Scanivalve Ethernet Driver

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Scanivalve Ethernet Driver Help

Help version 1.013

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Overview

The Scanivalve Ethernet Driver provides an easy and reliable way to connect Scanivalve Ethernet devices to OPC Client applications, including HMI, SCADA, Historian, MES, ERP and countless custom applications.

Setup

Supported Devices

DSA 3200
DTS 3250

Communication Protocol

Scanivalve Ethernet

Connection

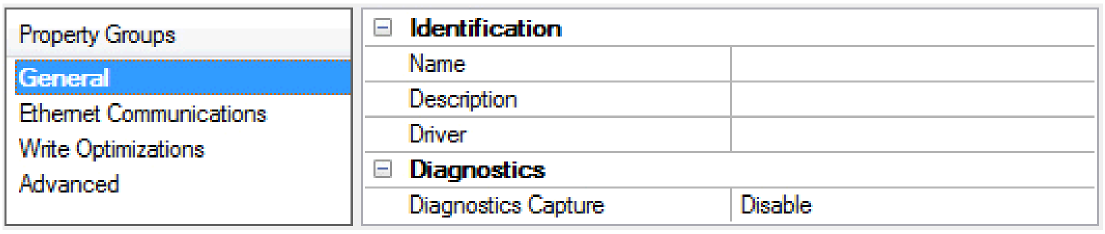
The Scanivalve devices listed above support only one connection at a time. In order for the driver to properly communicate with the device, no other applications should be connected to the device.

Device IDs

Device IDs are specified as YYY.YYY.YYY.YYY, where YYY designates the device IP address. 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.

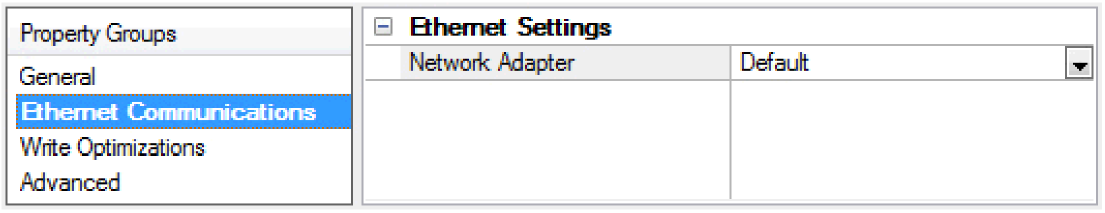
Note: With the server's online full-time operation, these properties can be changed at any time. This includes changing the channel name to prevent clients from registering data with the server. If a client has already acquired an item from the server before the channel name is changed, the items are 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.
For more information, refer to "Communication Diagnostics" in the server help.
Not all drivers support diagnostics. To determine whether diagnostics are available for a particular driver, open the driver information and locate the "Supports device level diagnostics" statement.

Channel Properties - Ethernet Communications

Ethernet Communication can be used to communicate with devices.



Ethernet Settings

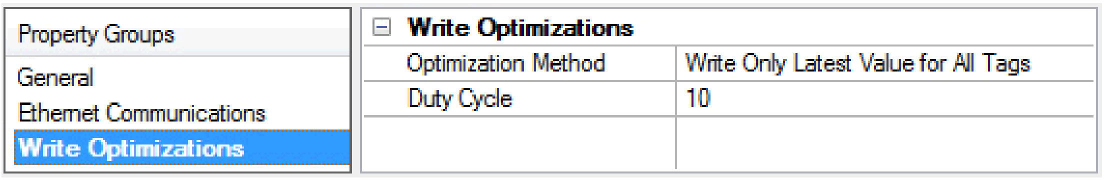
Network Adapter	Default

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.



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.

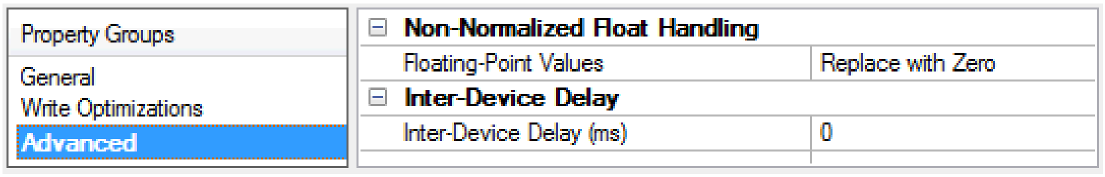
- **Write Only Latest Value for Non-Boolean Tags**: Many consecutive writes to the same value can accumulate in the write queue due to the time required to actually send the data to the device. If the server updates a write value that has already been placed in the write queue, far fewer writes are needed 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.lin

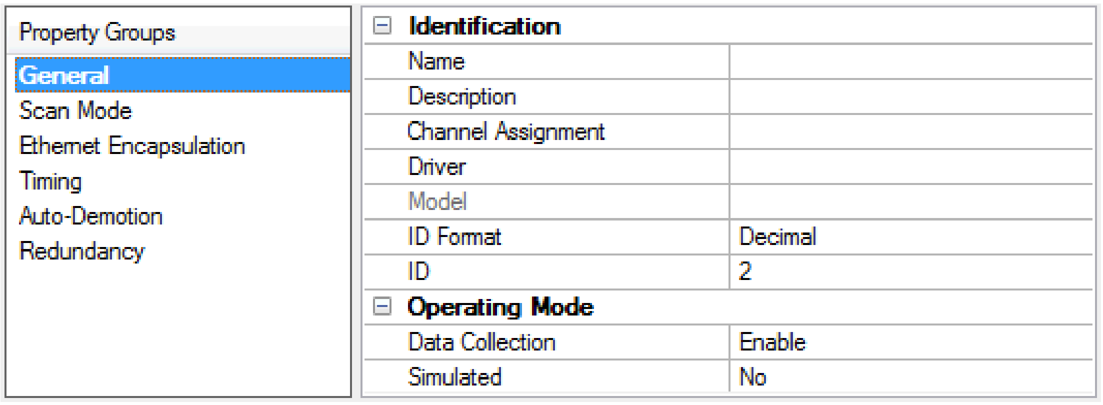
For more information on the floating point values, refer to "How To ... Work with Non-Normalized Floating Point Values" in the server help.

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.

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 driver-specific station or node. The type of ID entered depends on the communications driver being used. For many communication 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.

Note: 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. For more information, refer to the driver's help documentation.

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:

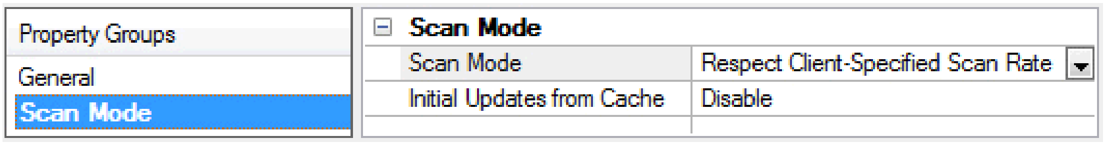
1. This System tag (_Simulated) is read only and cannot be written to for runtime protection. The System tag allows this property to be monitored from the client.

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.



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

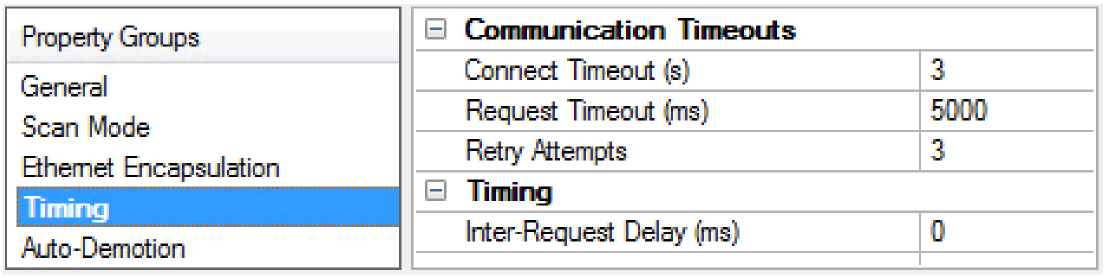
Scan Mode: specifies how tags in the device are scanned for updates sent to subscribed clients. Descriptions of the options are:

- **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 Communications Timeouts 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. Communications Timeouts properties are specific to each configured device.



Property Groups	Communication Timeouts	
General	Connect Timeout (s)	3
Scan Mode	Request Timeout (ms)	5000
Ethernet Encapsulation	Retry Attempts	3
Timing	**Timing**	
Auto-Demotion	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.

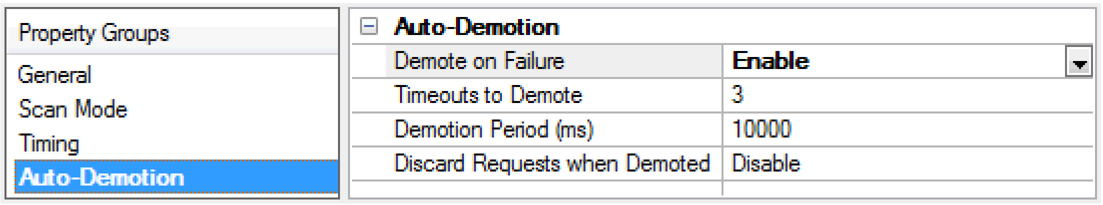
Retry Attempts: This property specifies how many times the driver retries a communications request before considering the request to have failed and the device to be in error. The valid range is 1 to 10. The default is typically 3, but can vary depending on the driver's specific nature. The number of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

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 supported by the driver.

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.

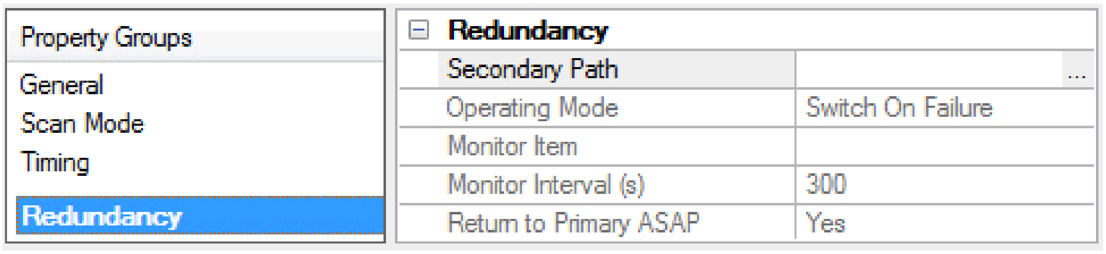
Discard Requests when Demoted: Select whether or not write requests should be attempted during the off-scan period. Disable to always send write requests regardless of the demotion period. Enable to discard writes; the server automatically fails any write request received from a client and does not post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

Device Properties - TCP/IP

Port Number

This property specifies the TCP/IP port number that the remote device is configured to use. The default port number is 23. The valid range is 1 to 65535.

Device Properties - Redundancy



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

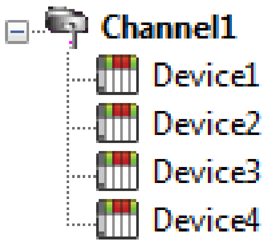
Redundancy is available with the Media-Level Redundancy Plug-in.

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

Optimizing Communications

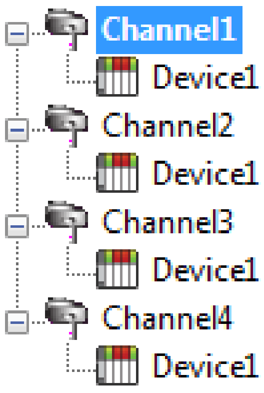
The Scanivalve Ethernet Driver has been designed to provide the best performance with the least amount of impact on the system's overall performance. While the Scanivalve Ethernet Driver is fast, there are a couple of guidelines that can be used in order to control and optimize the application and gain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

Our server refers to communications protocols like Scanivalve 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 Scanivalve 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 Scanivalve 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 Scanivalve 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 Scanivalve Ethernet Driver could only define one single channel, then the example shown above would be the only option available; however, the Scanivalve 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 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.

Data Types Description

Data Type	Description
Boolean	Single bit
Word	Unsigned 16 bit value
Short	Signed 16 bit value
Char	Signed 8 bit value
Float	32 bit floating point value
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.

DSA 3200
DTS 3250

DSA 3200 Addressing

The Scanivalve Ethernet Driver automatically generates all addressable tags for the device. The default data types for dynamically defined tags are shown in **bold.**

Address	Range	Data Type	Access
CalibrateZeRead Only	N/A	**Boolean**	Read/Write*
ClearErrors	N/A	**Boolean**	Read/Write*
DO (Digital Output)	0-7	**Boolean**	Read/Write*
ErrorString	0-15 (Optional)	**String**	Read Only
EU (Engineering Units)	N/A	**Boolean**	Read/Write
Pressure	1-16	**Float**	Read Only
Status	N/A	**String**	Read Only
Stop	N/A	**Boolean**	Read/Write*
Temperature	1-16	**Short**, Word	Read Only

*Addresses with Read/Write (Write Only) access are not actually readable from the device. They are initialized by the Scanivalve Ethernet Driver to a value of 0 (false) and will be returned by the OPC server to a client with a read value of 0 (false). All Write Only tags are Boolean and will cause the driver to send the command when a value is written to the tag.

ErrorString

The ErrorString tag will return up to 16 error strings from the device error buffer. If no address range is specified, ErrorString will return the last error from the device error buffer.

Status

Any Status value other than 'READY' indicates that the device is not ready to receive commands or requests for data. Scanned read addresses (Pressure and Temperature) and read values (ErrorString and EU) will not be updated while Status is not 'READY'. Likewise, commands CalibrateZero, ClearErrors, DO, and Stop will not be writable while Status is not 'READY'.

Note: A Status value other than 'READY' may occur while the device is processing a CalibrateZero command. In this case, the Status value will be returned as 'CALZ'.

DTS 3250 Addressing

The Scanivalve Ethernet Driver automatically generates all addressable tags for the device. The default data types for dynamically defined tags are shown in **bold**.

Address	Range	Data Type	Access
ADCalibrate	N/A	**Boolean**	Read/Write*
ClearErrors	N/A	**Boolean**	Read/Write*

Address	Range	Data Type	Access
ErrorString	0-15 (Optional)	**String**	Read Only
EU (Engineering Units)	N/A	**Char**	Read/Write
OpenTCTest	N/A	**Boolean**	Read/Write*
Pressure	1-16	**Float**	Read Only
Status	N/A	**String**	Read Only
Stop	N/A	**Boolean**	Read/Write*
Temperature	1-16	**Float**	Read Only
Temperature[x].Status	1-16	**Short**, Word	Read Only

*Addresses with Read/Write (Write Only) access are not actually readable from the device. They are initialized by the Scanivalve Ethernet Driver to a value of 0 (false) and will be returned by the OPC server to a client with a read value of 0 (false). All Write Only tags are Boolean and will cause the driver to send the command when a value is written to the tag.

ErrorString

The ErrorString tag will return up to 16 error strings from the device error buffer. If no address range is specified,ErrorString will return the last error from the device error buffer.

Status

Any Status value other than 'READY' indicates that the device is not ready to receive commands or requests for data. Scanned read addresses (Pressure, Temperature andTemperature[x].Status) and read values (ErrorString and EU) will not be updated while Status is not 'READY'. Likewise, commands ADCalibrate, ClearErrors, OpenTCTest, and Stop will not be writable while Status is not 'READY'.

Note: A Status value other than 'READY' may occur while the device is processing the ADCalibrater OpenTCTest commands. In this case, the Status value will be returned as 'ADCAL' or 'OTC', respectively.

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

Device Status Messages

Device '<device name>' is not responding

Device-Specific Messages

Failure to initiate 'winsock.dll'
Device '<device name>' received bad response on tag '<address>'

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.

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 properties 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 property.

Solution:

1. Verify the cabling between the PC and the device.
2. Verify that the specified communication properties 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 property so that the entire response can be handled.

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.

Device '<device name>' received bad response on tag '<address>'

Error Type:
Serious

Possible Cause:
The device is sending a response packet that is not expected by the driver. This can occur if multiple connections are made to a device. Response packets may be received by the driver that are in response to requests made by another connection.

Solution:
Verify that no other applications are connected to the device.

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