Thermo Westronics Ethernet Driver

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Thermo Westronics Ethernet Driver

Help version 1.014

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Overview

The Thermo Westronics Ethernet Driver provides a reliable way to connect Thermo Westronics Ethernet devices to OPC Client applications, including HMI, SCADA, Historian, MES, ERP and countless custom applications. It is intended for use with Thermo Westronics Ethernet devices.

Setup

Supported Devices

SV 100
SV 180
SV 180 (2.0) - version 2.0A or later

Communication Protocol

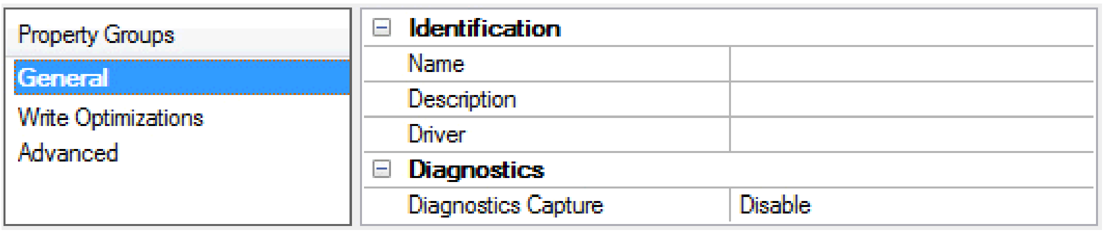
Modbus Ethernet

Device IDs

Device IDs are specified as YYY.YYY.YYY.YYY.XXX where YYY designates the device IP address and XXX designates the destination device unit number. Each YYY byte should be in the range of 0 to 255.

Channel Properties — General

This server supports the use of simultaneous multiple communications drivers. Each protocol or driver used in a server project is called a channel. A server project may consist of many channels with the same communications driver or with unique communications drivers. A channel acts as the basic building block of an OPC link. This group is used to specify general channel properties, such as the identification attributes and operating mode.



Identification	
Name	
Description	
Driver	
Diagnostics	
Diagnostics Capture	Disable

Identification

Name: User-defined identity of this channel. In each server project, each channel name must be unique. Although names can be up to 256 characters, some client applications have a limited display window when browsing the OPC server's tag space. The channel name is part of the OPC browser information.
For information on reserved characters, refer to "How To... Properly Name a Channel, Device, Tag, and Tag Group" in the server help.

Description: User-defined information about this channel.
Many of these properties, including Description, have an associated system tag.

Driver: Selected protocol / driver for this channel. This property specifies the device driver that was selected during channel creation. It is a disabled setting in the channel properties.

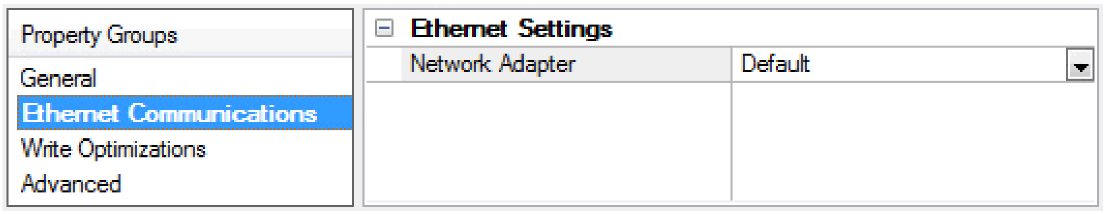
Note: With the server's online full-time operation, these properties can be changed at any time. This includes changing the channel name to prevent clients from registering data with the server. If a client has already acquired an item from the server before the channel name is changed, the items are unaffected. If, after the channel name has been changed, the client application releases the item and attempts to re-acquire using the old channel name, the item is not accepted. With this in mind, changes to the properties should not be made once a large client application has been developed. Utilize the User Manager to prevent operators from changing properties and restrict access rights to server features.

Diagnostics

Diagnostics Capture: When enabled, this option makes the channel's diagnostic information available to OPC applications. Because the server's diagnostic features require a minimal amount of overhead processing, it is recommended that they be utilized when needed and disabled when not. The default is disabled.
Note: This property is disabled if the driver does not support diagnostics.
For more information, refer to "Communication Diagnostics" in the server help.

Channel Properties — Ethernet Communications

Ethernet Communication can be used to communicate with devices.


Property Groups
General
Ethernet Communications
Write Optimizations
Advanced

Ethernet Settings

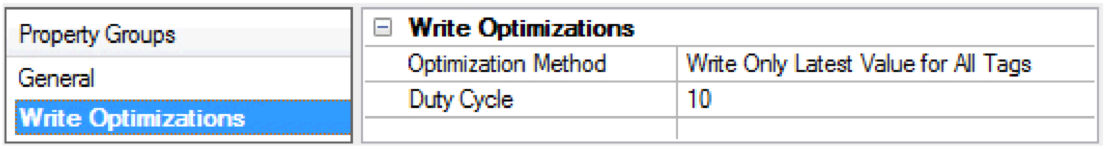
Network Adapter	Default

Ethernet Settings

Network Adapter: Specify the network adapter to bind. When Default is selected, the operating system selects the default adapter.

Channel Properties — Write Optimizations

As with any OPC server, writing data to the device may be the application's most important aspect. The server intends to ensure that the data written from the client application gets to the device on time. Given this goal, the server provides optimization properties that can be used to meet specific needs or improve application responsiveness.


Property Groups
General
Write Optimizations

Write Optimizations

Optimization Method	Write Only Latest Value for All Tags
Duty Cycle	10

Write Optimizations

Optimization Method: controls how write data is passed to the underlying communications driver. The options are:

- **Write All Values for All Tags**: This option forces the server to attempt to write every value to the controller. In this mode, the server continues to gather write requests and add them to the server's internal write queue. The server processes the write queue and attempts to empty it by writing data to the device as quickly as possible. This mode ensures that everything written from the client applications is sent to the target device. This mode should be selected if the write operation order or the write item's content must uniquely be seen at the target device.
- **Write Only Latest Value for Non-Boolean Tags**: Many consecutive writes to the same value can accumulate in the write queue due to the time required to actually send the data to the device. If the

server updates a write value that has already been placed in the write queue, far fewer writes are needed to reach the same final output value. In this way, no extra writes accumulate in the server's queue. When the user stops moving the slide switch, the value in the device is at the correct value at virtually the same time. As the mode states, any value that is not a Boolean value is updated in the server's internal write queue and sent to the device at the next possible opportunity. This can greatly improve the application performance.

Note: This option does not attempt to optimize writes to Boolean values. It allows users to optimize the operation of HMI data without causing problems with Boolean operations, such as a momentary push button.

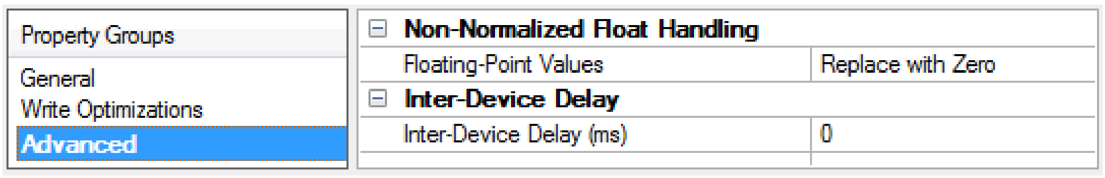
- **Write Only Latest Value for All Tags**: This option takes the theory behind the second optimization mode and applies it to all tags. It is especially useful if the application only needs to send the latest value to the device. This mode optimizes all writes by updating the tags currently in the write queue before they are sent. This is the default mode.

Duty Cycle: is used to control the ratio of write to read operations. The ratio is always based on one read for every one to ten writes. The duty cycle is set to ten by default, meaning that ten writes occur for each read operation. Although the application is performing a large number of continuous writes, it must be ensured that read data is still given time to process. A setting of one results in one read operation for every write operation. If there are no write operations to perform, reads are processed continuously. This allows optimization for applications with continuous writes versus a more balanced back and forth data flow.

Note: It is recommended that the application be characterized for compatibility with the write optimization enhancements before being used in a production environment.

Channel Properties — Advanced

This group is used to specify advanced channel properties. Not all drivers support all properties; so the Advanced group does not appear for those devices.



Non-Normalized Float Handling	
Floating-Point Values	Replace with Zero
Inter-Device Delay	
Inter-Device Delay (ms)	0

Non-Normalized Float Handling: Non-normalized float handling allows users to specify how a driver handles non-normalized IEEE-754 floating point data. A non-normalized value is defined as Infinity, Not-a-Number (NaN), or as a Denormalized Number. The default is Replace with Zero. Drivers that have native float handling may default to Unmodified. Descriptions of the options are as follows:

- **Replace with Zero**: This option allows a driver to replace non-normalized IEEE-754 floating point values with zero before being transferred to clients.
- **Unmodified**: This option allows a driver to transfer IEEE-754 denormalized, normalized, non-number, and infinity values to clients without any conversion or changes.

Note: This property is disabled if the driver does not support floating point values or if it only supports the option that is displayed. According to the channel's float normalization setting, only real-time driver tags (such as values and arrays) are subject to float normalization. For example, EFM data is not affected by this setting.

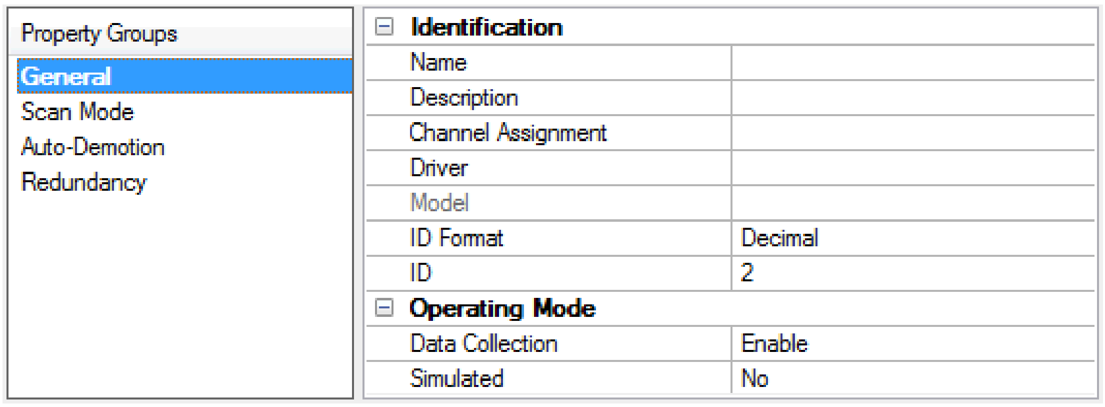
For more information on the floating point values, refer to "How To ... Work with Non-Normalized Floating Point Values" in the server help.

Inter-Device Delay: Specify the amount of time the communications channel waits to send new requests to the next device after data is received from the current device on the same channel. Zero (0) disables the delay.

Note: This property is not available for all drivers, models, and dependent settings.

Device Properties — General

A device represents a single target on a communications channel. If the driver supports multiple controllers, users must enter a device ID for each controller.



Identification	
Name	
Description	
Channel Assignment	
Driver	
Model	
ID Format	Decimal
ID	2
Operating Mode	
Data Collection	Enable
Simulated	No

Identification

Name: This property specifies the name of the device. It is a logical user-defined name that can be up to 256 characters long, and may be used on multiple channels.

Note: Although descriptive names are generally a good idea, some OPC client applications may have a limited display window when browsing the OPC server's tag space. The device name and channel name become part of the browse tree information as well. Within an OPC client, the combination of channel name and device name would appear as "ChannelName.DeviceName".

For more information, refer to "How To... Properly Name a Channel, Device, Tag, and Tag Group" in server help.

Description: User-defined information about this device.

Many of these properties, including Description, have an associated system tag.

Channel Assignment: User-defined name of the channel to which this device currently belongs.

Driver: Selected protocol driver for this device. This property specifies the driver selected during channel creation. It is disabled in the channel properties.

Model: This property specifies the specific type of device that is associated with this ID. The contents of the drop-down menu depends on the type of communications driver being used. Models that are not supported by a driver are disabled. If the communications driver supports multiple device models, the model selection can only be changed when there are no client applications connected to the device.

Note: If the communication driver supports multiple models, users should try to match the model selection to the physical device. If the device is not represented in the drop-down menu, select a model that conforms closest to the target device. Some drivers support a model selection called "Open," which allows users to communicate without knowing the specific details of the target device. For more information, refer to the driver help documentation.

ID: This property specifies the device's station / node / identity / address. The type of ID entered depends on the communications driver being used. For many drivers, the ID is a numeric value. Drivers that support a Numeric ID provide users with the option to enter a numeric value whose format can be changed to suit the needs of the application or the characteristics of the selected communications driver. The ID format can be Decimal, Octal, and Hexadecimal. If the driver is Ethernet-based or supports an unconventional station or node name, the device's TCP/IP address may be used as the device ID. TCP/IP addresses consist of four values that are separated by periods, with each value in the range of 0 to 255. Some device IDs are string based. There may be additional properties to configure within the ID field, depending on the driver.

Operating Mode

Data Collection: This property controls the device's active state. Although device communications are enabled by default, this property can be used to disable a physical device. Communications are not attempted when a device is disabled. From a client standpoint, the data is marked as invalid and write operations are not accepted. This property can be changed at any time through this property or the device system tags.

Simulated: This option places the device into Simulation Mode. In this mode, the driver does not attempt to communicate with the physical device, but the server continues to return valid OPC data. Simulated stops physical communications with the device, but allows OPC data to be returned to the OPC client as valid data. While in Simulation Mode, the server treats all device data as reflective: whatever is written to the simulated device is read back and each OPC item is treated individually. The item's memory map is based on the group Update Rate. The data is not saved if the server removes the item (such as when the server is reinitialized). The default is No.

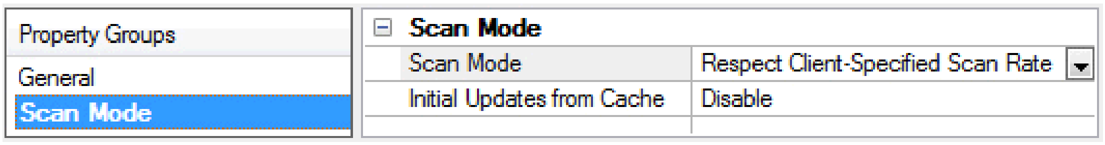
Notes:

1. This System tag (_Simulated) is read only and cannot be written to for runtime protection. The System tag allows this property to be monitored from the client.
2. In Simulation mode, the item's memory map is based on client update rate(s) (Group Update Rate for OPC clients or Scan Rate for native and DDE interfaces). This means that two clients that reference the same item with different update rates return different data.

Simulation Mode is for test and simulation purposes only. It should never be used in a production environment.

Device Properties — Scan Mode

The Scan Mode specifies the subscribed-client requested scan rate for tags that require device communications. Synchronous and asynchronous device reads and writes are processed as soon as possible; unaffected by the Scan Mode properties.



Scan Mode	
Scan Mode	Respect Client-Specified Scan Rate
Initial Updates from Cache	Disable

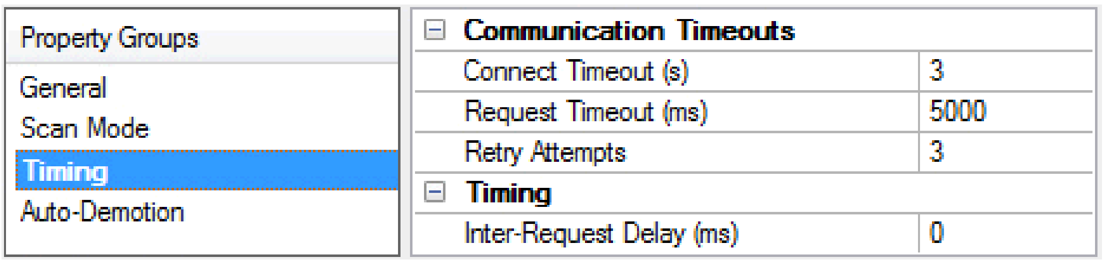
Scan Mode: specifies how tags in the device are scanned for updates sent to subscribed clients. Descriptions of the options are:

- **Respect Client-Specified Scan Rate**: This mode uses the scan rate requested by the client.
- **Request Data No Faster than Scan Rate**: This mode specifies the maximum scan rate to be used. The valid range is 10 to 99999990 milliseconds. The default is 1000 milliseconds.
  Note: When the server has an active client and items for the device and the scan rate value is increased, the changes take effect immediately. When the scan rate value is decreased, the changes do not take effect until all client applications have been disconnected.
- **Request All Data at Scan Rate**: This mode forces tags to be scanned at the specified rate for subscribed clients. The valid range is 10 to 99999990 milliseconds. The default is 1000 milliseconds.
- **Do Not Scan, Demand Poll Only**: This mode does not periodically poll tags that belong to the device nor perform a read to get an item's initial value once it becomes active. It is the client's responsibility to poll for updates, either by writing to the _DemandPoll tag or by issuing explicit device reads for individual items. *For more information, refer to "Device Demand Poll" in server help*.
- **Respect Tag-Specified Scan Rate**: This mode forces static tags to be scanned at the rate specified in their static configuration tag properties. Dynamic tags are scanned at the client-specified scan rate.

Initial Updates from Cache: When enabled, this option allows the server to provide the first updates for newly activated tag references from stored (cached) data. Cache updates can only be provided when the new item reference shares the same address, scan rate, data type, client access, and scaling properties. A device read is used for the initial update for the first client reference only. The default is disabled; any time a client activates a tag reference the server attempts to read the initial value from the device.

Device Properties — Timing

The device Timing properties allow the driver's response to error conditions to be tailored to fit the application's needs. In many cases, the environment requires changes to these properties for optimum performance. Factors such as electrically generated noise, modem delays, and poor physical connections can influence how many errors or timeouts a communications driver encounters. Timing properties are specific to each configured device.



Communication Timeouts	
Connect Timeout (s)	3
Request Timeout (ms)	5000
Retry Attempts	3
Timing	
Inter-Request Delay (ms)	0

Communications Timeouts

Connect Timeout: This property (which is used primarily by Ethernet based drivers) controls the amount of time required to establish a socket connection to a remote device. The device's connection time often takes longer than normal communications requests to that same device. The valid range is 1 to 30 seconds. The default is typically 3 seconds, but can vary depending on the driver's specific nature. If this setting is not supported by the driver, it is disabled.
Note: Due to the nature of UDP connections, the connection timeout setting is not applicable when communicating via UDP.

Request Timeout: This property specifies an interval used by all drivers to determine how long the driver waits for a response from the target device to complete. The valid range is 50 to 9,999,999 milliseconds (167.6667 minutes). The default is usually 1000 milliseconds, but can vary depending on the driver. The default timeout for most serial drivers is based on a baud rate of 9600 baud or better. When using a driver at lower baud rates, increase the timeout to compensate for the increased time required to acquire data.

Retry Attempts: This property specifies how many times the driver retries a communications request before considering the request to have failed and the device to be in error. The valid range is 1 to 10. The default is typically 3, but can vary depending on the driver's specific nature. The number of retries configured for an application depends largely on the communications environment. This property applies to both connection attempts and request attempts.

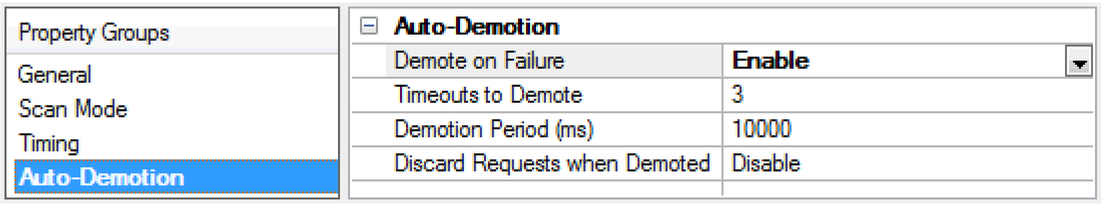
Timing

Inter-Request Delay: This property specifies how long the driver waits before sending the next request to the target device. It overrides the normal polling frequency of tags associated with the device, as well as one-time reads and writes. This delay can be useful when dealing with devices with slow turnaround times and in cases where network load is a concern. Configuring a delay for a device affects communications with all other devices on the channel. It is recommended that users separate any device that requires an inter-request delay to a separate channel if possible. Other communications properties (such as communication serialization) can extend this delay. The valid range is 0 to 300,000 milliseconds; however, some drivers may limit the maximum value due to a function of their particular design. The default is 0, which indicates no delay between requests with the target device.

Note: Not all drivers support Inter-Request Delay. This setting does not appear if it is not available.

Device Properties — Auto-Demotion

The Auto-Demotion properties can temporarily place a device off-scan in the event that a device is not responding. By placing a non-responsive device offline for a specific time period, the driver can continue to optimize its communications with other devices on the same channel. After the time period has been reached, the driver re-attempts to communicate with the non-responsive device. If the device is responsive, the device is placed on-scan; otherwise, it restarts its off-scan time period.



Auto-Demotion	
Demote on Failure	Enable
Timeouts to Demote	3
Demotion Period (ms)	10000
Discard Requests when Demoted	Disable

Demote on Failure: When enabled, the device is automatically taken off-scan until it is responding again.

Tip: Determine when a device is off-scan by monitoring its demoted state using the _AutoDemoted system tag.

Timeouts to Demote: Specify how many successive cycles of request timeouts and retries occur before the device is placed off-scan. The valid range is 1 to 30 successive failures. The default is 3.

Demotion Period: Indicate how long the device should be placed off-scan when the timeouts value is reached. During this period, no read requests are sent to the device and all data associated with the read requests are set to bad quality. When this period expires, the driver places the device on-scan and allows for another attempt at communications. The valid range is 100 to 3600000 milliseconds. The default is 10000 milliseconds.

Discard Requests when Demoted: Select whether or not write requests should be attempted during the off-scan period. Disable to always send write requests regardless of the demotion period. Enable to discard writes; the server automatically fails any write request received from a client and does not post a message to the Event Log.

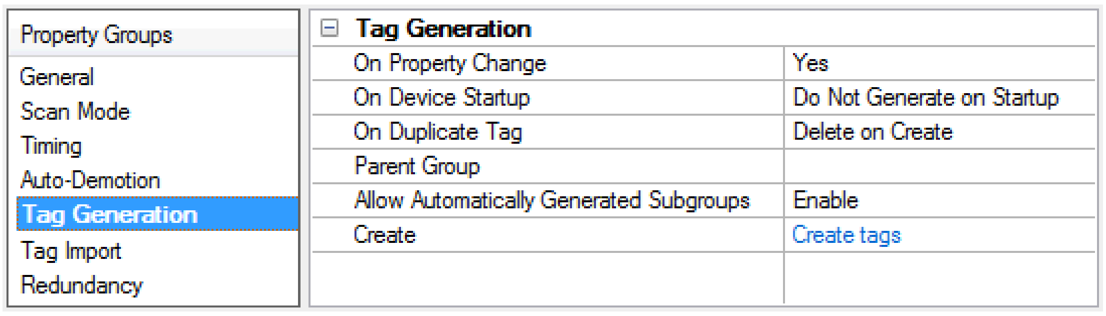
Device Properties — Tag Generation

The automatic tag database generation features make setting up an application a plug-and-play operation. Select communications drivers can be configured to automatically build a list of tags that correspond to device-specific data. These automatically generated tags (which depend on the nature of the supporting driver) can be browsed from the clients.

If the target device supports its own local tag database, the driver reads the device's tag information and uses the data to generate tags within the server. If the device does not natively support named tags, the driver creates a list of tags based on driver-specific information. An example of these two conditions is as follows:

1. If a data acquisition system supports its own local tag database, the communications driver uses the tag names found in the device to build the server's tags.
2. If an Ethernet I/O system supports detection of its own available I/O module types, the communications driver automatically generates tags in the server that are based on the types of I/O modules plugged into the Ethernet I/O rack.

Note: Automatic tag database generation's mode of operation is completely configurable. For more information, refer to the property descriptions below.



Tag Generation	
On Property Change	Yes
On Device Startup	Do Not Generate on Startup
On Duplicate Tag	Delete on Create
Parent Group	
Allow Automatically Generated Subgroups	Enable
Create	Create tags

On Property Change: If the device supports automatic tag generation when certain properties change, the **On Property Change** option is shown. It is set to **Yes** by default, but it can be set to **No** to control over when tag generation is performed. In this case, the **Create tags** action must be manually invoked to perform tag generation.

On Device Startup: This property specifies when OPC tags are automatically generated. Descriptions of the options are as follows:

- **Do Not Generate on Startup**: This option prevents the driver from adding any OPC tags to the tag space of the server. This is the default setting.
- **Always Generate on Startup**: This option causes the driver to evaluate the device for tag information. It also adds tags to the tag space of the server every time the server is launched.
- **Generate on First Startup**: This option causes the driver to evaluate the target device for tag information the first time the project is run. It also adds any OPC tags to the server tag space as needed.

Note: When the option to automatically generate OPC tags is selected, any tags that are added to the server's tag space must be saved with the project. Users can configure the project to automatically save from the **Tools** | **Options** menu.

On Duplicate Tag: When automatic tag database generation is enabled, the server needs to know what to do with the tags that it may have previously added or with tags that have been added or modified after the communications driver since their original creation. This setting controls how the server handles OPC tags that were automatically generated and currently exist in the project. It also prevents automatically generated tags from accumulating in the server.

For example, if a user changes the I/O modules in the rack with the server configured to **Always Generate on Startup**, new tags would be added to the server every time the communications driver detected a new I/O module. If the old tags were not removed, many unused tags could accumulate in the server's tag space. The options are:

- **Delete on Create**: This option deletes any tags that were previously added to the tag space before any new tags are added. This is the default setting.
- **Overwrite as Necessary**: This option instructs the server to only remove the tags that the communications driver is replacing with new tags. Any tags that are not being overwritten remain in the server's tag space.
- **Do not Overwrite**: This option prevents the server from removing any tags that were previously generated or already existed in the server. The communications driver can only add tags that are completely new.
- **Do not Overwrite, Log Error**: This option has the same effect as the prior option, and also posts an error message to the server's Event Log when a tag overwrite would have occurred.

Note: Removing OPC tags affects tags that have been automatically generated by the communications driver as well as any tags that have been added using names that match generated tags. Users should avoid adding tags to the server using names that may match tags that are automatically generated by the driver.

Parent Group: This property keeps automatically generated tags from mixing with tags that have been entered manually by specifying a group to be used for automatically generated tags. The name of the group can be up to 256 characters. This parent group provides a root branch to which all automatically generated tags are added.

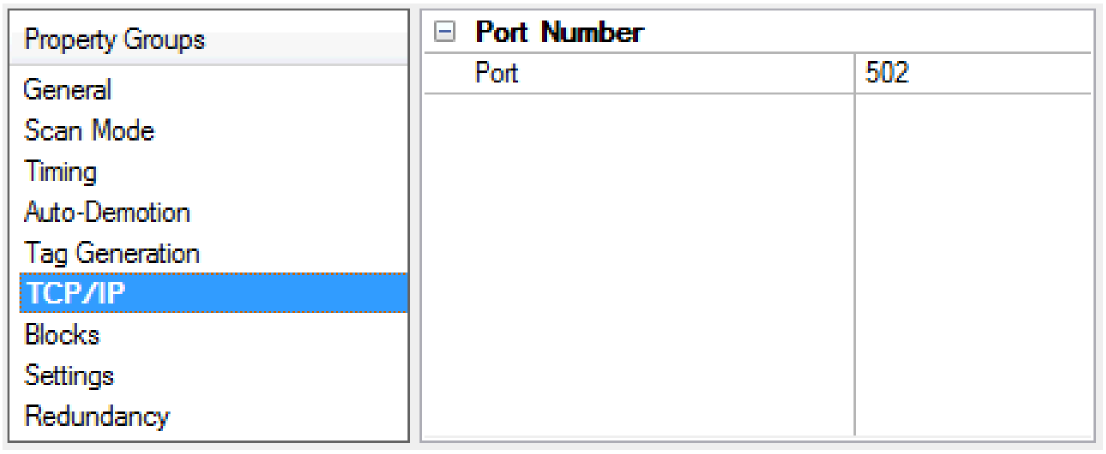
Allow Automatically Generated Subgroups: This property controls whether the server automatically creates subgroups for the automatically generated tags. This is the default setting. If disabled, the server generates the device's tags in a flat list without any grouping. In the server project, the resulting tags are named with the address value. For example, the tag names are not retained during the generation process.

Note: If, as the server is generating tags, a tag is assigned the same name as an existing tag, the system automatically increments to the next highest number so that the tag name is not duplicated. For example, if the generation process creates a tag named "AI22" that already exists, it creates the tag as "AI23" instead.

Create: Initiates the creation of automatically generated OPC tags. If the device's configuration has been modified, **Create tags** forces the driver to reevaluate the device for possible tag changes. Its ability to be accessed from the System tags allows a client application to initiate tag database creation.

Note: **Create tags** is disabled if the Configuration edits a project offline.

Device Properties — TCP/IP

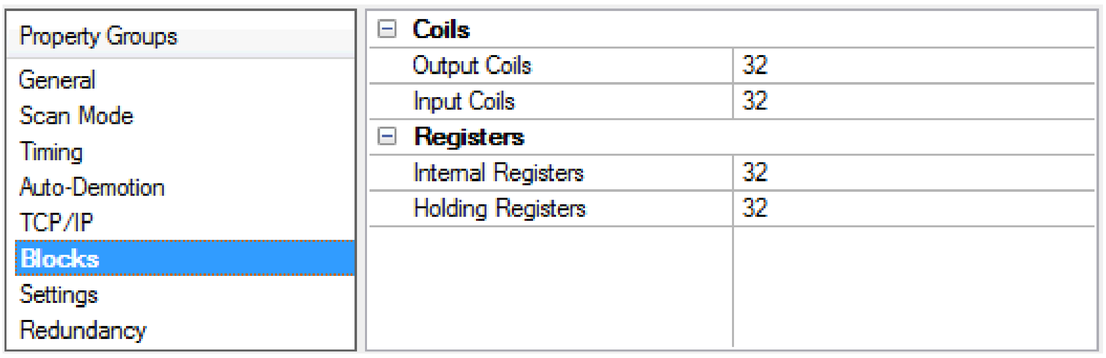


Port Number	
Port	502

Port Number

Port: Specifies the TCP/IP port number the remote device is configured to use. The default port number is 502.

Device Properties — Blocks



Coils	
Output Coils	32
Input Coils	32
Registers	
Internal Registers	32
Holding Registers	32

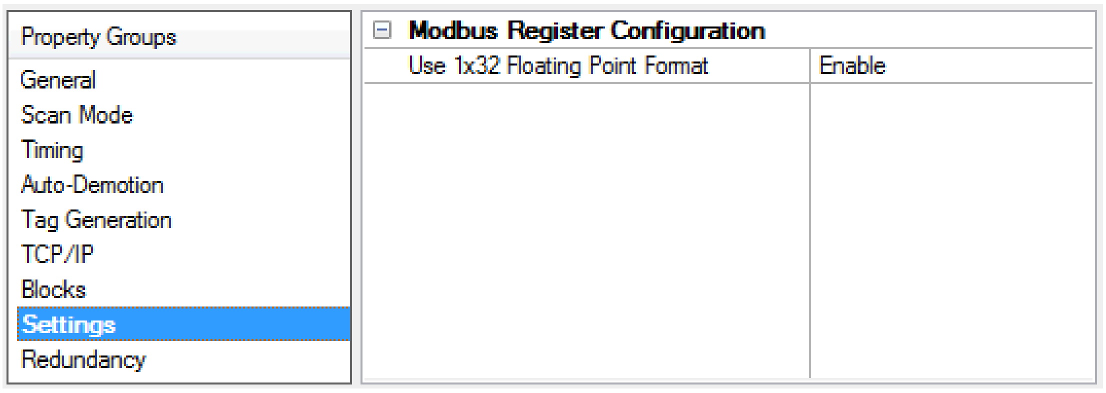
Coils

Input and output coils can be read from 8 to 800 points (bits) at a time.

Registers

Registers can be read from 1 to 56 locations (16 or 32-bit registers) at a time. The default block size should be changed if the device does not support block Read/Write operations. It should also be changed if the device contains non-contiguous addresses. If this is the case and the driver attempts to read a block of data that encompasses undefined memory, the device will most likely reject the request.

Device Properties — Settings



Modbus Register Configuration

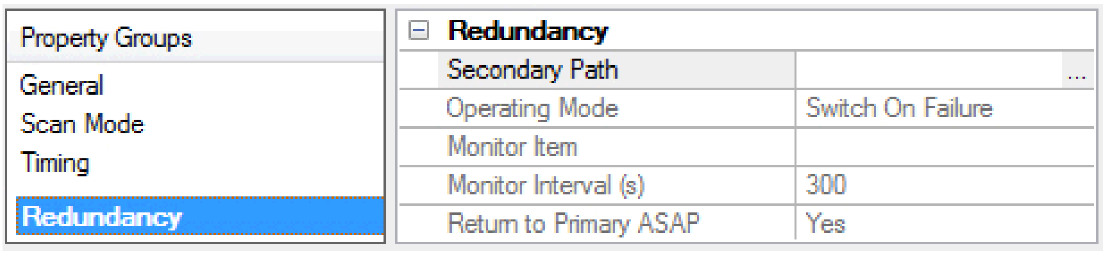
Use 1x32 Floating Point Format	Enable

Modbus Register Configuration

Some Thermo Westronics devices, such as the SV100 and SV180, give users the option of representing floating point data in either 1x32 or 2x16 format in Modbus communications.

Use 1x32 Floating Point Format: Enable when the device has been configured to use the 1x32 format.

Device Properties — Redundancy



Redundancy

Secondary Path	...
Operating Mode	Switch On Failure
Monitor Item	
Monitor Interval (s)	300
Return to Primary ASAP	Yes

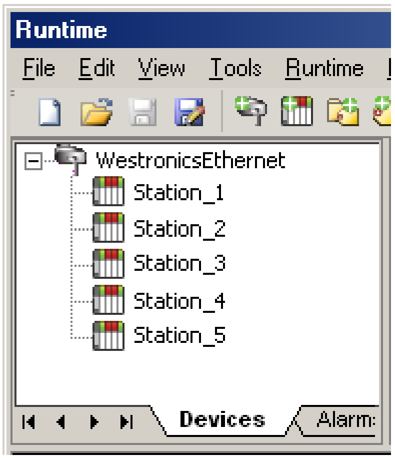
Redundancy is available with the Media-Level Redundancy Plug-In.

● *Consult the website, a sales representative, or the user manual for more information.*

Optimizing Communications

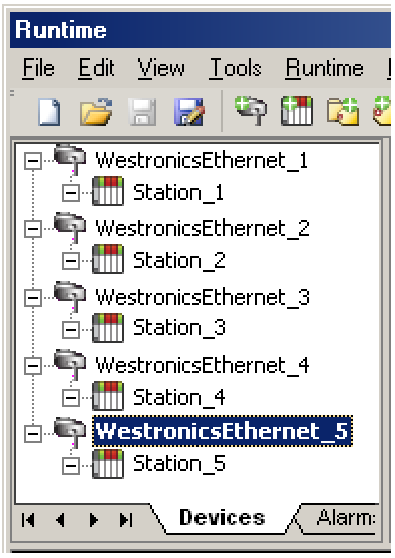
The Thermo Westronics Ethernet Driver has been designed to provide the best performance with the least amount of impact on the system's overall performance. While the Thermo Westronics Ethernet Driver is fast, there are a couple of guidelines that can be used in order to control and optimize the application and gain maximum performance.

This server refers to communications protocols like Thermo Westronics Ethernet as a channel. Each channel defined in the application represents a separate path of execution in the server. Once a channel has been defined, a series of devices must then be defined under that channel. Each of these devices represents a single Thermo Westronics Ethernet controller from which data will be collected. While this approach to defining the application will provide a high level of performance, it won't take full advantage of the Thermo Westronics Ethernet Driver or the network. An example of how the application may appear when configured using a single channel is shown below.



Each device appears under a single Thermo Westronics Ethernet channel. In this configuration, the driver must move from one device to the next as quickly as possible in order to gather information at an effective rate. As more devices are added or more information is requested from a single device, the overall update rate begins to suffer.

If the Thermo Westronics Ethernet Driver could only define one single channel, then the example shown above would be the only option available; however, the Thermo Westronics Ethernet Driver can define up to 100 channels. Using multiple channels distributes the data collection workload by simultaneously issuing multiple requests to the network. An example of how the same application may appear when configured using multiple channels to improve performance is shown below.



Each device has now been defined under its own channel. In this new configuration, a single path of execution is dedicated to the task of gathering data from each device. If the application has 100 or fewer channels, it can be optimized exactly how it is shown here.

The performance will improve even if the application has more than 100 channels. While 100 or fewer channels may be ideal, the application will still benefit from additional channels. Although by spreading the device load across all channels will cause the server to move from device to device again, it can now do so with far less devices to process on a single channel.

Block Size, which is available on each defined device, can also affect the Thermo Westronics Ethernet Driver performance. Block Size refers to the number of bytes that may be requested from a device at one time. To refine the performance of this driver, block size can be configured to 1-56 registers and 8-800 bits.

Data Types Description

Data Type	Description
Boolean	Single bit
Word	Unsigned 16 bit value bit 0 is the low bit bit 15 is the high bit
Short	Signed 16 bit value bit 0 is the low bit bit 14 is the high bit bit 15 is the sign bit
DWord	Unsigned 32 bit value bit 0 is the low bit bit 31 is the high bit
Long	Signed 32 bit value bit 0 is the low bit bit 30 is the high bit bit 31 is the sign bit
Float	32 bit floating point value. The driver interprets two consecutive 16 bit registers as a floating point value by making the second register the high word and the first register the low word.
String	Zero terminated character array

Address Descriptions

Address specifications vary depending on the model in use. Select a link from the following list to obtain specific address information for the model of interest.

SV100
SV180
SV180 (2.0)

SV100 Addressing

The Thermo Westronics Ethernet Driver automatically generates tags for many of the most important device parameters. Tags can be manually created to access all device parameters mapped to Modbus address locations within the device. The following tables describe how to specify a Modbus address when creating a tag. The default data types for dynamically defined tags are shown in **bold**.

Note: The full range of addresses accepted by this driver may not be valid for each particular device.

Modbus Addressing Decimal Format

Address	Range	Data Type	Access
Output Coils	000001-065536	**Boolean**	Read/Write
Input Coils	100001-165536	**Boolean**	Read Only
Internal Registers	300001-305000 300001.0-300001.15...305000.0-305000.15 305001-306000 306001-307000 306001.0-306001.15...307000.0-307000.15 307001-308000 308001-365536 308001.0-308001.15...365536.0-365536.15	**Word**, Short **Boolean** **DWord**, Long **Word**, Short **Boolean** **Float** **Word**, Short **Boolean**	Read Only
Holding Registers	400001-406000 400001.0-400001.15...406000.0-406000.15 406001-407000 407001-408000 407001.0-407001.15...408000.0-408000.15 408001-409000 409001-465536	**Word**, Short **Boolean** **DWord**, Long **Word**, Short **Boolean** **Float** **Word**, Short	Read/Write

Address	Range	Data Type	Access
	409001.0-409001.15...465536.0-465536.15	**Boolean**	

Modbus Addressing Hexadecimal Format

Address	Range	Data Type	Access
Output Coils	H000001-H010000	**Boolean**	Read/Write
Input Coils	H100001-H110000	**Boolean**	Read Only
Internal Registers	H300001-H301388 H300001.0-H300001.F...H301388.0-H301388.F H301389-H301770 H301771-H301B58 H301771.0-H301771.F...H301B58.0-H301B58.F H301B59-H301F40 H301F41-H310000 H301F41.0-H301F41.F...H31000.0-H310000.F	**Word**, Short **Boolean** **DWord**, Long **Word**, Short **Boolean** **Float** **Word**, Short **Boolean**	Read Only
Holding Registers	H400001-H401770 H400001.0-H400001.F...H401770.0-H401770.F H401771-H401B58 H401B59-H401F40 H401B59.0-H401B59.F...H401F40.0-H401F40.F H401F41-H402328 H402329-H410000 H402329.0-H402329.F...H410000.0-H410000.F	**Word**, Short **Boolean** **DWord**, Long **Word**, Short **Boolean** **Float** **Word**, Short **Boolean**	Read/Write

Array Support

Arrays are supported for 16-bit internal and holding register locations for all data types except Boolean and strings. There are two methods of addressing an array. The examples below use holding register locations.

4xxxx [rows] [cols]
4xxxx [cols] (this method assumes rows is equal to one)

Rows multiplied by cols cannot exceed the block size that has been assigned to the device for the register type. For arrays of 32 bit data types, rows multiplied by cols multiplied by 2 cannot exceed the block size.

SV180 Addressing

The SV180 model is for SV180 devices using firmware versions prior to 2.0A. If the device uses firmware 2.0A or later, select the SV180 (2.0) model. For more information, refer to **SV180 (2.0) Addressing**.

The Thermo Westronics Ethernet Driver automatically generates tags for many of the most important device parameters. Tags can be manually created to access all device parameters mapped to Modbus address locations within the device. The following tables describe how to specify a Modbus address when creating a tag. The default data types for dynamically defined tags are shown in **bold**.

Note: The full range of addresses accepted by this driver may not be valid for each particular device.

Modbus Addressing Decimal Format

Address	Range	Data Type	Access
Output Coils	000001-065536	**Boolean**	Read/Write
Input Coils	100001-165536	**Boolean**	Read Only
Internal Registers	300001-305000 300001.0-300001.15...305000.0-305000.15 305001-306000 306001-307000 306001.0-306001.15...307000.0-307000.15 307001-308000 308001-365536 308001.0-308001.15...365536.0-365536.15	**Word**, Short **Boolean** **DWord**, Long **Word**, Short **Boolean** **Float** **Word**, Short **Boolean**	Read Only
Holding Registers	400001-405000 400001.0-400001.15...405000.0-405000.15 405001-406000 406001-407000 406001.0-406001.15...407000.0-407000.15 407001-408000 408001-465536 408001.0-408001.15...465536.0-465536.15	**Word**, Short **Boolean** **DWord**, Long **Word**, Short **Boolean** **Float** **Word**, Short **Boolean**	Read/Write

Modbus Addressing Hexadecimal Format

Address	Range	Data Type	Access
Output Coils	H000001-H010000	**Boolean**	Read/Write
Input Coils	H100001-H110000	**Boolean**	Read Only
Internal Registers	H300001-H301388	**Word**, Short	Read Only
	H300001.0-H300001.F ...H301388.0-H301388.F	**Boolean**	
	H301389-H301770	**DWord**, Long	
	H301771-H301B58	**Word**, Short	
	H301771.0-H301771.F ...H301B58.0-H301B58.F	**Boolean**	
	H301B59-H301F40	**Float**	
	H301F41-H310000	**Word**, Short	
	H301F41.0-H301F41.F ...H310000.0-H310000.F	**Boolean**	
Holding Registers	H400001-H401388	**Word**, Short	Read/Write
	H400001.0-H400001.F...H401388.0-H401388.F	**Boolean**	
	H401389-H401770	**DWord**, Long	
	H401771-H401B58	**Word**, Short	
	H401771.0-H401771.F... H401B58.0-H401B58.F	**Boolean**	
	H401B59-H401F40	**Float**	
	H401F41-H410000	**Word**, Short	
	H401F41.0-H401F41.F...H410000.0-H410000.F	**Boolean**	

Array Support

Arrays are supported for 16-bit internal and holding register locations for all data types except Boolean and strings. There are two methods of addressing an array. The examples below use holding register locations.

4xxxx [rows] [cols]
4xxxx [cols] (this method assumes rows is equal to one)

Rows multiplied by cols cannot exceed the block size that has been assigned to the device for the register type. For arrays of 32 bit data types, rows multiplied by cols multiplied by 2 cannot exceed the block size.

SV180 (2.0) Addressing

The SV180 (2.0) model is for SV180 devices using firmware version 2.0A or later. If the device uses an earlier firmware version, select the SV180 model. For more information, refer to **SV180 Addressing**.

The Thermo Westronics Ethernet Driver automatically generates tags for many of the most important device parameters. Tags can be manually created to access all device parameters mapped to Modbus address locations within the device. The following tables describe how to specify a Modbus address when creating a tag. The default data types for dynamically defined tags are shown in **bold**.

Note: The full range of addresses accepted by this driver may not be valid for each particular device.

Modbus Addressing Decimal Format

Address	Range	Data Type	Access
Output Coils	000001-065536	**Boolean**	Read/Write
Input Coils	100001-165536	**Boolean**	Read Only
Internal Registers	NA	NA	NA
Holding Registers	400001-465535*	**Float**	Read/Write

Modbus Addressing Hexadecimal Format

Address	Range	Data Type	Access
Output Coils	H000001-H010000	**Boolean**	Read/Write
Input Coils	H100001-H110000	**Boolean**	Read Only
Internal Registers	NA	NA	NA
Holding Registers	H400001-H410000*	**Float**	Read/Write

*Each value uses two registers when the device is configured to use the 2x16 floating point format. For example, Point 1 Data uses 400001 and 400002, Point 2 Data 2 uses 400003 and 400004 and so forth. Tags should address the first register used for the value. Each value uses one register when the device is configured to use the 1x32 floating point format. For example, Point 1 Data 1 uses 400001, Point 2 Data uses 400002 and so forth. For more information, refer to **Settings**.

Array Support

Arrays are supported for 16-bit internal and holding register locations for all data types except Boolean and strings. There are two methods of addressing an array. The examples below use holding register locations.

4xxxx [rows] [cols]
4xxxx [cols] (this method assumes rows is equal to one)

Rows multiplied by cols cannot exceed the block size that has been assigned to the device for the register type. For arrays of 32 bit data types, rows multiplied by cols multiplied by 2 cannot exceed the block size.

Error Descriptions

The following error/warning messages may be generated. Click on the link for a description of the message.

Address Validation

Missing address
Device address <address> contains a syntax error
Address <address> is out of range for the specified device or register
Device address <address> is not supported by model <model name>
Data Type <type> is not valid for device address <address>
Device address <address> is Read Only
Array size is out of range for address <address>
Array support is not available for the specified address: <address>

Device Status Messages

Device <device name> is not responding
Unable to write to <address> on device <device name>

Device-Specific Messages

Failure to initiate 'Winsock.dll'
Bad address in block [<start address> to <end address>] on device <device name>

Missing address

Error Type:

Warning

Possible Cause:

A tag address that has been specified dynamically has no length.

Solution:

Re-enter the address in the client application.

Device address <address> contains a syntax error

Error Type:

Warning

Possible Cause:

A tag address that has been specified dynamically contains one or more invalid characters.

Solution:

Re-enter the address in the client application.

Address <address> is out of range for the specified device or register

Error Type:

Warning

Possible Cause:
A tag address that has been specified dynamically references a location that is beyond the range of supported locations for the device.

Solution:
Verify that the address is correct; if it is not, re-enter it in the client application.

Device address <address> is not supported by model <model name>

Error Type:
Warning

Possible Cause:
A tag address that has been specified dynamically references a location that is valid for the communications protocol but not supported by the target device.

Solution:
Verify that the address is correct; if it is not, re-enter it in the client application. Also verify that the selected model name for the device is correct.

Data Type <type> is not valid for device address <address>

Error Type:
Warning

Possible Cause:
A tag address that has been specified dynamically has been assigned an invalid data type.

Solution:
Modify the requested data type in the client application.

Device address <address> is Read Only

Error Type:
Warning

Possible Cause:
A tag address that has been specified dynamically has a requested access mode that is not compatible with what the device supports for that address.

Solution:
Change the access mode in the client application.

Array size is out of range for address <address>

Error Type:
Warning

Possible Cause:
A tag address that has been specified dynamically is requesting an array size that is too large for the address type or block size of the driver.

Solution:
Re-enter the address in the client application to specify a smaller value for the array or a different starting point.

Array support is not available for the specified address: <address>

Error Type:
Warning

Possible Cause:
A tag address that has been specified dynamically contains an array reference for an address type that doesn't support arrays.

Solution:
Re-enter the address in the client application to remove the array reference or correct the address type.

Device <device name> is not responding

Error Type:
Serious

Possible Cause:

1. The connection between the device and the Host PC is broken.
2. The communication parameters for the connection are incorrect.
3. The named device may have been assigned an incorrect Network ID.
4. The response from the device took longer to receive than the amount of time specified in the "Request Timeout" device setting.

Solution:

1. Verify the cabling between the PC and the device.
2. Verify that the specified communication parameters match those of the device.
3. Verify that the Network ID given to the named device matches that of the actual device.
4. Increase the Request Timeout setting so that the entire response can be handled.

Unable to write to <address> on device <device name>

Error Type:
Serious

Possible Cause:

1. The named device may not be connected to the network.
2. The named device may have been assigned an incorrect Network ID.

3. The named device is not responding to write requests.
4. The address does not exist in the PLC.

Solution:

1. Check the PLC network connections.
2. Verify that the Network ID given to the named device matches that of the actual device.

Failure to initiate 'Winsock.dll'

Error Type:
Fatal

Possible Cause:
Could not negotiate with the operating systems Winsock 1.1 functionality.

Solution:
Verify that the Winsock.dll is properly installed on the system.

Bad address in block [<start address> to <end address>] on device <device name>

Error Type:
Serious

Possible Cause:
An attempt has been made to reference a nonexistent location in the specified device.

Solution:
Verify the tags assigned to addresses in the specified range on the device and eliminate ones that reference invalid locations.

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