	Station ID Device ID	Start/End (Total) Point Numbers
1	10.14.3.64	Station 64 Device Identification 64	17/48 (32)
2	10.14.3.68	Station 68 Device Identification 68	49/96 (48)
3	10.14.3.3		
4	10.14.3.72	Sbest Prince 72 10.14.3.72	97/144 (48)
5			
6			
7			
8			
9			
10			
11			
12			

Additional notes:

Immediately after MWEB has been enabled, you will see that the starting point numbers will all be initialized to zero and after all connections possible are made, the page will contain the starting point numbers. Note that during this time, neither the External Serial Communication nor the Ethernet Communications will operate. After the communications has been established they will start automatically.

## Access Control Configuration

The SER<sup>NET</sup> is equipped with built-in security to prevent unauthorized access to network configuration parameters, firmware upgrades and other critical settings. This page is where the system administrator sets up user passwords and network configuration such as SNMP and Modbus access and port numbers. Access control is available to Administrators only.

The functions available with the 'user' and 'admin' log-ons are detailed below.

**User Account can:**

- View Active Alarms
- View Event Logs
- View Configuration Details
- Sort and Filter Events for viewing purposes
- Export events via csv download
- Print events

### **Admin Account can:**

- Include all of the 'User' functions above
- Change configuration details (anything with an 'Apply' button)
- Set time and date
- Acknowledge Alarms
- Erase the Event Log
- Enable or Disable an alarm
- Change Passwords
- Save and Restore Configuration
- Firmware Upgrade
- Option Upgrade

### **Trusted IPs/hostnames**

To add another level of security to your network, select the appropriate checkboxes if you wish to restrict IP/hostnames for either SNMP or Modbus. Once checked, the traffic to the port will be restricted, allowing access to only those addresses/hostnames that you entered into the trusted field. This works like a firewall. You enter a semi-colon separated list of addresses or hostnames into the trusted field.

### **Ports**

All units in the network must have the same port number. The default port numbers are displayed in their respective fields.

### **HTTPS**

HTTPS requires users to select the secure web log on. You need to identify the specific port address used for this secure connection.

Note: When HTTPS is enabled, you must precede the web browser url address by HTTPS://iIP Address, instead of HTTP://IP Address.

### **Network Configuration**

This page is available only to Administrators. Logged in under User, all items are grayed out. This page is where you configure the network & gateway information such as:

- Device ID
- MAC Address
- DHCP Enable/Disable
- IP Address
- Netmask
- Gateway

- Nameservers
- Domain

Notice the Ping test field at the bottom. If you suspect a unit is not responding or question its connectivity, type its IP address into this field and click the *Test* button. The SER<sup>NET</sup> will ping the requested unit. The results will be displayed in a new Web browser window.

## **Authentication**

The standard authentication method used is called 'Digest' which encrypts the log-in information to the unit. In some applications where you have difficulty logging into the SER<sup>NET</sup>, you may need to switch the authentication method to 'basic'.

Note: After switching the authentication method to 'basic', the units username and password will be reset to the defaults.

## Date / Time Configuration

The SER<sup>NET</sup> date and time can be synchronized to an external time source using IRIG-B, NTP or another SER<sup>NET</sup> unit via a RS-485 serial time sync. IRIG-B and NTP can be used simultaneously with IRIG-B used as the primary time source and NTP used as a backup in case the IRIG-B signal is lost.

If IRIG-B is not used, then NTP becomes the primary time source. An SER<sup>NET</sup> unit connected to the primary time source can be designated as a 'Master' for sharing the time synchronization signal for up to 24 SER<sup>NET</sup> units designated as 'Slave'.

IRIG-B does not require any configuration other than selecting either the modulated or demodulated mode. Once connected to a suitable time source, the IRIG-B time sync status will be noted in red as 'IRIG-B signal detected'.

NTP configuration will allow up to three NTP time servers at different IP addresses. Preference will be given to the best NTP time source and will automatically switch to one of the other NTP time servers when a signal drops out.

When external time synchronization is not used, the SER<sup>NET</sup> can be configured with the PC time and date or any time and date you enter.

*Note: IRIG-B date does not include the year. If the year is incorrect, you should initially set the year by selecting either "Set Date/Time from PC Clock" or "Set Date/Time Manually (2<sup>nd</sup> & 3<sup>d</sup> radio buttons under Alternate Time Source).*

The SER<sup>NET</sup> has built-in diagnostics to check the time synchronization continuously and every hour, it will be noted in the Event Log. If you wish to remove this hourly time synchronization event, select the option to 'Suppress Hourly Time Sync'.

## Save and Restore Configuration

Available to Administrator only, this page provides a way for you to save the unit's configuration to an XML file. The advantage to this is if for whatever reason you need to reload that network configuration at a later date, you'll have the configuration file saved already. Simply browse to the file on your PC and restore the configuration file to the unit.

Note: it is strongly advised to have a copy of each SER<sup>NET</sup>'s configuration file saved at all times. After you make changes, save a new copy by clicking on the *Save Configuration* button.

To restore a configuration.

1. Click the *Browse* button.
2. From the choose file dialog, select your configuration file to be downloaded to SER<sup>NET</sup>.
3. A message box will pop up asking you to confirm your action. Click Ok.

Your SER<sup>NET</sup> unit will be re-configured with the saved file, including all Alarm Inputs and Outputs.

## Firmware Configuration

The current version of Software/Firmware installed on your unit is provided on the SER<sup>NET</sup> web browser Home Page. If a new version of the SER<sup>NET</sup> firmware is available, this page is where you upload the new file. Simply browse for the file on your PC and it will begin uploading after your confirmation. The original system configuration will be restored after a firmware upgrade, but it is always good practice to save a copy of this configuration prior to the firmware upgrade using the 'Save and Restore' function.

**Caution:** during firmware update, do not close the browser window or power down the unit. Doing so will cancel the upload process and corrupt the firmware.

During the firmware update process, the file status progress bar will indicate the status of the update.

- Green status (Finished or No Update) – update successful.
- Yellow status – potential red status event with one of the module updates, or the main board download may have exceeded the 5 minutes allotted to its download. Either way, it's more of an alert than necessarily an error for that particular update.
- Red status (File Error, or Hardware Error) – may be one of the following:
  - the file that you were trying to download is not correct
  - the file could be corrupted
  - there was a hardware problem in attempting to erase, or write to the flash

Any status other than green should be reported to your AMETEK representative.

When the firmware is upgraded, you will be prompted to re-boot the SER<sup>NET</sup> by cycling power or selecting the checkbox – 'Reboot when complete', can automatically do this.

## Option Upgrade

SER<sup>NET</sup> can be upgraded in the field. The primary purpose of this step is to enable various options that were not supplied with the original unit.

The SER<sup>NET</sup> web browser home page will identify the model number of your SER<sup>NET</sup> unit and the options provided. A description of this model number is shown in section 'Product Overview'. The available options that can be upgraded in the future include:

Option Code	Option	Description
MOD	Modbus Communications	Modbus RTU and Modbus TCP/IP modes
DNP	DNP Communications	Serial and Ethernet modes
MWEB		Single web browser displays alarms from up to 24 SER <sup>NET</sup> Units via Ethernet LAN
1F	24Vdc Power	Power Supply Options are included for the option upgrade in order to correctly indicate the model number, which is presented on the WEB Browser Home Screen.
1U	120/240Vac; 125VDC Power	
2F	Dual 24Vdc Power Inputs	
2U	Dual 120/240Vac; 125VDC Power Inputs	
UF	24Vdc and 120/240Vac; 125VDC Power Inputs	

1. Simply call your AMETEK representative to request new options.
  - a. You will need to know your unique MAC address and which options you desire to upgrade.
  - b. Your rep. will then give you a unique Upgrade Key specific to the unit you wish to upgrade.
2. This Upgrade Key must be entered exactly as provided into the upgrade field.
3. Once you enter the Upgrade Key, click the *Submit Key* button and the unit will display the proposed model configuration.
4. Examine the details and if they are correct, click *Upgrade Unit*.
5. Click the *Yes* button to complete the process, which will reboot the unit.

Note: If an error occurs or perhaps you mistyped a letter, a failure message will appear at the bottom of the page. Carefully retype the Upgrade Key in and click *Submit Key* again. And repeat steps 2–5.

## Logon as User

To switch logon type click this link. If you are logged in as User, it will display *Logon as Admin* and vice versa. Remember, User logon is restricted.

## Documentation

At the bottom of the side-bar you'll find links to the Ametek Power Instruments Web site, User Guide and MIB files. MIB files are files used to configure SNMP traps.



## Service & Maintenance

### -Firmware Upgrade (*Firmware Configuration Page*)

Your AMETEK sales rep. will notify you of firmware upgrades. And you can download the new file from their Web site or via e-mail. To upgrade the firmware:

Make sure you are logged in as Administrator.

1. Click the *Browse* button
2. From the Choose File dialog box, locate the new firmware file (.tar).
3. Click Open.
4. Confirm that you want to upgrade the firmware.

As the system firmware is being upgraded, the status will be displayed detailing each step of the upgrade. You can check the box labeled "Reboot when complete" to have the system automatically reboot after the upgrade is complete.

## Reset Password & IP Address

If you have forgotten your password or IP address you can reset SER<sup>NET</sup> while connected to a terminal emulation program and view or change these items. As shown in Figure B-1, accessible through a small hole is a reset microswitch inside the unit. Typically you would use a straightened paper clip through the hole to press it.

To reset the unit:

1. Power up the unit and wait 15 seconds after unit is operational.
2. Press the microswitch with a paper clip. This sets a flag in the database that will take effect upon next reboot.
3. Power off the unit.
4. Make sure you have a cable connected from the serial port to your PC before power up.
5. Open a terminal emulation program and configure it as follows:  
9600 baud, 8 data bits, 1 stop bit, No parity
6. Power on the unit.

In your terminal program, you will be presented with numbered menu choices to reset the password to default, change the IP address etc. After making the changes, select Save & apply all settings. If you have changed the IP address, you need to open the network page in your browser and make sure it reflects what you changed.

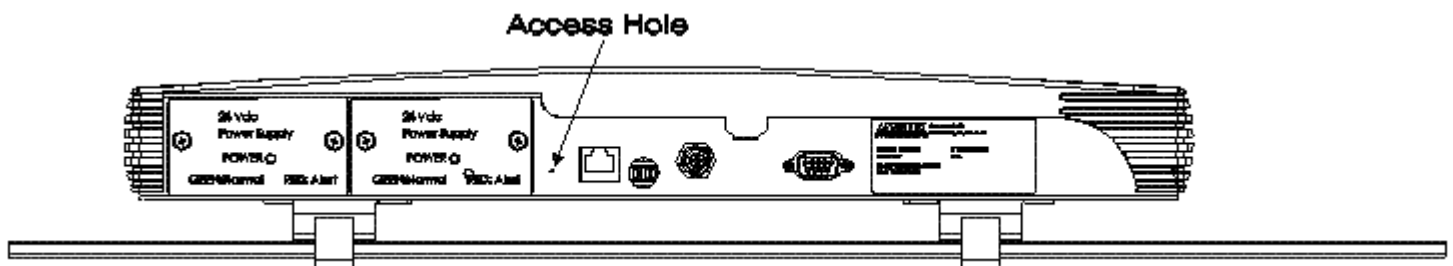


Figure B-1 Access Hole

# System Specifications

## INPUT

### System Capacity

- 16, 32, 48 inputs per unit
- 3,072 inputs per SER system

### Field Contacts

- Normally Open (N.O.) or Normally Closed (N.C.)
- Wetted (voltage supplied) or dry (voltage free) contacts

### Field Contact Voltage Range

- 20-150 VDC (auto-select)
- Max 2mA per input

### Input Response

- 1 millisecond to 60 seconds

Responds to alarms as quick as 1 ms or alarms lasting up to 60 seconds

### Contact De-Bounce

- 0-60 seconds

Can ignore multiple alarms occurring within 0-60 seconds from initial alarm

### Delete From Scan

#### Automatic Mode

- Adjustable from 0-255 events per minute. Automatically resets itself

#### Manual Mode

- Disable any input manually

## ALARM LEGENDS

- 32 character alarm legend
- 32 character normal legend

## LED INDICATORS

### Alarm Status

- Red LED per input
- Flash upon alarm, steady ON after acknowledged via WEB browser

### Power, Status, Time Sync

- Green LED for "Normal"
- Red LED for "Abnormal"

## OUTPUTS

### Alarm Relays

- 2 form C (SPDT) relays, configurable via WEB browser for:
  - Common alarm (closes on any alarm)
  - Reflash alarm (pulses upon new alarm)
  - System watchdog
- Energized or de-energized operation

### Relay Ratings

- 24 VDC @ 2.0 amps
- 120 VDC @ 0.4 amps
- 120 VAC @ 2.0 amps

## TIME STAMPED ALARMS

- 1 ms time stamp resolution
- 40,000 event storage (per unit)

## TIME SYNCHRONIZATION

- IRIG-B time sync input (modulated or de-modulated) accurate to +/- 1 ms UTC Time  
Modulated or Demodulated, 10K ohm input impedance
- NTP time sync
  - 1-3 IP addressed sources
  - accuracy based on location of NTP time servers up to. +/- 2 ms UTC time
- Internal Crystal
  - Accurate to 1 sec/day
- Master unit with IRIG-B or NTP Time Source can synchronize up to 24 "Slave" units via RS485 (max 4,000 feet)  
Accuracy to +/- 2 ms of Master Time Source

## COMMUNICATIONS

### Serial Port

- RS-232/485 selectable

### Protocols

- Modbus RTU

Master Mode Connect to a maximum of 3 Modbus Slave Devices Transmit Alarm Status and/or Event with timestamp

Slave Mode

Transmit Alarm Status and/or Event with timestamp

- DNP 3.0

Slave Mode

Transmit Alarm Status and/or Event with timestamp

- Serial ASCII

### Ethernet Port • 10/100

- DHCP or Fixed IP

• Maximum of 10 simultaneous connections (communication protocols, web browser sessions)

- Modbus TCP/IP

Master Mode

Connect to a maximum of 3 Modbus Slave Devices

Transmit Alarm Status and/or Event with timestamp

Slave Mode

Transmit Alarm Status and/or Event with timestamp

Maximum of 5 simultaneous sessions

## WEB Server

- Used for configuration of unit
- Graphical and text display of alarms
- Can combine up to 24 units on a single WEB browser (1,152 alarms)
- Sorting and filtering functions
- Acknowledgement of alarms
- Separate screens for active alarms and archived event log
- Email notification
- Export to CSV, COMTRADE
- Printing of alarms (auto/manual)
- Multiple levels of security

## CONNECTIONS

Field Contacts, Relay Outputs, Power Inputs, Master/Slave Time Sync

- Removable barrier terminal block
- 12-24 AWG wire, Torque rating 5 lb. in.

Serial Communication Port

9 Pin Female D connector

Ethernet Communication Port

RJ45 connector

IRIG-B Time Synchronization Input

BNC connector

## MECHANICAL

Surface Mounting

- Din rail / panel
- 17.8"(452) x 6.8"(172) x 2.3"(58)

19" Rack Mounting

- 1U
- 6.8" (172) Depth

## POWER REQUIREMENTS

Internal Power Supplies

24VDC Power Supply

- 24 VDC (19-29 VDC)

AC/DC Power Supply

- 85-300 VAC 50,60 Hz
- 100-300 VDC

Can use 1 supply above or 2 for redundancy / dual power applications

- Hot swappable

Power Requirements

0.10 A maximum

24 Vdc, 0.40 A maximum

120 Vac, 0.20 A maximum

125 Vdc, 0.20 A maximum

240 Vac,

## External Power Supplies

### 48 VDC Power Supply

- 48 VDC (36-72 VDC)
- Output: 24 VDC (requires internal 24 VDC power supply above)

## External Field Contact Voltage Supply

### AC/DC FCV Supply

- Input: 90-265 Vac or 110-350 VDC
- Output: 125 VDC

## Environment

Operating Temperature Range:	-20 to 60 °C (-4 to 140 °F)
Relative Humidity:	20 – 95 % non-condensing
Storage Temperature Range:	-20 to 80 °C (-4 to 176 °F)

## Electrical

Surge Withstand:	ANSI C37.90.1	2.5 kV Oscillatory, 4kV Fast Transient
Electrical Fast Transient/Burst Immunity:	IEC 61000-4-4	2kV dc Power, 1kV I/O)
Surge Immunity:	IEC 61000-4-5	1kV Common Mode, line-to-ground)
Radiated RFI Immunity:	IEC 61000-4-3	10 V/m
Conducted RFI Immunity:	IEC 61000-4-6	3V
Radiated Emissions:	CISPR11	Class A
Conducted Emissions:	CISPR11	Class A
Radiated Power Frequency Magnetic Field:	IEC 61000-4-8	30 A/m
ESD Effects:	IEC 61000-4-2	4kV contact 8kV air

### Dielectric Withstand:

FROM (1)	TO (1)	Withstand voltage
Power Input 1	Power Input 2	2000 Vdc

<b>FROM (1)</b>	<b>TO (1)</b>	<b>Withstand voltage</b>
Power Inputs 1 & 2	Earth	2000 Vdc
Power Inputs 1 &2	Relay outputs	3150 Vdc
Power Inputs 1 &2	Field contact Inputs	3150 Vdc
Power Inputs 1 & 2	Digital Communication, except for Ethernet	3150 Vdc
Power Inputs 1 & 2	Ethernet	2000 Vdc
Relay outputs	Earth	1320 Vdc
Relay outputs	Digital Communication, except for Ethernet	2100 Vdc
Relay outputs	Ethernet	1320 Vdc
Field contact inputs	Earth	1320 Vdc
Field contact inputs	Digital Communication	2100 Vdc
Field contact inputs	Ethernet	1320 Vdc

## Appendix A MODBUS DATA FORMATS

The system has the capability of operating with two distinct data formats: Status Mode (On/Off status) and Event Mode (Alarm Status with Time Stamp). These formats are embedded within Modbus data registers for transmission and reception.

A selection of Modbus function may be used and these vary depending on whether the SER<sup>NET</sup> is operating as a Modbus master or slave.

Modbus Function	Description	Data Units	Mode
03	Read Holding Registers	Words	Master or Slave
07	Read Exception Status	Bytes	Slave Only
16	Preset Multiple Registers	Words	Master or Slave

A function value of 03 (Read Holding Registers) is set to read alarm data from the system (in slave configuration). Single and multiple register writes are supported. Exception status responses (function 07) and Slave ID (function 17) are also supported. Exception codes for unrecognized received messages are also included.

The Modbus functions are enabled by the software model number and require a key to enable them, which is supplied by Ametek. This may be done prior to delivery or retrofitted in installed systems.

### Modbus Operation

The SER<sup>NET</sup> Modbus operates as a Master or Slave in both Modbus RTU and Modbus TCP/IP modes. The SER<sup>NET</sup> Modbus port will transmit the ON/OFF Status (called 'Alarms') and the timestamp recorded for every alarm and return to normal occurrence (called 'Events'). Alarm ON/OFF Status is provided by reading 16-bit holding registers (Modbus Function 03) with a single bit designated per input. A 48 input system would indicate the status of all alarms using three 16-bit holding registers.

Event Data is provided by reading six 16-bit holding registers (Modbus Function 03) that contain the time, date, input number and alarm status for each event. An event could be an input going into alarm or returning to normal. Event data is provided in blocks of ten events for a total of sixty 16-bit holding registers. If there are no new events since the last Modbus poll, it will return all FF's. If there are more than 10 events in the buffer, then it will continue to submit 10 events every poll until there are no new events.

### Modbus Operation as a Stand-Alone or Slave Unit

The Modbus data from a Stand-Alone or Slave SER<sup>NET</sup> unit will provide the ON/OFF Status and timestamp of each alarm in that unit for the 16, 32 or 48 channels depending on system size.

**Modbus Master:** In this configuration, the Modbus Port is configured as a Master, with connection to up to 3 Modbus Slave devices. For 'Alarm' ON/OFF status, you can select all or specific inputs by checking the input number box. The Modbus Start address



can be configured based on the application. The ending address will automatically be presented based on the number of inputs selected. Example: If all 48 alarms are selected, it will require three 16 bit registers, 32 alarms will require 2 registers, 16 alarms will require 1 register, etc. For Event data, you will select a Modbus Start address and the ending address will automatically increment by 60 (for 10 events).

**Modbus Slave:** In this configuration, the Modbus Port is configured as a Slave, with connection to a Modbus Master device. With Modbus TCP/IP, multiple Modbus Masters can connect to our SER<sup>NET</sup> Slave. The Modbus Start address can be configured based on the application. The ending address will automatically be presented based on the number of inputs selected. Example: If the SER<sup>NET</sup> unit has 48 alarms, it will require three 16 bit registers, 32 alarms will require 2 registers, 16 alarms will require 1 register, etc. For Event data, you will select a Modbus Start address and the ending address will automatically increment by 60 (for 10 events).

### **Modbus Operation with MWEB SER<sup>NET</sup> Systems**

When the system is configured with the MWEB option, the Master SER<sup>NET</sup> will provide the ON/OFF Status and timestamp of each alarm in the complete system, inclusive of all Slave SER<sup>NET</sup> units connected to the Master. For example, if the SER<sup>NET</sup> system had one Master and 3 slave units with 48 inputs each, the total quantity of inputs represented by the Master SER<sup>NET</sup> Modbus would be 192. With the Modbus & DNP protocols, all point numbers throughout the network are contiguous and unique. Note that all remote devices must be connected with the Combined SER (MWEB) configuration screen before the virtual point numbers are assigned. For example, with a 48-point master and two 48-point remote devices; points will be numbered 1–48 (Master), 49–96 (remote 1) and 97–144 (remote 2). This virtual point numbering scheme is automatically set up at the time MWEB is enabled and remains intact until MWEB is disabled

**Modbus Master:** In this configuration, the Modbus Port is configured as a Master, with connection to a single Modbus Slave device. The Modbus Start address can be configured based on the application. The ending address will automatically be presented based on the number of inputs selected. Example: If the SER<sup>NET</sup> system had 160 alarms, it will require ten 16 bit registers. For Event data, you will select a Modbus Start address and the ending address will automatically increment by 60 (for 10 events). Event data will be provided for all inputs in the system. Each event will include the input number.

**Modbus Slave:** In this configuration, the Modbus Port is configured as a Slave, with connection to a Modbus Master device. With Modbus TCP/IP, multiple Modbus Masters can

connect to our SER<sup>NET</sup> Slave. The Modbus Start address can be configured based on the application. The ending address will automatically be presented based on the number of inputs in the system. Example: If the SER<sup>NET</sup> system has 480 alarms, it will require thirty 16 bit registers.

For Event data, you will select a Modbus Start address and the ending address will automatically increment by 60 (for 10 events). Event data will be provided for all inputs in the system. Each event will include the input number.

**Modbus Alarm Data Mapping - Input Status (ON/OFF)**

The system can present raw field input point data. Every poll of our device will show the current status of each input with a 1 representing an input in alarm and a 0 representing an input in the normal mode. This is not a representation of the Field Contact Input status which can be set for N.O. or N.C. operation, but the true state of each alarm input.(Alarm or Normal)

Data is again presented in a 16-bit register format.

The Modbus Map for a SER<sup>NET</sup> Device is shown below.

Modbus Address	Bit 15	.....	.....	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
40001	AP 16			AP 07	AP 06	AP 05	AP 04	AP 03	AP 02	AP 01
40002	AP 32									AP 17
40003	AP 48									AP 33

AP = Alarm Point #

Note: 48 Point unit showed above with a Modbus starting address of 40001 . If the unit is provided with 16 Alarm Inputs, one 16 bit register is used. If the unit is provided with 32 Alarm Inputs, two 16 bit registers are used. If the Modbus data is coming from a SER<sup>NET</sup> MWEB Master, it will provide the corresponding number of registers. For example, a 480 input system would provide thirty 16-bit registers. (40001 thru 40030)

## Modbus Event Data (Status + Time Stamp)

Event data may be read in blocks of 10 events at a time. These appear in a block of 60 registers (6 per event). Once ten events are read then the registers are reloaded with any subsequent ones from the event buffer until all events are retrieved. If no event has occurred, then all sixty registers are filled with FF HEX.

The event data format is as shown below:

16-bit Word	MSB (bit positions 8 - 15)	LSB (bit positions 0 - 7)
1	Year	Month
2	Day	Hour
3	Minute	Second
4	Millisecond	
5	Input Point Number	
6	IRIG-B Status [0 = off, 1 = on]	Input Status [0= Alarm, 1=Normal]

An example of the register format for 10 events is shown below.

Modbus Address	Event #	Modbus Data	
		MSB (bit positions 8 - 15)	LSB (bit positions 0 - 7)
41001	1	Year [0-99]	Month [1-12]
41002		Day [1-31]	Hour [1-24]
41003		Minute [1-60]	Second [1-60]
41004		Millisecond [0-999]	
41005		Input Point Number [1-1200]	
41006		IRIG-B Status [0 = off, 1 = on]	Input Status [0= Alarm, 1=Normal]
41007	2	Year [0-99]	Month [1-12]
41008		Day [1-31]	Hour [1-24]
41009		Minute [1-60]	Second [1-60]
41010		Millisecond [0-999]	
41011		Input Point Number [1-1200]	
41012		IRIG-B Status [0 = off, 1 = on]	Input Status [0= Alarm, 1=Normal]
41055	10	Year [0-99]	Month [1-12]
41056		Day [1-31]	Hour [1-24]
41057		Minute [1-60]	Second [1-60]
41058		Millisecond [0-999]	
41059		Input Point Number [1-1200]	
41060		IRIG-B Status [0 = off, 1 = on]	Input Status [0= Alarm, 1=Normal]

## Modbus Addresses

Conventional addresses are included in the configuration. The input and output functions here are the most common and refer to a system in slave configuration.

Conventional Start address	Data	Input Functions	Output Functions
00000	Output Coils	05,15	01
10000	Discrete Inputs		02
30000	Input Registers		04
40000	Holding (output) Registers	06,16	03
60000	Extended Memory		

## Default Values

Designation	Options	Default	Comments
Modbus Address	0-255	01	
Receive Start Address	40001-49999	40001	Register address entry.
Transmit Start Address	40001-49999	40001	
Modbus Mode	Master/Slave	Slave	Is this system Modbus Master?
Data type	AN3135 Style AN3135/Point/State	Point	An3135 mimic, point or alarm state data.
Baud rate	2400/4800/ 9600/19200	9600	
Parity	Odd/Even/none	None	Parity type
Transmit controls	Yes/No		Send alarm control (ACK, RST) data
Data direction	Input/output	Output	1 bit per point to designate Tx/Rx data
Modbus format	ASCII/RTU	RTU	

**Default Baud Rate – change to 19200 in table above**

# Appendix B

## DNP Data Formats

The DNP Communication option is used to transmit point status (Binary Inputs) and time stamped events (Binary Input Change with Time). The DNP Communications work in a slave mode and operate over RS-232/485 or Ethernet. The DNP implementation is outlined in the Device Profile Document.

## Device Profile Document

<b>DNP V3.0</b>	
DEVICE PROFILE DOCUMENT	
Vendor Name: <b>AMETEK Power Instruments</b>	
Device Name: <b>SER<sup>NET</sup>, using the Triangle MicroWorks, Inc. DNP3 Multi-Port Slave Source Code Library</b>	
Highest DNP Level Supported: For Requests: <b>Level 2</b> For Responses: <b>Level 2</b>	Device Function: <b>Slave</b>
Notable objects, functions, and/or qualifiers supported in addition to the Highest DNP Levels Supported (the complete list is described in the attached table): <b>For static (non-change-event) object requests, request qualifier codes 00 and 01 (start-stop), and 17 and 28 (index) are supported in addition to request qualifier code 06 (no range – or all points). Static object requests received with qualifiers 00, 01 or 06, will be responded to with qualifiers 00 or 01. Static object requests received with qualifiers 17 or 28 will be responded to with qualifiers 17 or 28. For change-event object requests, qualifier codes 06 (no range) and 07 and 08 (limited quantity) are supported. Qualifiers 17 or 28 are always returned.</b>	
Maximum Data Link Frame Size (octets): Transmitted: <b>292</b> Received <b>292</b>	Maximum Application Fragment Size (octets): Transmitted: <b>Configurable up to 2048</b> Received <b>2048</b>
Maximum Data Link Re-tries: <b>Configurable from 0 to 255</b>	Maximum Application Layer Re-tries: <b>None</b>
Requires Data Link Layer Confirmation: <b>Configurable as: Never, Only for multi-frame messages, or Always</b>	
Requires Application Layer Confirmation: <b>When sending multi-fragment responses (Slave devices only)</b> <b>Sometimes</b>	
Timeouts while waiting for: Data Link Confirm: <b>Configurable.</b> Complete Appl. Fragment: <b>None</b> Application Confirm: <b>Configurable.</b> Complete Appl. Response: <b>None</b>	

Sends/Executes Control Operations:	
WRITE Binary Outputs	<b>Never</b>
SELECT/OPERATE	<b>Always</b>
DIRECT OPERATE	<b>Always</b>
DIRECT OPERATE – NO ACK	<b>Always</b>
Count > 1	<b>Never</b>
Pulse On	<b>Always</b>
Pulse Off	<b>Always</b>
Latch On	<b>Always</b>
Latch Off	<b>Always</b>
Queue	<b>Never</b>
Clear Queue	<b>Never</b>
Reports Binary Input Change Events when no specific variation requested: <b>Never</b>	Reports time-tagged Binary Input Change Events when no specific variation requested: <b>Never</b>
Sends Unsolicited Responses: <b>Never</b>	Sends Static Data in Unsolicited Responses: <b>Never</b> No other options are permitted.
Default Counter Object/Variation: Default Object      1 Default Variation:  1	Counters Roll Over at: <b>No Counters Reported</b>
<b>Yes</b>	

## Implementation Table

OBJECT			REQUEST	RESPONSE	
Object Number	Variation Number	Description	Function Codes (decimal)	Function Codes (decimal)	Qualifier Codes (hex)
1	1	Binary Input	1 (read)	129 (response)	00, 01 (start-stop) 17,128 (Index)
2	2	Binary Input Change with Time	1 (read)	129 (response)	00, 01 (start-stop) 17,128 (Index)
50	1	Time and Date	1 (read)	129 (response)	07
60	1	Class 0 Data	1 (read)	129 (response)	
60	2	Class 1 Data	1 (read)	129 (response)	
60	3	Class 2 Data	1 (read)	129 (response)	
60	4	Class 3 Data	1 (read)	129 (response)	

## Binary Inputs

Each Object 1, Variation 1 request will provide the status (on/off) of all SER<sup>NET</sup> inputs as shown below. This is not the status of the alarm contact (open/closed), but whether an input is in alarm or has returned to normal.

Index #	DNP Object		Description
	Object Number	Variation Number	
00	01	01	Point 1 Digital Contact Alarm
01	01	01	Point 2 Digital Contact Alarm
02	01	01	Point 3 Digital Contact Alarm
03	01	01	Point 4 Digital Contact Alarm
04	01	01	Point 5 Digital Contact Alarm
05	01	01	Point 6 Digital Contact Alarm
06	01	01	Point 7 Digital Contact Alarm
07	01	01	Point 8 Digital Contact Alarm
08	01	01	Point 9 Digital Contact Alarm
09	01	01	Point 10 Digital Contact Alarm
10	01	01	Point 11 Digital Contact Alarm
1196	01	01	Point 1197 Digital Contact Alarm
1197	01	01	Point 1198 Digital Contact Alarm
1198	01	01	Point 1199 Digital Contact Alarm
1199	01	01	Point 1200 Digital Contact Alarm

**Note: The number of Index's (point #) is based on the system size.**

**For example: A stand-alone 48 channel unit will include Index # 00-47.**

**A distributed MWEB system with (1) Master 48 channel unit and (24) Slave 48 channel units will include index # 00-1199 as shown above.**

## Binary Input Change with Time

The time stamped alarms are presented as Binary Input Changes with Time as shown below: An event includes any change of status (inputs going to the alarm state or inputs returning to normal).

DNP Object		Description
Object Number	Variation Number	
02	02	Digital Contact Alarm w/time of event

These events will be reported as they occur.

## Time and Date

This DNP Object is used to set the SER<sup>NET</sup> clock with the time and date. It uses the Absolute Time which is recorded as milliseconds since midnight, January 1st, 1970, at zero hours, zero minutes, zero seconds, and milliseconds.

DNP Object		Description
Object Number	Variation Number	
50	01	Time and Date



## **Appendix C Replacement/spare parts/accessories:**

- Ethernet Switch - 5 Port, Industrial Hardened
- Ethernet Switch - 8 Port, Industrial Hardened
- Remote Access Switch - 5 Ethernet Ports, 1 Internal 56K modem, Industrial Hardened
- External 48Vdc to 24vDC Power Supply
- External 125Vdc Output Field Contact Voltage Supply (AC/DC Input)
- GPS Clock, IRIG-B Output
- GPS Clock, NTP Output

# Appendix D Browser Compatibility

If using Internet Explorer you must disable the caching of web pages.

## To disable caching with Microsoft Internet Explorer V7

- 1 Choose **Internet Options** from the **Tools** menu. The Internet Options window opens.
- 2 Click **Settings** in the **Browsing History** group on the **General** tab page. The Settings window opens.
- 3 Make sure that the **Check for newer versions of stored pages** option is set to **Every time I visit the web page**.
- 4 Click **OK** to close the Settings window.
- 5 Click **OK** to close the Internet Options window.

## To disable caching with Microsoft Internet Explorer (v5 only)

- 1 Choose **Internet Options** from the **Tools** menu. The Internet Options window opens.
- 2 Click **Settings** in the **Temporary Internet files** group. The Settings window opens.
- 3 Make sure that the **Check for newer versions of stored pages** option is set to **Every visit to the page**.
- 4 Click **OK** to close the Settings window.
- 5 Click **OK** to close the Internet Options window.

## To disable caching with Microsoft Internet Explorer 4.01 to 5

- 1 Choose **Internet Options** from the **View** menu. The Internet Options window opens.
- 2 In the **General** tab's **Temporary Internet Files** group, click the **Settings** button. The Settings window opens.
- 3 Make sure that the **Check for newer versions of stored pages** option is set to **Every visit to the page**.
- 4 Click **OK** to close the Settings window.
- 5 Click **OK** to close the Internet Options window.

## To disable caching with Microsoft Internet Explorer on Mac OS

- 1 Choose **Preferences** from the **Edit** menu. The Internet Explorer Preferences window opens with a list of preference categories on the left side of the window.
- 2 Locate and click **Advanced** (listed under **Web Browser**). The advanced options for the browser are displayed in the right side of the window.
- 3 In the **Cache** group, choose **Always** for the **Update pages** option.
- 4 Click **OK** to save your options and close the window.

## To disable caching with Netscape Navigator

- 1 Choose **Preferences** from the **Edit** menu. The Preferences window opens.
- 2 In the **Category** group (left frame), click the **plus sign (+)** next to the **Advanced** category.
- 3 Under **Advanced**, select the **Cache** option. The right side of the Preferences window changes to the Cache options.
- 4 At the bottom of the Cache group of options, be sure that the **Document in cache is compared to document on network** option is set to **Every time**.
- 5 Click **OK** to close the Preferences window.

## **Appendix E Notes on saving the event file as .csv**

Opening the .csv file with Excel corrupts the time column.

When saving the event file as a .csv and then opening this file with Excel, the data in the time column to gets corrupted. The reason is that Excel automatically formats this column as a type “general” and therefore tries to interpret the time as a number.

To make Excel display the time stamp correctly, select the entire column, then select “Format > Cells” from the main menu bar. Once in the Format Cells dialog box, select Custom Category and enter “h:mm:ss:000” in the type text field.

# Appendix F Default Settings

## Default Settings of Main Board

Alarm Inputs:

Input Enabled: All set to enabled

Filter Mode: All set to Filter time

Filter Time: All set to 0

Auto DFS: All set to 0

Alarm Legends: Are Never Changed from user settings. From factory they are set to "Input X is in Alarm"

Alarm Legends: Are Never Changed from user settings. From factory they are set to "Input X has returned to Normal"

Alarm Output 1: Coil State is Energized; Relay Function is Watchdog

Alarm Output 2: Coil State is De-energized; Relay Function is Alarm

# Appendix I Diagnostic Events

The following diagnostic events could be reported in the Event Log.

M = Master

S = Slave

Unit	Diagnostic Events (Descriptor 'D')	Description
<b>Configuration Related Events</b>		
M/S	Configuration Changed via WEB	Alarm Inputs/Outputs configuration Change
M/S	Configuration Changed via File Restore	Alarm Inputs/Outputs configuration Change by importing a cconfiguration file via the web page Restore feature
M/S	Enabled Alarm Input via WEB Page	Alarm manually enabled via configuration
M/S	Disabled Alarm Input via WEB Page	Alarm manually disabled via configuration
<b>System Operational Events</b>		
M/S	Alarm Acknowledged	Alarm Acknowledged via the browser at the same unit
M	Remote Alarm Acknowledged	Alarm Acknowledged at the Master browser for a Slave unit
S	Alarm Acknowledged at Remote Master	Alarm Acknowledged at the Master browser for a Slave unit
M/S	Restored to Scan	Auto Delete from scan de-activated for a repetitive alarm
M/S	Off Scan	Auto Delete from Scan activated for a repetitive alarm
M/S	SER Buffer Overflow	The number of alarms received exceeded the capability of the unit 80 events/sec x 35 inputs for several minutes
M/S	Lost a maximum of X events.	This event may occur in conjunction with an "SER Buffer Overflow" event. An attempt is made to recover the lost event(s).
<b>Power Related Events</b>		
M/S	Main Board Power On	Unit powered up or configuration just performed which took the system off line
M/S	Power Loss / Reboot	Loss of power or unit powered down automatically during a firmware upgrade
M/S	Power Restored / Reboot Complete	Power restored or unit powered up automatically during a firmware upgrade
<b>Combined SER (MWEB) Events</b>		
M	Connected to Remote Device at <i>Station ID</i>	Master unit connected to Slave unit (occurs during initial set-up)
M	Disconnected from Remote Device at <i>Station ID</i>	Master unit manually disconnected from Slave unit
M	Slave at Station ID no longer responding	Master unit no longer communicating to the Slave
S	Master Combined SER at Station ID Disconnected	Slave unit identifying that it is no longer connected to a Master
S	Master Combined SER at Station ID Connected	Slave unit identifying that it has been connected to a Master
M	Alarm Out of Sync Forced ON	When a Master Reconnects to a Slave, any existing Slave alarms are treated at the Master as new alarms
M	Alarm Out of Sync Forced OFF	When a Master disconnects from a Slave, any existing Slave alarms at the Master are automatically returned to normal

Unit	Diagnostic Events (Descriptor 'D')	Description
<b>Serial and Ethernet Communications</b>		
M/S	Modbus RTU Master Response Error: Invalid response from Slave (Slave Address #)	Serial Modbus Master did not receive a response from the Slave unit
M/S	Modbus RTU Master Response Error (Exception from Slave (Slave Address #))	Serial Modbus Master received an Exception from this slave
M/S	Modbus RTU Master Response Error (Address Error from Slave (Slave Address #))	Serial Modbus Master received an invalid address request from this slave
M/S	Modbus RTU Master Response Error (No response from Slave (Slave Address #))	Serial Modbus Master received no response from this slave
M/S	Ethernet Modbus Master Failed to connect to (Slave IP Address)	Modbus TCP/IP Master did not receive a response from the Slave unit
M/S	Ethernet Modbus Master successfully connected to (Slave IP Address)	Modbus TCP/IP Master connect to slave after failure.
M/S	Ethernet Modbus Master Response Error (Exception from Slave (Slave Address #))	Modbus TCP/IP Master received an Exception from this slave
M/S	Ethernet Modbus Master Response Error (Address Error from Slave (Slave Address #))	Modbus TCP/IP Master received an invalid address request from this slave
M/S	Ethernet Modbus Master Response Error (No response from Slave (Slave Address #))	Modbus TCP/IP Master received no response from this slave
M/S	Ethernet Modbus Master Response Error (MBAP transaction id error from slave (Slave Address #))	Modbus TCP/IP Master found a transaction problem with the MBAP (ethernet message header)
M/S	Ethernet Modbus Master Response Error (MBAP protocol id error from slave (Slave Address #))	Modbus TCP/IP Master found a protocol error in the MBAP (ethernet message header)
M/S	Serial Port Timed out	When configured for Serial Comms Ascii Protocol this indicates a failure to write to the serial port after waiting for 1 minute.
M/S	Failed to initialize serial port	Indicates a hardware failure of the serial port.
<b>Firmware Upgrade Events</b>		
M/S	Error opening file jffs/update/sernetmainboard.S19	Indicates a failure during firmware upgrade.
M/S	FAILED to update firmware on main board	Indicates a failure during firmware upgrade reported by the Web Board.
M/S	Firmware Update Succeeded	This is a message to indicate that the firmware update was completed OK.
M/S	Firmware Update Failed	If the firmware update to the Main Board has failed you will see this event.

Unit	Diagnostic Events (Descriptor 'D')	Description
<b>Internal Communication Events</b>		
M/S	Cold Start with Default Settings	This should only occur if the main board is jumpered to reinitialize the Alarm Input/Output configuration
M/S	Received invalid Event code(X) for input number(Y)	Main Board firmware is out of date with Web board firmware; (Should Not occur)
M/S	Communications Failure with Main Board	This event may occur immediately after a firmware upgrade. It is usually paired with the event "Communications Restored with main Board". If you do not see the Restored event then a hardware failure has occurred.
M/S	Communications Restored with Main Board	When an internal communications failure occurred but has been corrected you will see this events. Should only occur after a firmware upgrade.

Unit	Time Sync Events (Descriptor 'T')	Description
M/S	Hourly Time Update	Time updated on the hour successfully between the Main Board and WEB Board
M/S	Obtained IRIG-B Synchronization	IRIG-B Time Sync signal detected
M/S	Lost IRIG-B Synchronization	The IRIG-B Time Sync signal was lost
M/S	Obtained IRIG-B Synchronization	IRIG-B Time Sync signal detected
M/S	Lost IRIG-B Synchronization	The IRIG-B Time Sync signal was lost
S	Obtained Serial Synchronization	Slave unit has synchronized it's time to the master via the RS485 time sync
S	Lost Serial Synchronization	Slave unit has lost it's synchronization to the master via the RS485 time sync

## Appendix J Legend Format for CSV Import

The following formatting instructions for the csv import file must be followed:

1. The first value must be the point number you wish to update 1->48; this must be followed by a comma character.  
For MWEB (Combined SER) systems, the input numbers in your file should match the input channel assignments, ex. Master SER has inputs 1-48, slave 1 has inputs 49-96, etc
2. The second field is the text string you want loaded for Alarm Legend. If there is a separate legend for the normal state, enter a comma after the Alarm legend. The max length for the Alarm Legend is 32 characters; therefore; only the first 32 characters will be stored.
3. The 3rd field is the text string you want loaded for Normal Legend; this string **MUST NOT** contain any commas. The max length for the Normal Legend is 32 characters; therefore; only the first 32 characters will be stored.

An example of a valid entry is: **1, Input 1 is in Alarm, Input 1 has returned to Normal**

### Additional Notes:

- Lines beginning with a # character indicate a comment line; these are allowed as they are not processed
- Only include lines for inputs you wish to change either the Alarm Legend or Normal Legend. If you only wish to update the Alarm Legend; you may skip entering the 3rd field as defined above in 3. For example: 1, Fire Alarm  
This a valid entry and will modify only the Alarm Legend for input 1.
- If you only wish to update the Normal Legend; you must still enter it as the 3rd field as defined above in 3; but you can skip modification of the Alarm Legend by not entering any characters between the commas. For example: 1, , Fire Alarm has returned to Normal  
This a valid entry and will modify only the Normal Legend for input 1.  
Note: if you put a space between the 2 commas above it will be interpreted as entering a single space for the Alarm Legend and this would clear out any previous entry.



## Telephone / Fax Number List

This errata sheet provides an easy-to-use reference for all major departments. Use these numbers for ordering equipment, application assistance, technical support, and scheduling field service

Please Note: Your instruction manual may contain other phone and fax numbers; this list will take precedence.

### MAIN OFFICE

AMETEK Power Instruments – Rochester  
255 North Union St., Rochester, NY 14605

DEPARTMENT/PRODUCT LINE	TELEPHONE	FAX
MAIN PHONE	585-263-7700	585-262-4777
FIELD SERVICE	800-374-4835	585-238-4945
REPAIRS/RETURNS	888-222-6282	585-238-4945
SALES SUPPORT	800-950-5503	585-454-7805

### FAR EAST OFFICE

AMETEK Power Instruments  
271 Bukit Timah Road, #03-09  
Balmoral Plaza, Singapore 259708  
Tel: 65-732-8675  
Fax: 65-732-8676

### UK OFFICE

AMETEK Power Instruments  
Unit 20, Ridgeway  
Donibristle Industrial Estate  
Dunfermline, UK  
Tel: 1383-825630  
Fax: 1383-825715

## Procedures for Factory Repair and Return

- A. Obtain a Returned material Authorization (RMA) number by calling AMETEK Repair Sales and giving the following information:
  1. **Model** and **Serial Number** of the equipment
  2. Failure Symptom – **Be Specific**
  3. Approximate date of installation
  4. The site name and address of the failed equipment
  5. Complete shipping information for the return of the equipment if other than the operating site
  6. Name and telephone number of person to contact if questions arise.
  
- B. Enclose the information with the equipment and pack in a commercially accepted shipping container with sufficient packing material to insure that no shipping damage will occur. Mark the outside of the container with the RMA number. Ship to the appropriate location: **Attention:** Repair Department

### **AMETEK Power Instruments**

255 North Union Street  
Rochester, New York 14605 USA  
Tel: (888) 222-6282  
Fax: (585) 238-4945

- C. Your emergency equipment will be tested, repaired and inspected at the factory. Factory turnaround is ten working days or less (excluding shipping time).
  
- D. For emergency service or repair status information, please contact the AMETEK Repair Sales Engineer at (800) 374-4835.

## Warranty

AMETEK warrants equipment of its own manufacture to be free from defects in material and workmanship, under normal conditions of use and service. AMETEK will replace any component found to be defective, upon its return, transportation charges prepaid, within one year of its original purchase. AMETEK will extend the same warranty protection on accessories that is extended to AMETEK by the original manufacturer. AMETEK assumes no responsibility, expressed or implied, beyond its obligation to replace any component involved. Such warranty is in lieu of all other warranties expressed or implied.