TIWAY Host Adapter Driver

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Help version 1.028

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Overview

The TIWAY Host Adapter Driver provides a reliable way to connect TIWAY Host Adapter devices to OPC Client applications, including HMI, SCADA, Historian, MES, ERP, and countless custom applications. It is intended for use with a TIWAY 1 Host Adapter or a TIWAY 1 UNILINK Host Adapter using the NITP protocol. The driver makes requests to the Host Adapter unit, which then forwards the request on to the actual network. When a response is received, the Host Adapter returns the response to the driver. The driver can be configured to control the behavior of the adapter, or the adapter can be configured with DIP switches on the unit to tell the driver to respect these settings. Once connected to a TIWAY 1 network, the driver can communicate with up to 254 secondary devices.

Host Adapters can be configured as MHIUs or HIUs. MHIUs are capable of implementing Network Manager duties for the TIWAY network. If a TIWAY network is already up and running, the new Host Adapter should be configured as an HIU. Having multiple Network Managers on a network will cause erratic behavior: it may also lose data because the each unit will struggle for control.

*For a complete description of the Host Adapter unit and the various operating modes, refer to the **Unilink Host Adapter** user manual.*

Setup

Supported Devices

TIWAY secondary device

Communication Protocol

Non-Intelligent Terminal Protocol (NITP)

Supported Communication Parameters

Baud Rate: 300, 600, 1200, 2400, 9600, 19200, or 38400
Stop Bits: 1
Parity: Odd
Data Bits: 7

Channel and Device Limits

The maximum number of channels supported by this driver is 100. The maximum number of devices supported by this driver is 254 per channel.

Flow Control

When using an RS232 / RS485 converter, the type of flow control that is required depends on the needs of the converter. Some converters do not require any flow control whereas others require RTS flow. For more information on flow requirements, refer to the converter's documentation. It is recommended that an RS485 converter that provides automatic flow control be used.

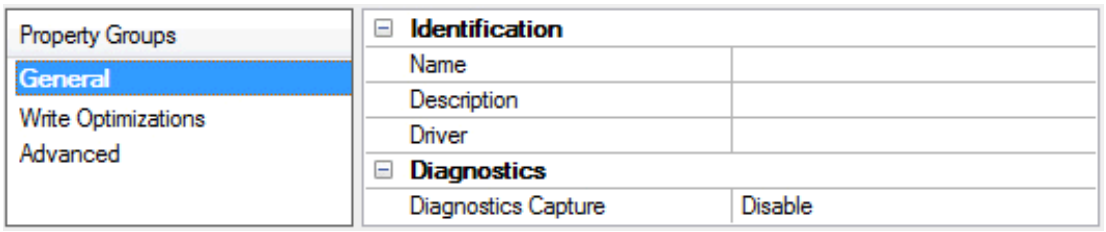
Note: Select RTS, DTR.

Ethernet Encapsulation

This driver supports Ethernet Encapsulation, which allows the driver to communicate with serial devices attached to an Ethernet network using a terminal server (such as the Lantronix DR1). This mode may be invoked through the COM ID property group in Channel Properties.

Channel Properties — General

This server supports the use of multiple simultaneous 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: Specify the 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. The property is required for creating a channel.

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

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

Driver: Specify the 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. The property is required for creating a channel.
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. Changes to the properties should not be made once a large client application has been developed. Utilize proper user role and privilege management to prevent operators from changing properties or accessing server features.

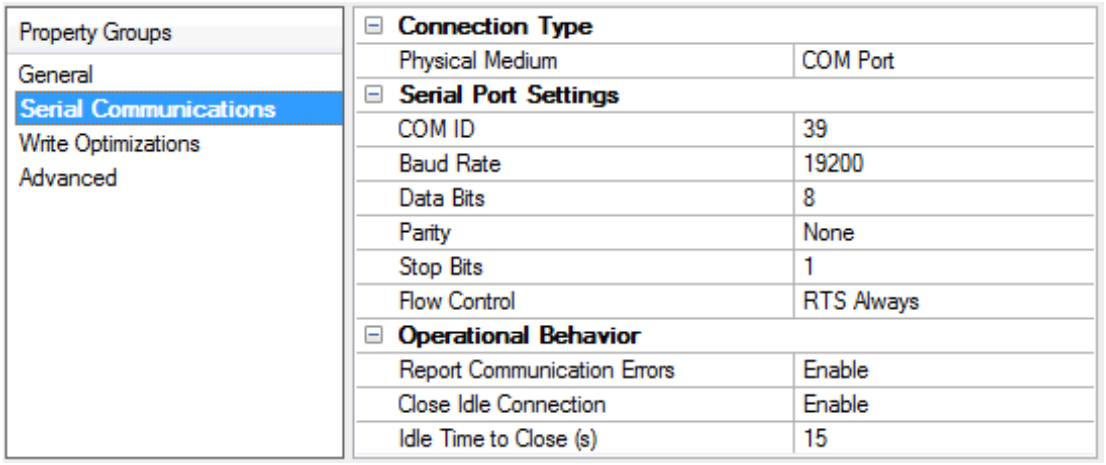
Diagnostics

Diagnostics Capture: When enabled, this option makes the channel's diagnostic information available to OPC applications allows the usage of statistics tags that provide feedback to client applications regarding the operation of the channel. 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 not available if the driver does not support diagnostics.
For more information, refer to "Communication Diagnostics" and "Statistics Tags" in the server help.

Channel Properties — Serial Communications

Serial communication properties are available to serial drivers and vary depending on the driver, connection type, and options selected. Below is a superset of the possible properties.
Click to jump to one of the sections: Connection Type, Serial Port Settings or Ethernet Settings, and Operational Behavior.

Note: With the server's online full-time operation, these properties can be changed at any time. Utilize proper user role and privilege management to prevent operators from changing properties or accessing server features.



Connection Type

Physical Medium: Choose the type of hardware device for data communications. Options include COM Port, None, Modem, and Ethernet Encapsulation. The default is COM Port.

- **None**: Select None to indicate there is no physical connection, which displays the Operation with no Communications section.
- **COM Port**: Select Com Port to display and configure the Serial Port Settings section.
- **Modem**: Select Modem if phone lines are used for communications, which are configured in the Modem Settings section.
- **Ethernet Encap.**: Select if Ethernet Encapsulation is used for communications, which displays the Ethernet Settings section.
- **Shared**: Verify the connection is correctly identified as sharing the current configuration with another channel. This is a read-only property.

Serial Port Settings

COM ID: Specify the Communications ID to be used when communicating with devices assigned to the channel. The valid range is 1 to 9991 to 16. The default is 1.

Baud Rate: Specify the baud rate to be used to configure the selected communications port.

Data Bits: Specify the number of data bits per data word. Options include 5, 6, 7, or 8.

Parity: Specify the type of parity for the data. Options include Odd, Even, or None.

Stop Bits: Specify the number of stop bits per data word. Options include 1 or 2.

Flow Control: Select how the RTS and DTR control lines are utilized. Flow control is required to communicate with some serial devices. Options are:

- **None**: This option does not toggle or assert control lines.
- **DTR**: This option asserts the DTR line when the communications port is opened and remains on.
- **RTS**: This option specifies that the RTS line is high if bytes are available for transmission. After all buffered bytes have been sent, the RTS line is low. This is normally used with RS232/RS485 converter hardware.
- **RTS, DTR**: This option is a combination of DTR and RTS.
- **RTS Always**: This option asserts the RTS line when the communication port is opened and remains on.
- **RTS Manual**: This option asserts the RTS line based on the timing properties entered for RTS Line Control. It is only available when the driver supports manual RTS line control (or when the properties are shared and at least one of the channels belongs to a driver that provides this support).
  RTS Manual adds an **RTS Line Control** property with options as follows:
  - **Raise**: This property specifies the amount of time that the RTS line is raised prior to data transmission. The valid range is 0 to 9999 milliseconds. The default is 10 milliseconds.
  - **Drop**: This property specifies the amount of time that the RTS line remains high after data transmission. The valid range is 0 to 9999 milliseconds. The default is 10 milliseconds.
  - **Poll Delay**: This property specifies the amount of time that polling for communications is delayed. The valid range is 0 to 9999. The default is 10 milliseconds.

Tip: When using two-wire RS-485, "echoes" may occur on the communication lines. Since this communication does not support echo suppression, it is recommended that echoes be disabled or a RS-485 converter be used.

Operational Behavior

- **Report Communication Errors**: Enable or disable reporting of low-level communications errors. When enabled, low-level errors are posted to the Event Log as they occur. When disabled, these same errors are not posted even though normal request failures are. The default is Enable.
- **Close Idle Connection**: Choose to close the connection when there are no longer any tags being referenced by a client on the channel. The default is Enable.
- **Idle Time to Close**: Specify the amount of time that the server waits once all tags have been removed before closing the COM port. The default is 15 seconds.

Ethernet Settings

Note: Not all serial drivers support Ethernet Encapsulation. If this group does not appear, the functionality is not supported.

Ethernet Encapsulation provides communication with serial devices connected to terminal servers on the Ethernet network. A terminal server is essentially a virtual serial port that converts TCP/IP messages on the Ethernet network to serial data. Once the message has been converted, users can connect standard devices that support serial communications to the terminal server. The terminal server's serial port must be properly configured to match the requirements of the serial device to which it is attached. *For more information, refer to "Using Ethernet Encapsulation" in the server help.*

- **Network Adapter**: Indicate a network adapter to bind for Ethernet devices in this channel. Choose a network adapter to bind to or allow the OS to select the default.
  Specific drivers may display additional Ethernet Encapsulation properties. For more information, refer to ***Channel Properties — Ethernet Encapsulation****.*

Modem Settings

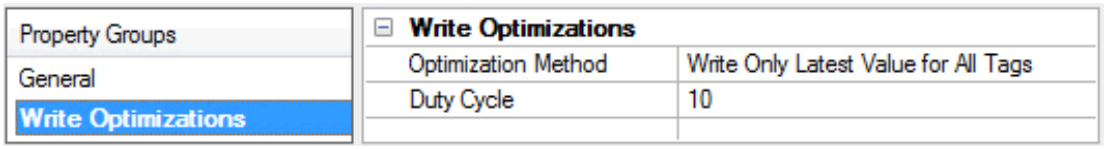
- **Modem**: Specify the installed modem to be used for communications.
- **Connect Timeout**: Specify the amount of time to wait for connections to be established before failing a read or write. The default is 60 seconds.
- **Modem Properties**: Configure the modem hardware. When clicked, it opens vendor-specific modem properties.
- **Auto-Dial**: Enables the automatic dialing of entries in the Phonebook. The default is Disable. *For more information, refer to "Modem Auto-Dial" in the server help.*
- **Report Communication Errors**: Enable or disable reporting of low-level communications errors. When enabled, low-level errors are posted to the Event Log as they occur. When disabled, these same errors are not posted even though normal request failures are. The default is Enable.
- **Close Idle Connection**: Choose to close the modem connection when there are no longer any tags being referenced by a client on the channel. The default is Enable.
- **Idle Time to Close**: Specify the amount of time that the server waits once all tags have been removed before closing the modem connection. The default is 15 seconds.

Operation with no Communications

- **Read Processing**: Select the action to be taken when an explicit device read is requested. Options include Ignore and Fail. Ignore does nothing; Fail provides the client with an update that indicates failure. The default setting is Ignore.

Channel Properties — Write Optimizations

The server must ensure that the data written from the client application gets to the device on time. Given this goal, the server provides optimization properties to meet specific needs or improve application responsiveness.



Write Optimizations

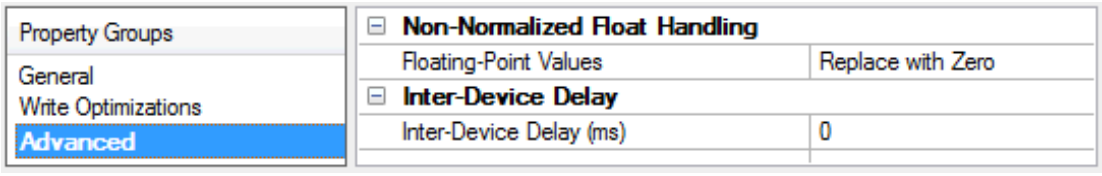
Optimization Method: Controls how write data is passed to the underlying communications driver. The options are:

- **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: 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. Non-normalized float handling allows users to specify how a driver handles non-normalized IEEE-754 floating point data. 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.

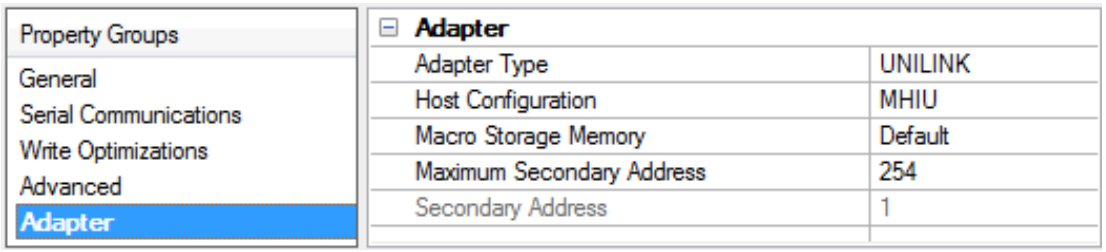
Note: This property is not available if the driver does not support floating-point values or if it only supports the option that is displayed. According to the channel's float normalization setting, only real-time driver tags (such as values and arrays) are subject to float normalization. For example,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

Channel Properties — Adapter



Adapter Type: Specify the type of adapter to use for communications with the TIWAY network. Options include the UNILINK adapter or the TIWAY 1 adapter.
Note: When the TIWAY 1 adapter is selected, all other adapter properties will be disabled because they are not needed.

Host Configuration: Specify the host configuration. Options include MHIU, HIU, MHIU - EHA Mode, or HIU - EHA Mode. It is recommended that MHIU be selected when the adapter is configured for MHIU. Selecting

HIU when the adapter is configured for MHIU will result in faulty data.

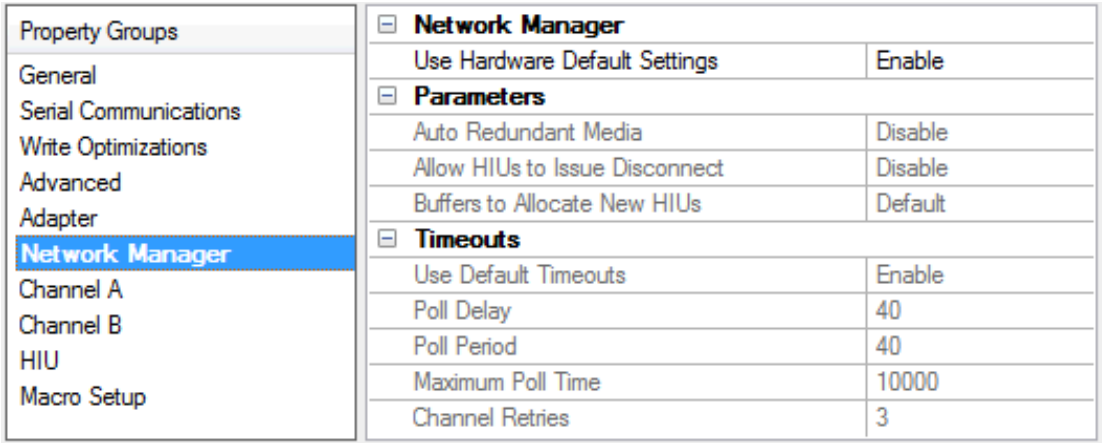
Note: If the adapter is powered-up, reset, or the Configure Adapter command is successfully processed, the driver will issue a Configure HIU (Command 11) along with the properties specified in the HIU property group of Channel Properties. If the default settings are used, the driver will send the command without any parameters. If the EHA mode is the selected adapter, the Configure Adapter command will not be sent.

Macro Storage Memory: Specify the macro storage memory. Options include Default, 16 KB, 24 KB, and Max. Available. The default setting is Default.

Maximum Secondary Address: Specify the maximum secondary address for the TIWAY network that will be controlled by the Host Adapter. The valid range is 1 to 254. The default setting is 254.

Secondary Address: Specify the secondary address for the TIWAY network that will be controlled by the Host Adapter. The default setting is 1.

Channel Properties — Network Manager



Network Manager

Use Hardware Defaults: Select Enable to communicate using the pre-set values established by the manufacturer to reduce configuration effort. Choose Disable to access and alter any of the hardware settings below.

Parameters

Auto Redundant Media: Select Enable to allow the Network Manager function to automatically switch a secondary device to the opposite channel if communications can no longer continue on the current channel.

Allow HIUs to Issue Disconnect: Select Enable to permit the Host Interface Unit (HIU) to send commands to disconnect devices.

Buffers to Allocate New HIUs: Select Default to enable buffers to allocate new Host Interface Units (HIU) as necessary.

Timeouts

Use Default Timeouts: Select Enable to use the timeouts configured by the hardware manufacturer.

Poll Delay: Specify the minimum delay between polls for response.

Poll Period: Specify the minimum delay between receipt of primitive by a secondary for response. This parameter defines the Poll delay or the minimum delay between the receipt of a primitive by a secondary and the first Network Manager poll for the primitive response. The value is in milliseconds and ranges from 0 to 5,000 (0000 hex to 1388 hex) in increments of 10 ms. If a value is specified that is not an increment of 10 ms, it will be rounded down to the next lower increment of 10. The default is 40 ms.

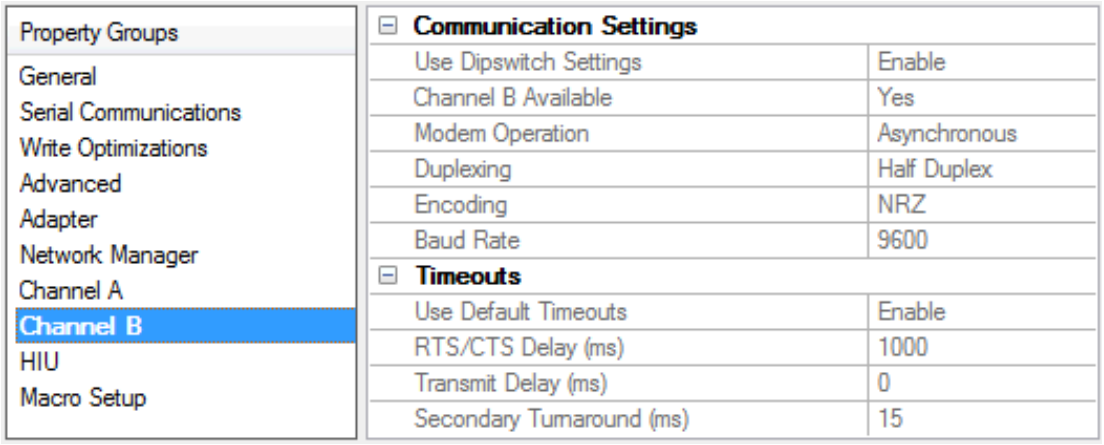
Maximum Poll Time: This parameter defines the maximum poll time or the maximum amount of time the Network Manager will poll for a Primitive response before issuing an error message. The time is measured from the secondary acknowledgement of the received Primitive request. The value is in milliseconds and ranges from 0 to 40,000 (0000 hex to 9C40 hex) in increments of 10 ms. If a value is specified that is not an increment of 10 ms, it will be rounded down to the next lower increment of 10. The default is 10,000 ms.

Channel Retries: The maximum number of attempts that are made to communicate on the channel.

Note: If the adapter powers up, resets, or successfully processes the Configure Adapter command, the driver will issue a Configure Network Manager (Command 30). The Network Manager, Channel A, and Channel B parameters will be sent along with this command. The driver will send the command without any parameters if the default settings were chosen.

Important: Channel B parameters are only available for editing when **Enable Auto Redundant Media** is selected.

Channel Properties — Channel A/B



Communication Settings

Use Dipswitch Settings: Select Enable to use the positions of the hardware dip switches to determine parameters such as default mode, ports, and adapter.

Channel B Available: Select Yes or No based on the hardware configuration in the environment. (Only for Channel A Group)

Modem Operation: Select Synchronous or Asynchronous based on the clocking signals and pins configured on the environment hardware.

Duplexing: Select Duplex or Half Duplex

Encoding: Select Non-Return-to-Zero (NRZ) or Non-Return-to-Zero-Inverted (NRZI) data encoding method.

Baud Rate: Specify the data transfer rate of the communication channel.

Timeouts

Use Default Timeouts: Select Enable to use the timeouts configured by the hardware manufacturer.

RTS/CTS Delay: Specify the wait period, in milliseconds, for the Clear-To-Send or Request-To-Send commands.

Transmit Delay: Specify the wait period, in milliseconds, for the communication transmission.

Secondary Turnaround: Specify the time, in milliseconds, required for a secondary to generate a response to the network manager.

Note: If the adapter powers up, resets, or successfully processes the Configure Adapter command, the driver will issue a Configure Network Manager (Command 30). The Network Manager, Channel A, and Channel B parameters will be sent along with this command. The driver will send the command without any parameters if the default settings were chosen.

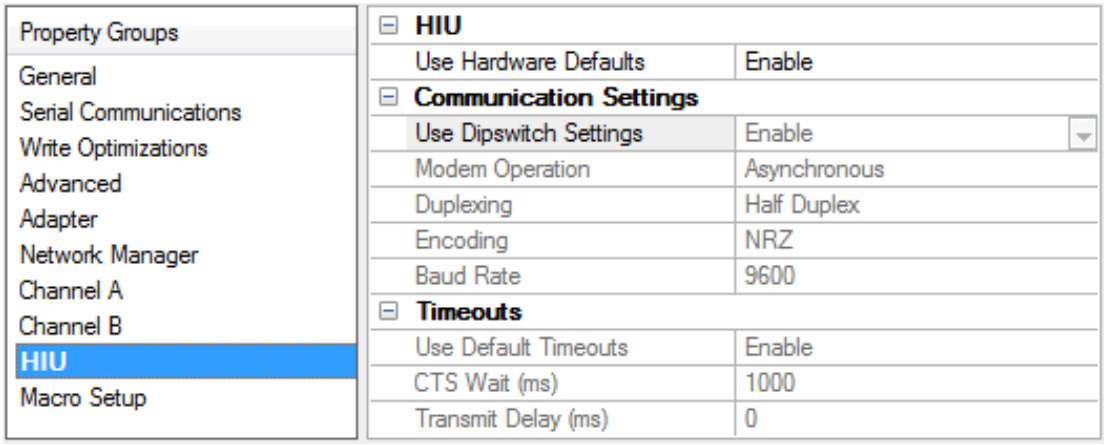
Important: Channel B parameters are only available for editing when **Enable Auto Redundant Media** is selected.

Tested DIP Switch Settings

The following switch settings have been tested and found to work with this driver.

DIP Switch 1	1 up	2-4 down	5-6 up	7 down	8 up	9 down	10 up
DIP Switch 2	1 up	2-4 down	5-6 up	7 down	8 up	9-10 down	N/A.

Channel Properties — HIU (Host Interface Unit)



HIU

Use Hardware Defaults: Select Enable to communicate using the pre-set values established by the manufacturer to reduce configuration effort. Choose Disable to access and alter any of the hardware settings below.

Refer to the Tiway or Unilink Host adapter manuals for details on configurion.

Communication Settings

Use Dipswitch Settings: Select Enable to use the positions of the hardware dip switches to determine parameters such as default mode, ports, and adapter.

Modem Operation: Select Synchronous or Asynchronous based on the clocking signals and pins configured on the environment hardware.

Duplexing: Select Duplex or Half Duplex

Encoding: Select Non-Return-to-Zero (NRZ) or Non-Return-to-Zero-Inverted (NRZI) data encoding method.

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RTS/CTS Delay: Specify the wait period, in milliseconds, for the Clear-To-Send or Request-To-Send commands.

Transmit Delay: Specify the wait period, in milliseconds, for the communication transmission.

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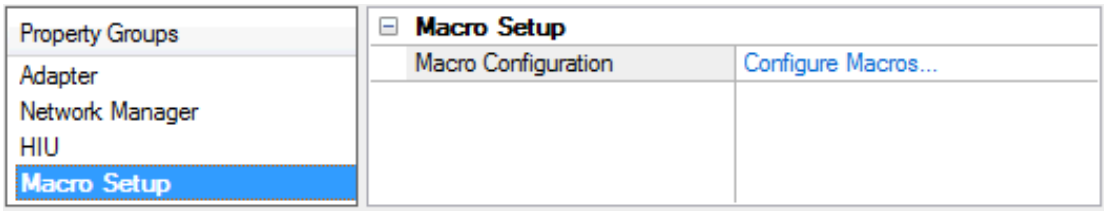
Tested DIP Switch Settings

The following switch settings have been tested and found to work with this driver.

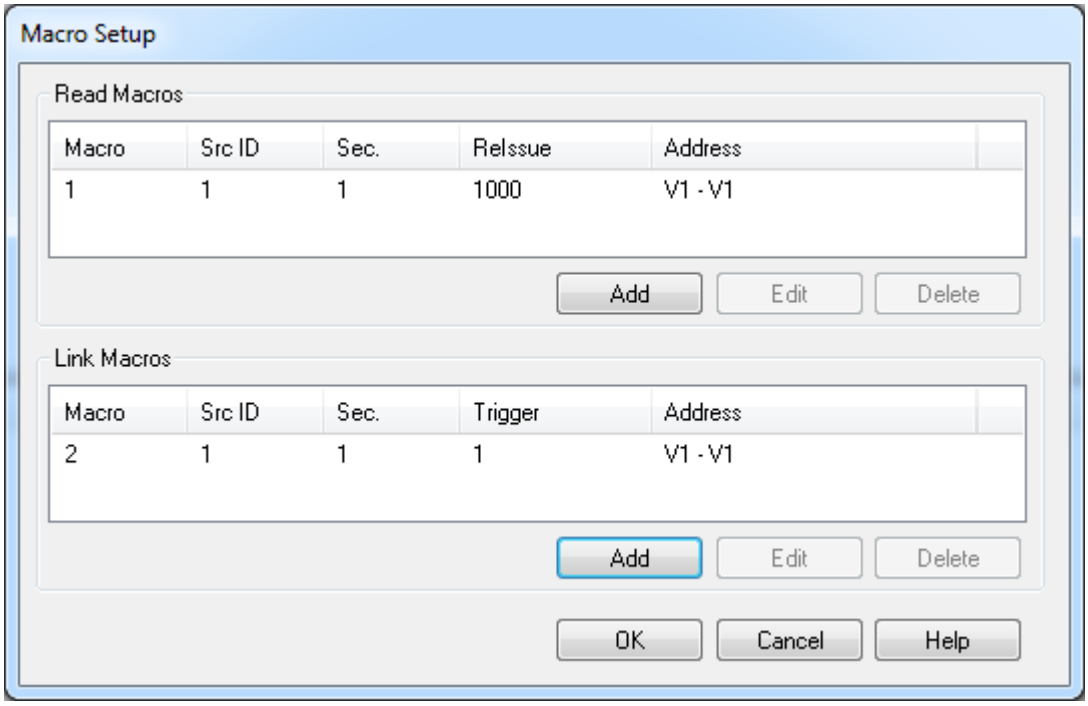
DIP Switch 1	1 up	2-4 down	5-6 up	7 down	8 up	9 down	10 up
DIP Switch 2	1 up	2-4 down	5-6 up	7 down	8 up	9-10 down	N/A

Channel Properties — Macro Setup



Macro Setup

This channel-level property initiates defining Read and Link Macros. It has two purposes: first, to list the macros defined and second, to provide an interface to add, edit, and remove Read and Link Macros. Click on the link to **Configure Macros...** to open the following dialog.

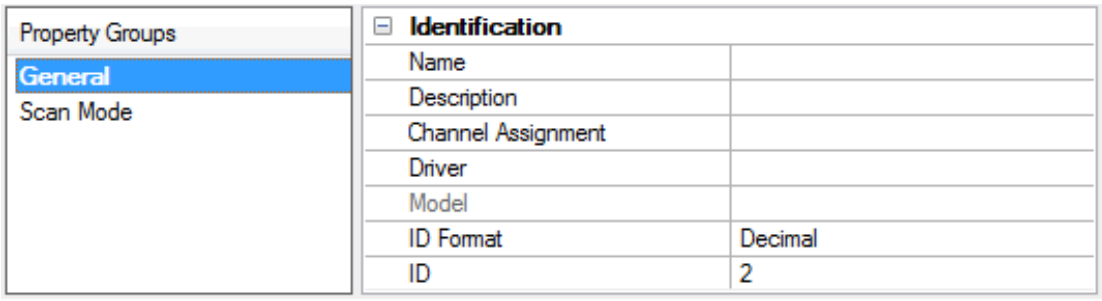


Click **Add** in the **Read Macro** section or **Link Macro** section to define a new macro.

Note: Adding and editing macros utilizes the same dialog used to define or redefine. Removing a macro removes the defined macro from the list and, more importantly, from the driver. All listed macros are downloaded to the device.

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: Specify 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: Specify the user-defined information about this device.
Many of these properties, including Description, have an associated system tag.

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

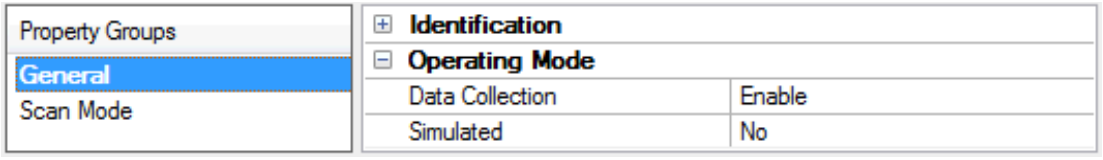
Driver: Selected protocol driver for this device.

Model: Specify the type of device that is associated with this ID. The contents of the drop-down menu depend 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: Specify 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 format is set by the driver by default. Options include 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: Place the device into or out of 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.

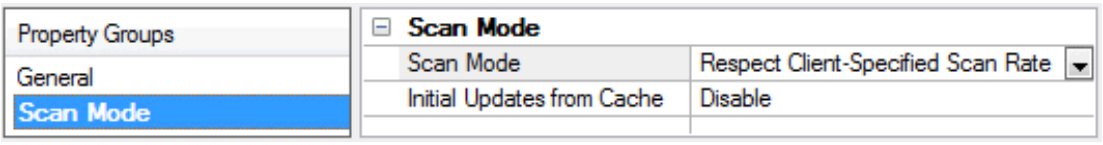
Notes:

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: Specify how tags in the device are scanned for updates sent to subscribing 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 value set as the maximum scan rate. 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

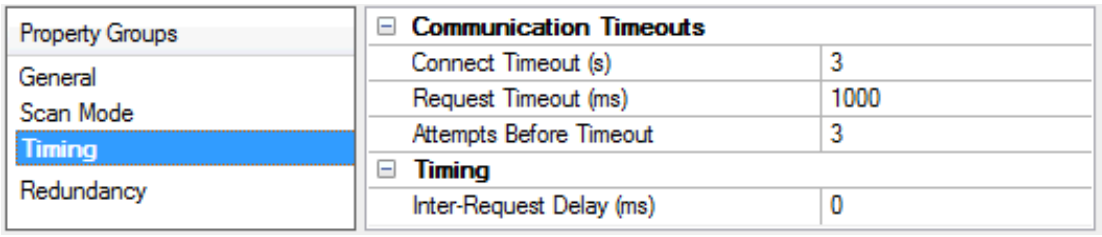
increased, the changes take effect immediately. When the scan rate value is decreased, the changes do not take effect until all client applications have been disconnected.

- **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 OPC 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.



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: Specify 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.

Attempts Before Timeout: Specify how many times the driver issues 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 attempts configured for an application depends largely on the communications environment. This property applies to both connection attempts and request attempts.

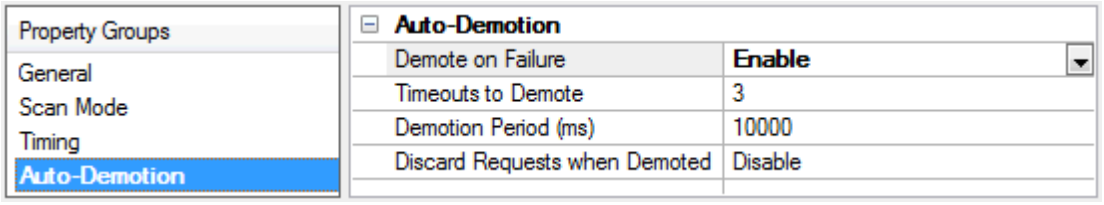
Timing

Inter-Request Delay: Specify 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.



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

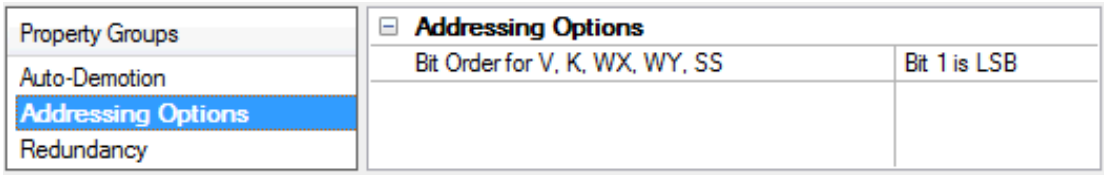
Tip: Determine when a device is off-scan by monitoring its demoted state using the _AutoDemoted system tag.

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 — Addressing Options



Bit Order for V, K, WX, WY, SS: Specify the order in which bits are presented to V, K, WX, WY, and SS memory types when bit accessed. MSB means Most Significant Bit and LSB means Least Significant Bit. The default setting is Bit 1 is LSB.

Note: DWord follows the same bit order logic as Words, but has 32 bits instead of 16.

Bit 1 Is MSB of Word

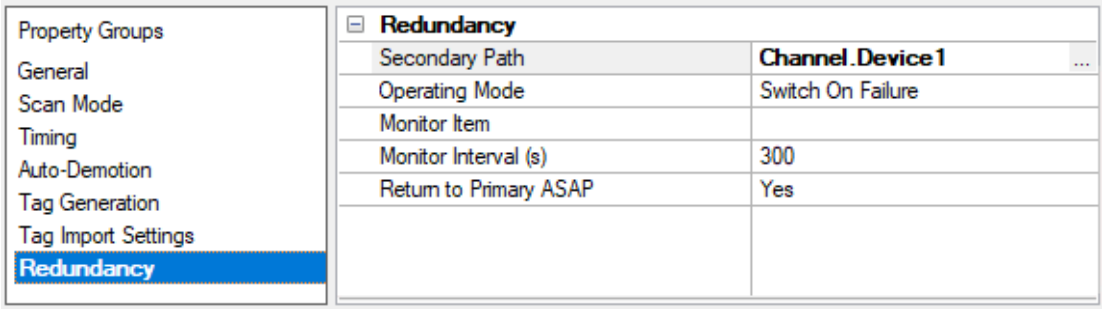
MSB								LSB							
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16

Bit 1 Is LSB of Word

MSB								LSB							
16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1

See Also: Address Descriptions

Device Properties — Redundancy



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

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

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 registers as a floating-point value by making the second register the high word and the first register the low word.

* Long is the same as Double in the TISOFT programming software.
** Float is the same as Real in the TISOFT programming software.

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.

Standard Data Type Addressing
Alarm Addressing
Loop Addressing
UHA Status & Control Addressing
Macro Addressing

Standard Data Type Addressing

The driver supports the following addresses for use with a Series 500 NIM only. The default data type for each address type is shown in **bold**.

For more information on applicable PLCs, refer to device specific documentation.

Address Type	Format	Range	Data Types	Access
Discrete Inputs	X<address>	1-65536	**Boolean**	Read/Write
Discrete Outputs	Y<address>	1-65536	**Boolean**	Read/Write
Word Inputs**	WX<address> WX<address>.<bit>	1-65536 Bit 1-16*	Short, **Word**, Long, DWord, Float **Boolean**	Read/Write Read/Write
Word Outputs**	WY<address> WY<address>.<bit>	1-65536 Bit 1-16*	Short, **Word**, Long, DWord, Float **Boolean**	Read/Write Read/Write
Discrete Control	C<address>	1-65536	**Boolean**	Read/Write
Word Memory**	V<address> V<address>.<bit>	1-65536 Bit 1-16*	Short, **Word**, Long, DWord, Float **Boolean**	Read/Write Read/Write
Constant Memory**	K<address> K<address>.<bit>	1-65536 Bit 1-16*	Short, **Word**, Long, DWord, Float **Boolean**	Read Only Read Only
Secondary System Status**	SS<address> SS<address>.<bit> SS Bit Definitions	1-65536 Bit 1-32*	Long, **DWord**, Float **Boolean**	Read Only Read Only
Timer/Counter Preset	TCP<address>	1-65536	Short, **Word**	Read/Write
Timer/Counter Current	TCC<address>	1-65536	Short, **Word**	Read/Write
Drum Step Preset	DSP<address>	1 -256	**Byte**	Read/Write
Drum Step Current	DSC<address>	1-256	**Byte**	Read/Write
Drum Count Preset	DCP<drum>.<step>	drum 1-256 step 1-16	Short, **Word**	Read/Write

** For more information, refer to Addressing Options.*

* * Addresses of this type may be used as arrays. To specify an array address, append "*[rows][cols]*" to the end of an address. If only *[cols]* is specified, *[rows]* will default to 1. The maximum array size, which is determined by the multiplication of rows and columns, is 64 Words.

Note: The maximum array size for SS and alarm types is specified in DWords; thus, the maximum array size is 32 DWords. Furthermore, the actual number of addresses available for each type depends on the configuration of the PLC. If the driver finds that an address is not present in the device at Runtime, the driver will post an error message and remove the tag from its scan list.

SS Bit Definitions

Secondary System Status Data Element Format - Word #1(LSW)

MSB			LSB
ABCD	EFGH	IJKL	MNOP

Element	SS bit	Description
A	17	*
B	18	*
C	19	*
D	20	*
E	21	*
F	22	*
G	23	*
H	24	*
I	25	*
J	26	*
K	27	*
L	28	*
M	29	*
N	30	*
O	31	*
P	32	*

* Each bit set to 1 indicates that the corresponding bit in Word #2 is a reported status.

Word #2(MSW)

MSB			LSB
ABCD	EFGH	IJKL	MNOP

Status Bit	SS bit	Description
A	1	0 = NIM in REMOTE mode 1 = NIM in LOCAL mode
B	2	0 = P/C System in REMOTE mode 1 = P/C System in LOCAL mode

Status Bit	SS bit	Description
C	3	Undefined
D	4	Undefined
E	5	Undefined
F	6	Undefined
G	7	Undefined
H	8	Undefined
I	9	Undefined
J	10	Undefined
K	11	Undefined
L	12	Undefined
M	13	Undefined
N	14	Undefined
O	15	Undefined
P	16	Undefined

Alarm Addressing

The driver supports the following Analog Alarm addresses for use with a Series 500 NIM only. The default data type for each address type is shown in **bold**.

For more information on applicable PLCs, refer to device specific documentation.

Address Type	Format	Range	Data Types	Access
Alarm Variable Flag	AVF<alarm> AVF<alarm>.<bit> AVF Bit Definitions	1-256 Bit 1-16	Short, Word Boolean	Read Only
Alarm Control Flag	ACF<alarm> ACF<alarm>.<bit> ACF Bit Definitions	1-256 Bit 1-32	Long, **DWord** **Boolean**	Read/Write
Alarm PV High Limit*	APVH<alarm>	1-256	**Float**	Read/Write
Alarm PV Low Limit*	APVL<alarm>	1-256	**Float**	Read/Write
Alarm Process Variable*	APV<alarm>	1-256	**Float**	Read/Write
Alarm High Alarm Limit*	AHA<alarm>	1-256	**Float**	Read/Write
Alarm Low Alarm Limit*	ALA<alarm>	1-256	**Float**	Read/Write
Alarm Orange Dev. Alarm Limit*	AODA<alarm>	1-256	**Float**	Read/Write
Alarm Yellow Dev. Alarm Limit*	AYDA<alarm>	1-256	**Float**	Read/Write
Alarm Sample Rate*	ATS<alarm>	1-256	**Float**	Read/Write
Alarm Setpoint*	ASP<alarm>	1-256	**Float**	Read/Write
Alarm Error*	AERR<alarm>	1-256	**Float**	Read Only
Alarm High-High Alarm Limit*	AHHA<alarm>	1-256	**Float**	Read/Write

Address Type	Format	Range	Data Types	Access
Alarm Low-Low Alarm Limit*	ALLA<alarm>	1-256	**Float**	Read/Write
Alarm Rate of Change Alarm*	ARCA<alarm>	1-256	**Float**	Read/Write
Alarm Setpoint High Limit	ASPH<alarm>	1-256	**Float**	Read/Write
Alarm Setpoint Low Limit	ASPL<alarm>	1-256	**Float**	Read/Write
Alarm Alarm Deadband	AADB<alarm>	1-256	**Float**	Read/Write
Alarm Raw High Alarm Limit	AHAR<alarm>	1-256	Short, **Word**	Read/Write
Alarm Raw Low Alarm Limit	ALAR<alarm>	1-256	Short, **Word**	Read/Write
Alarm Raw Process Variable	APVR<alarm>	1-256	Short, **Word**	Read/Write
Alarm Raw Orange Deviation	AODAR<alarm>	1-256	Short, **Word**	Read/Write
Alarm Raw Yellow Deviation	AYDAR<alarm>	1-256	Short, **Word**	Read/Write
Alarm Raw Setpoint	ASPR<alarm>	1-256	Short, **Word**	Read/Write
Alarm Raw Alarm Deadband	ADBR<alarm>	1-256	Short, **Word**	Read/Write
Alarm Raw Error	AERRR<alarm>	1-256	Short, **Word**	Read Only
Alarm Raw High-High Alarm Limit	AHHAR<alarm>	1-256	Short, **Word**	Read/Write
Alarm Raw Low-Low Alarm Limit	ALLAR<alarm>	1-256	Short, **Word**	Read/Write
Alarm Raw Setpoint Low Limit	ASPLR<alarm>	1-256	Short, **Word**	Read/Write
Alarm Raw Setpoint High Limit	ASPHR<alarm>	1-256	Short, **Word**	Read/Write
Alarm MSW of Alarm C Flags	ACFH<alarm>	1-256	Short, **Word**	Read/Write
Alarm LSW of Alarm C Flags	ACFL<alarm>	1-256	Short, **Word**	Read/Write
Alarm ACK Flag	AACK<alarm>	1-256	Short, **Word**	Read Only

* Addresses of this type may be used as arrays. To specify an array address, append "*[rows][cols]*" to the end of an address. If only *[cols]* is specified, *[rows]* will default to 1. The maximum array size, which is determined by the multiplication of rows and columns, is 64 Words.

Note: The maximum array size for SS and alarm types is specified in DWords; thus, the maximum array size is 32 DWords. Furthermore, the actual number of addresses available for each type depends on the configuration of the PLC. If the driver finds that an address is not present in the device at Runtime, the driver will post an error message and remove the tag from its scan list.

AVF Bit Definitions

Analog Alarm Variable Flag Data Element Format - MSB LSB

MSB		LSB	
ABCD	EFGH	IJKL	MNOP

Element	AVF bit	Description
A	1	Enable alarm
B	2	Disable alarm
C	3	Analog variable in high high alarm
D	4	Analog variable in high alarm
E	5	Analog variable in low alarm

Element	AVF bit	Description
F	6	Analog variable in low low alarm
G	7	Analog variable in yellow deviation alarm
H	8	Analog variable in orange deviation alarm
I	9	Analog variable in rate-of-change alarm
J	10	Analog variable in broken transmitter alarm
K	11	Analog alarm is overrunning
L	12	Not used, set to 0
M	13	Not used, set to 0
N	14	Not used, set to 0
O	15	Not used, set to 0
P	16	Not used, set to 0

ACF Bit Definitions

Analog Alarm Control Flag Data Element Format

MSB							LSB
ABCD	EFGH	IJKL	MNOP	QRST	UVWX	YZab	cdef

Element	ACF bit	Description
A	1	PV scale 20% offset
B	2	Take square root of PV
C	3	Monitor HIGH/LOW alarm
D	4	Monitor HIGH-HIGH/LOW-LOW alarm
E	5	Monitor deviation alarms
F	6	Monitor rate-of-change alarm
G	7	Monitor broken transmitter alarm
H	8	0 = Local setpoint 1 = Remote setpoint
I	9	Unused, set to 0
J	10	Unused, set to 0
K	11	Unused, set to 0
L	12	Unused, set to 0
M	13	Unused, set to 0
N	14	Unused, set to 0
O	15	Unused, set to 0
P	16	Unused, set to 0
Q	17	Unused, set to 0
R	18	Unused, set to 0
S	19	Unused, set to 0
T	20	Unused, set to 0

Element	ACF bit	Description
U	21	Unused, set to 0
V	22	Unused, set to 0
W	23	Unused, set to 0
X	24	Unused, set to 0
Y	25	Special function program number
Z	26	Special function program number
a	27	Special function program number
b	28	Special function program number
c	29	Special function program number
d	30	Special function program number
e	31	Special function program number
f	32	Special function program number

Note: If a bit is set to 1, the corresponding action is enabled. If a bit is set to 0, the corresponding action is disabled.

Loop Addressing

The driver supports the following PID Loop addresses for use with a Series 500 NIM only. The default data type for each address type is shown in **bold**.

For more information on applicable PLCs, consult device specific documentation.

Address Type	Format	Range	Data Types	Access
Loop Gain*	LKC<loop>	1-256	**Float**	Read/Write
Loop Reset*	LTI<loop>	1-256	**Float**	Read/Write
Loop Rate*	LTD<loop>	1-256	**Float**	Read/Write
Loop High Alarm Limit*	LHA<loop>	1-256	**Float**	Read/Write
Loop Low Alarm Limit*	LLA<loop>	1-256	**Float**	Read/Write
Loop Process Variable*	LPV<loop>	1-256	**Float**	Read/Write
Loop PV High Limit*	LPVH<loop>	1-256	**Float**	Read/Write
Loop PV Low Limit*	LPVL<loop>	1-256	**Float**	Read/Write
Loop Orange Dev. Alarm Limit*	LODA<loop>	1-256	**Float**	Read/Write
Loop Yellow Dev. Alarm Limit*	LYDA<loop>	1-256	**Float**	Read/Write
Loop Sample Rate*	LTS<loop>	1-256	**Float**	Read/Write
Loop Setpoint*	LSP<loop>	1-256	**Float**	Read/Write
Loop Output*	LMN<loop>	1-256	**Float**	Read/Write
Loop Status (V) Flags	Reference the Loop VFlag address in V-Memory as specified in the Loop.	1-256 Bit 1-32	Long, **DWord**	Read/Write

Address Type	Format	Range	Data Types	Access
	Loop V-Flag Bit Definitions		**Boolean**	
Loop Control (C) Flags*	LCF<loop> LCF<loop>.<bit> LCF Bit Definitions	1-256 Bit 1-32	Long, **DWord** **Boolean**	Read/Write
Loop Ramp/Soak Status Flags*	LRSF<loop> LRSF<loop>.<bit> LRSF Bit Definitions	1-256 Bit 1-16	Short, **Word** **Boolean**	Read Only
Loop Error*	LERR<loop>	1-256	**Float**	Read Only
Loop Bias*	LMX<loop>	1-256	**Float**	Read/Write
Loop High-High Alarm Limit*	LHHA<loop>	1-256	**Float**	Read/Write
Loop Low-Low Alarm Limit*	LLLA<loop>	1-256	**Float**	Read/Write
Loop Rate of Change Alarm*	LRCA<loop>	1-256	**Float**	Read/Write
Loop Setpoint High Limit	LSPH<loop>	1-256	**Float**	Read/Write
Loop Setpoint Low Limit	LSPL<loop>	1-256	**Float**	Read/Write
Loop Alarm Deadband	LADB<loop>	1-256	**Float**	Read/Write
Loop Raw High Alarm Limit	LHAR<loop>	1-256	Short, **Word**	Read/Write
Loop Raw Low Alarm Limit	LLAR<loop>	1-256	Short, **Word**	Read/Write
Loop Raw Process Variable	LPVR<loop>	1-256	Short, **Word**	Read/Write
Loop Raw Orange Deviation	LODAR<loop>	1-256	Short, **Word**	Read/Write
Loop Raw Yellow Deviation	LYDAR<loop>	1-256	Short, **Word**	Read/Write
Loop Raw Output	LMNR<loop>	1-256	Short, **Word**	Read/Write
Loop Raw Setpoint	LSPR<loop>	1-256	Short, **Word**	Read/Write
Loop Raw Error	LERRR<loop>	1-256	Short, **Word**	Read Only
Loop Raw High-High Alarm Limit	LHHAR<loop>	1-256	Short, **Word**	Read/Write
Loop Raw Low-Low Alarm Limit	LLLAR<loop>	1-256	Short, **Word**	Read/Write
Loop Raw Alarm Deadband	LADBR<loop>	1-256	Short, **Word**	Read/Write
Loop Raw Bias	LMXR<loop>	1-256	Short,	Read/Write

Address Type	Format	Range	Data Types	Access
			Word	
Loop Raw Setpoint Low Limit	LSPLR<loop>	1-256	Short, **Word**	Read/Write
Loop Raw Setpoint High Limit	LSPHR<loop>	1-256	Short, **Word**	Read/Write
Loop MSW of Loop C Flags	LCFH<loop>	1-256	Short, **Word**	Read/Write
Loop LSW of Loop C Flags	LCFL<loop>	1-256	Short, **Word**	Read/Write
Loop Derivative Gain Limit Coef.	LKD<loop>	1-256	Short, **Word**	Read/Write
Loop Ramp/Soak Step Number	LRSN<loop>	1-256	Short, **Word**	Read/Write
Loop Alarm Ack Flags	LACK<loop>	1-256	Short, **Word**	Read Only

* Addresses of this type may be used as arrays. To specify an array address, append "*[rows][cols]*" to the end of an address. If only *[cols]* is specified, *[rows]* will default to 1. The maximum array size, which is determined by the multiplication of rows and columns, is 64 Words.

Note: The maximum array size for SS and alarm types is specified in DWords; thus, the maximum array size is 32 DWords. Furthermore, the actual number of addresses available for each type depends on the configuration of the PLC. If the driver finds that an address is not present in the device at Runtime, the driver will post an error message and remove the tag from its scan list.

Loop V-Flag Bit Definitions

Loop Variable Flag Data Element Format - MSB LSB

MSB			LSB
ABCD	EFGH	IJKL	MNOP

Element	Loop V-Flag Bit	Description
A	1	Loop Mode: If set to 1, the loop is in auto mode. If set to 0, the loop is in manual mode.
B	2	Loop Cascade: If set to 1, the loop is in closed cascade. If set to 0, the loop is in open cascade.
C	3	Error Deviation: If set to 1, the loop is in positive error deviation. If set to 0, the loop is in negative error deviation.
D	4	PV High High Alarm: If set to 1, the process variable is in high high alarm. If set to 0, the process variable is not in high high alarm.
E	5	PV High Alarm: If set to 1, the process variable is in high alarm. If set to 0, the process variable is not in

Element	Loop V-Flag Bit	Description
		high alarm.
F	6	PV Low Alarm: If set to 1, the process variable is in low alarm. If set to 0, the process variable is not in low alarm.
G	7	PV Low Low Alarm: If set to 1, the process variable is in low low alarm. If set to 0, the process variable is not in low low alarm.
H	8	Yellow Band: If set to 1, the loop deviation is in the yellow band. If set to 0, the loop deviation is not in the yellow band.
I	9	Orange Band: If set to 1, the loop deviation is in the orange band. If set to 0, the loop deviation is not in the orange band.
J	10	PV Rate of Change Alarm: If set to 1, the loop PV is in rate of change alarm. If set to 0, the loop PV rate of change is not in alarm (for 560/565 P/Cs).
K	11	PV Broken Transmitter Alarm: If set to 1, the loop PV has a broken transmitter. If set to 0, the loop PV does not have a broken transmitter (for 560/565 P/Cs).
L	12	Loop Overrun: If set to 1, the loop is overrunning its time allocation. If set to 0, the loop is not over-running its time allocation (for 560/565 P/Cs).
M	13	Spare: Set to 0.
N	14	Spare: Set to 0.
O	15	Spare: Set to 0.
P	16	Spare: Set to 0.

LCF Bit Definitions

Loop Control Flag Data Element Format

MSB							LSB
ABCD	EFGH	IJKL	MNOP	QRST	UVWX	YZab	cdef

Element	LCF Bit	Description
A	1	PV scale 20% offset
B	2	Take square root of PV
C	3	Monitor HIGH/LOW alarm
D	4	Monitor HIGH-HIGH/LOW-LOW alarm
E	5	Monitor deviation alarms
F	6	Monitor rate-of-change alarm
G	7	Monitor broken transmitter alarm
H	8	Use PID position algorithm

Element	LCF Bit	Description
I	9	Use PID velocity algorithm
J	10	Direct acting
K	11	Rever acting
L	12	Error squared control
M	13	Error deadband control
N	14	Lock auto/manual mode
O	15	Lock cascade mode
P	16	Lock setpoint
Q	17	Unknown
R	18	Execute Special Function program on the PV
S	19	Execute Special Function program on the setpoint
T	20	Freeze error sum on output out-of-range
U	21	Ramp/soak on the setpoint
V	22	Output is bipolar
W	23	Process variable is bipolar
X	24	Enable derivative gain limiting
Y	25	Number of the SF program that will be executed
Z	26	Number of the SF program that will be executed
a	27	Number of the SF program that will be executed
b	28	Number of the SF program that will be executed
c	29	Number of the SF program that will be executed
d	30	Number of the SF program that will be executed
e	31	Number of the SF program that will be executed
f	32	Number of the SF program that will be executed

Note: If the bit is set to 1, the option is enabled. If the bit is set to 0, the option is disabled.

LRSF Bit Definitions

Ramp/Soak Status Data Element Format MSB-LSB

MSB			LSB
ABCD	EFGH	IJKL	MNOP

Element	LRSF Bit	Description
A	1	All programmed steps finished (1=yes)
B	2	Soak timer in wait state with PV out of range (1=yes)
C	3	Unused, set to 0
D	4	Unused, set to 0
E	5	Unused, set to 0
F	6	Unused, set to 0

Element	LRSF Bit	Description
G	7	Unused, set to 0
H	8	Unused, set to 0
I	9	Ramp/soak step number currently executing
J	10	Ramp/soak step number currently executing
K	11	Ramp/soak step number currently executing
L	12	Ramp/soak step number currently executing
M	13	Ramp/soak step number currently executing
N	14	Ramp/soak step number currently executing
O	15	Ramp/soak step number currently executing
P	16	Ramp/soak step number currently executing

UHA Status & Control Addressing

The driver supports the following UHA status and control addresses. The default data type for each address type is shown in **bold**.

Address Description	Format	Range	Data Types	Access
Error communicating with adapter?	_AdapterError	N/A	Boolean	Read Only
Secondary connected to network?	_SecondaryLog<sec. id>	1-254	Boolean	Read Only
Software Reset of UHA.	_SoftReset	N/A	Boolean	Write Only
HardwareReset of UHA.	_HardReset	N/A	Boolean	Write Only

Notes:

1. _AdapterError notifies users when there is a loss of communication between the OPC Server and the UHA.
2. _Error for each device (secondary) notifies users when there is a loss of communication between the UHA and the secondary in question.

Macro Addressing

Macro Data Addressing (Applicable to Standard & Trigger Macros Only)

Macros are independent network requests stored and scheduled by the HIU function. The TIWAY Host Adapter Driver not only allows for macro creation and download, but also provides direct access to macro memory for reading. It is important to reiterate that macro memory is Read Only. Linked macros are inherently Read/Write (store and forward) but the act of writing is done transparently without user intervention. In fact, the memory of the Action Macro (write portion) is neither readable nor writable from an OPC tag standpoint and so cannot be addressed.

See Also: UNILink Macros

1. To start, define the macro. For more information, refer to Defining Macros.
2. Next, create an OPC tag that references the macros statically or dynamically. The syntax is #<*Macro number*><*memory type*><*address*>, where:

- #: This item signifies that the following tag is a macro tag.
- **<Macro number>**: This item is the user-defined macro number as entered during macro creation.
- **<Memory type>**: This item is the memory type of the given macro, which must match the memory type entered during macro creation.
- **<Address>**: This item is the address of interest, which must fall in the address range entered during macro creation.

Macro Data Addressing Examples

Example One: Defined Macro

Macro Number	Source ID	Secondary ID	Address
3	2	15	V200-V200

Macro Reference

Address	Valid?	Explanation
#2V200	False	Incorrect macro number
#3V200	True	N/A
#3V201	False	Address out of range

Example Two: Defined Macro

Macro Number	Source ID	Secondary ID	Address
18	1	2	X17-X32

Macro Reference

Address	Valid?	Explanation
#1X20	False	Incorrect macro number
#18X20	True	N/A
#18V20	False	Incorrect address type

Macro Status & Control Addressing

The driver supports the following macro addresses.

Format	Address Description	Range	Data Types	Access
_InitializingMacros	True while driver is creating/setting up macros in the UHA.	N/A	Boolean	Read Only
_MacroMemAvail	Memory available for macros.	N/A	Long, DWord	Read Only
_MacroBuffAvail	Number of macro buffers available.	N/A	Short, Word	Read Only
_SourceIDAvail	Number of Source IDs available.	N/A	Short, Word	Read Only
_SourceIDActive<Source ID>	Source ID active?	1-254	Boolean	Read

Format	Address Description	Range	Data Types	Access
				Only
_Enable#<macro num>	Enable/disable given macro.	1-254	Boolean	Write Only
_EnableStatus#<macro num>	Response code from last macro enable/disable of given macro.*	1- 254	Short, Word	Read Only
_BufferNum#<macro num>	Buffer number for given macro.	1-254	Short, Word	Read Only
_MRSW#<macro num>	Last MRSW for given macro.**	1-254	Short, Word	Read Only

* *For more information, refer to* ***Macro Enable/Disable Status****.*
** *For more information, refer to* ***Macro Response Status Word (MRSW)****.*

UNILink Macros

Macros are TIWAY network requests that are stored and scheduled for independent processing by the HIU. Because macros are Read requests (except for Link Macros, which also involve a write request), they are ideal for performing non real-time monitoring of network data. By moving non-critical monitoring to macros, the HIU resources are free to perform time-critical monitoring and control.

Requirements

1. Selection of the UNILINK model.
2. Selection of the MHIU or HIU configuration mode.

Note: Macros are not supported in the Emulate Host Adapter mode.

In the TIWAY Host Adapter Driver, macros are defined via the Graphical User Interface (GUI) in the OPC server. Tags can then be created that reference data obtained from these defined macros. If such tags are referenced from a client, the driver will download the macros defined in the GUI. Only those macros that are enabled will present valid data to these tags. Macro definitions can be edited or removed while the client is referencing it with the understanding that tags referencing such macros can break. In this case, the macro reference tag is requesting a piece of data that the macro is no longer retrieving. Caution should be taken when editing macros so that macro-referencing tags do not fall outside the macro range (data block).

Macro Logistics

- A macro and its data are stored in a macro buffer. A macro number identifies each macro buffer.
- The number of bytes required (memory usage) for a macro buffer primarily depends on the number of elements requested to be read as defined in the macro. The UNILINK Host Adapter User Manual explains how to calculate such usage but is not necessary since this usage can be monitored through **Macro Status & Control Addressing** tags in the server.
- The maximum amount of memory to set aside for all macro buffers defined is set in the Adapter property group in Channel Properties. Typical values are 16 KB and 24 KB. This is not the amount of memory available for each macro but the amount available for all macros combined.

- A maximum of 254 macro buffers can be allocated. Thus, 254 macros can be defined.
- For macros to be executed, they must be assigned to a task (which is commonly called a source).
- A source is a collection of macros executed under the same time slice, independent of other UHA resources. For example, if there are 10 macros defined in a source in a round robin manner, each macro will be allocated 1/10 of a second for every second elapsed. Each source is identified by a Source ID.
- A maximum of 32 sources can be defined. Since each source is its own independent task, this implies there can be 32 sources operating simultaneously.

Macro Performance vs. Memory

There are a few rules that can be implemented to maximize macro performance. In general, performance is achieved through a sacrifice in memory resources and vice versa. They are as follows:

- Each macro should request as much data as necessary, which increases the macro buffer size needed and utilizes available memory resources (macro memory set aside).
- Macros should be spread evenly across as many sources as possible. Since the time slice is shared within each source, it's best to have few macros per source. For instance, if there are a total 32 macros to be defined, assign one macro to a source. This utilizes all sources available, but each macro will have maximum performance.

Read Macros

Read Macros have two purposes: to read a block of data and to make it available for access. Throughout this help file, this will be called a standard Read Macro. Macros are the "store" in "store and forward" for macro linking. In linking, the Read Macro gathers the data that the link will take and forward or write to another memory location. This is called a Trigger Macro. With this in mind, a Read Macro can be defined for two reasons or one, depending on the application.

For more information on linking, refer to ***Link Macros****.*

There are three essential steps for using Read Macros: defining, downloading, and referencing.

Defining the Macro

Read Macros are defined via a Graphical User Interface. *For more information, refer to* ***Defining Macros****.*

Downloading the Macro

Read Macros are automatically downloaded. Any time a Read Macro definition is added, edited, or removed, the driver will automatically reinitialize the macro. For more information, refer to the UNILINK Host Adapter User Manual.

1. To start, allocate the Source IDs. Each Source ID referenced in the macro definitions will be allocated in the UHA. All others will be de-allocated.
2. Next, allocate macro Storage Buffers. For each Read Macro, a buffer will be allocated and assigned a buffer number in the UHA under the Source ID specified for that macro. The size of the buffer depends on the request protocol packet size and the response protocol packet size, since both are stored in the macro buffer.
3. Then, define the macros. For each Read Macro, the read request protocol packet will be assigned to the macro buffer that was previously assigned under the Source ID specified for that macro.

Referencing the Macro

Referencing a macro means accessing the data gathered by the macro. This is accomplished by requesting the macro response data given the macro buffer number assigned and Source ID specified for that macro. The driver automatically performs this action when a client tag is referencing a macro. Macro response data

is essentially a block of data, which may contain one or many elements. The key to referencing this block from a client/server tag standpoint is to first specify the macro of interest and then the specific address within the block. For example, if a macro with macro number 4 were defined to gather V1 to V10, then the macro data block would be a 10-word block. If V7 were of interest, request for V7 in macro 4. The addressing for such a request is #4V7. *For more information, refer to* ***Macro Addressing***.

Link Macros

A Link Macro forwards or writes data originating from a Trigger Macro to a location on the same or different secondary on the network. Throughout this help file, the term Link Macro refers to the Trigger and Action Macro pair.

There are three essential steps for using Link Macros: defining, downloading, and referencing.

Defining the Macro

Link Macros are defined via a Graphical User Interface. *For more information, refer to* ***Defining Macros***.

Downloading the Macro

Link Macros are automatically downloaded, and will be reinitialized anytime a Link Macro definition is added, edited, or removed.

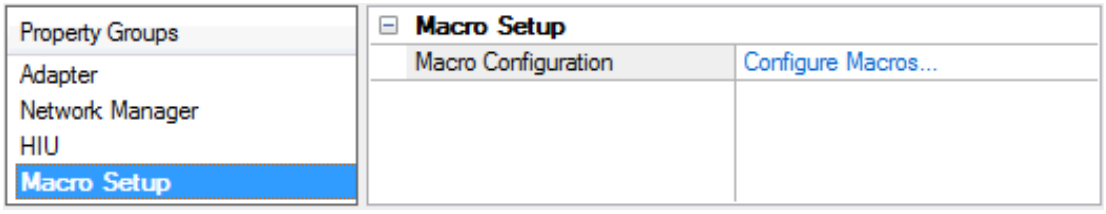
For more information, refer to the ***Unilink Host Adapter*** *user manual.*

1. To start, allocate the Source IDs. Each Source ID referenced in the macro definitions will be allocated in the UHA. All others will be de-allocated.
2. Next, allocate macro Storage Buffers. For each Action Macro, a buffer will be allocated and assigned a buffer number in the UHA under the Source ID specified for that macro. The size of the buffer depends on the request protocol packet size and the response protocol packet size, since both are stored in the macro buffer.
3. Then, define the macros. For each Action Macro, the write request protocol packet will be assigned to the macro buffer previously assigned under the Source ID specified for that macro.
4. Next, link macros. Each Action Macro will be linked to the Trigger Macro defined in the Link Macro.

Referencing the Macro

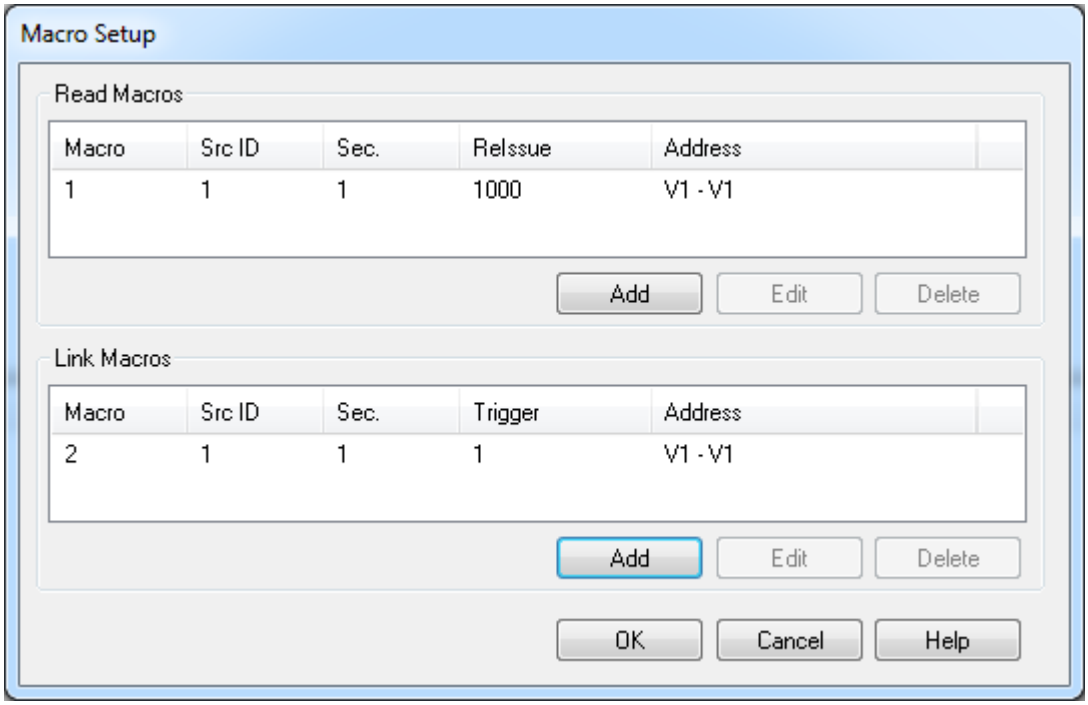
Trigger Macros can be referenced as described in the Read Macros section above. Action Macros cannot be referenced. As previously mentioned, both the Trigger and Action Macro must be initially disabled. Thus, when beginning to use macros, the Trigger Macro must be manually enabled using the *_Enable#<Trigger Macro num>* address.

Channel Properties — Macro Setup



Macro Setup

This channel-level property initiates defining Read and Link Macros. It has two purposes: first, to list the macros defined and second, to provide an interface to add, edit, and remove Read and Link Macros. Click on the link to **Configure Macros...** to open the following dialog.

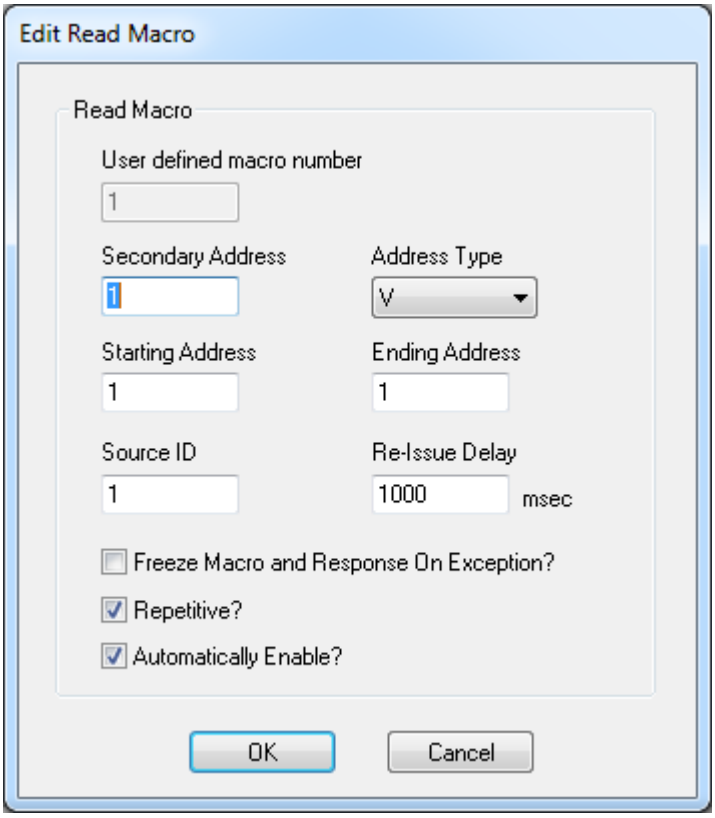


Click **Add** in the **Read Macro** section or **Link Macro** section to define a new macro.

Note: Adding and editing macros utilizes the same dialog used to define or redefine. Removing a macro removes the defined macro from the list and, more importantly, from the driver. All listed macros are downloaded to the device.

Defining Read Macros

Read Macros are defined and redefined through the common interface shown below.



Each of the variables shown above are described in more detail in the table below.

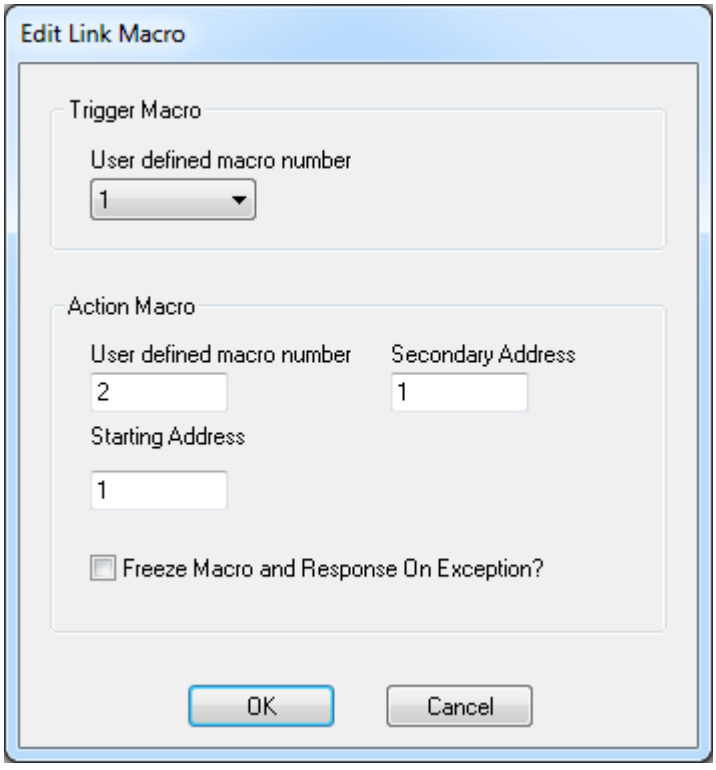
Each variable retains its definition and rules regardless of whether the macro is new or being edited.

Variable	Description/Rules	Default
User Defined Macro Number	Driver-specific number for identifying a macro, which is used in referencing macro data via OPC tag address. This number must be unique among both Read and Link Macros.	1
Secondary Address	Secondary device (i.e. PLC) address for which the given macro applies to.	1
Address Type	The data element type to be read in the macro.	V-Memory
Starting Address	The first data element to be read in the macro	1
Ending Address	The last data element to be read in the macro. The difference between the starting and ending addresses define the data block that is the macro.	1
Source ID	The desired Source ID to store and execute this macro from.	1
Re-Issue Delay	The "minimum reissue" delay time in milliseconds. This specifies the time to wait before reissuing the macro command and only applies to repetitive macros.	1000ms
Freeze	An exception occurs when the data retrieved from the secondary differs from	False

Variable	Description/Rules	Default
Macro and Response On Exception?	the data stored in the macro buffer. If desired, the macro can be configured to disable when such an exception occurs. This is termed freezing and can be accomplished by selecting the checkbox. This feature only applies to repetitive macros.	
Repetitive?	When this checkbox is selected, the macro will be repetitive. The HIU will automatically reissue the macro as long as the macro is enabled. Again, if a new response differs from a previous response, the exception flag is set. When this checkbox is not selected, the macro will be non-repetitive. When enabled, the macro will be issued, its exception flag set, and automatically be disabled. Re-enabling the macro will cause a reissue of the macro.	True
Automatically Enabled?	When this checkbox is selected, the macro will automatically be enabled once downloaded. The MRSW will be reset to 0 and increment on every issue. When this checkbox is non-selected, the macro will not be automatically enabled. The MRSW will be set to 0x8001 and will require manual enabling for use. This is required case for Trigger Macros in a link.	True

Defining Link Macros

Link Macros are defined and redefined through the common interface shown below. They are comprised of two parts: the Trigger Macro and the Action Macro. The Trigger Macro specifies what will be linked to, whereas the Action Macro specifies what to do with the data received from the trigger.



Descriptions of the properties are as follows:

- **User-Defined Macro Number (Trigger)**: Read Macro that will act as the Trigger Macro, or "store" portion of the "store and forward" process of the link.

- **User Defined Macro Number (Action)**: Driver-specific number for identifying a macro. This number must be unique among both Link and Read Macros.
- **Secondary Address**: Secondary device (PLC) address to which the Action Macro will "forward" link data.
- **Starting Address**: The first data element to be written to on the "forward" portion of the link.
- **Freeze Macro and Response On Exception**: An exception occurs when the data retrieved from the secondary differs from the data stored in the macro buffer. If desired, the macro can be configured to disable when such an exception occurs. This is termed freezing and can be accomplished by selecting the checkbox. This feature only applies to repetitive macros.

Each variable retains its definition and rules regardless of whether the macro is new or being edited.

Non-Configurable Properties

Variable	Description/Rules
Address Type	The data element type of the address on the "forward" portion of the link must be the same address type on the "store" portion, defined by the Trigger Macro.
Ending Address	Given the block size defined in the Trigger Macro, the ending address is calculated based on the starting address defined for the Action Macro.
Source ID	Same as Source ID for Trigger Macro.
Re-Issue Delay	The Trigger Macro drives the "store and forward" process; thus, the re-issue delay has no meaning for the Action Macro.
Repetitive?	The Action Macro must be non-repetitive.
Automatically Enabled?	The Trigger Macro (as well as the Action Macro) must be initially disabled.

Macro Enable/Disable Status

Response Code	Description
0	Macro successfully enabled/disabled.
1	Macro buffer number requested has not been allocated.
2	Macro buffer number specified has a different Source ID than the one specified.
3	Macro buffer specified is the Action Macro in a Link Macro pair that cannot be explicitly enabled or disabled.
4	Incorrect command issued.
5	The macro has not been downloaded yet.
6	Macro buffer specified is the Trigger Macro in a Link Macro pair that cannot be explicitly enabled at this time because the Action Macro response has not returned.
7	The specified macro buffer cannot be enabled because the secondary device associated with it is offline.

Macro Response Status Word (MRSW)

The MRSW indicates the status of the macro response as well as the number of times the macro has been updated. Each defined macro has its own MRSW. The table below shows some possible values.

MRSW Values (hex)	Description
0000	This macro has not been executed since the last time it was enabled.
0001 to 7FFF	The number of times a repetitive macro response has been updated.
8000 to FFFF	Termination Code: The macro is disabled due to either an error, an exception, or an explicit disable.

*Termination Codes are listed in detail under **MRSW Termination Codes**.*

Error Descriptions

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

Address Validation

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

Serial Communications

Communications error on <channel name> [<error mask>]
COMn does not exist
COMn is in use by another application
Error opening COMn
Unable to set comm properties on COMn

Device Status Messages

Device <device name> is not responding

Device Specific Messages

Adapter reporting command timeout - Error 0x001. Reconfiguring adapter
Adapter reporting HIU not initialized - Error 0x100B. Reconfiguring adapter
Adapter reporting unrecognized command - Error 0x0084. Reconfiguring adapter
Host adapter not responding
Secondary device <device name> no longer connected to network. Reconnecting secondary

Read Errors

Unable to read block starting at <address> on device <device name>: Adapter Error <code>
Unable to read block starting at <address> on device <device name>: Adapter Error <code>. Block deactivated
Unable to read block starting at <address> on device <device name>: Framing Error
Unable to read block starting at <address> on device <device name>: Secondary Error: <code>
Unable to read block starting at <address> on device <device name>: Secondary Error: <code>. Block deactivated
Unable to read tag <address> on device <device name>: Task Error: <code>
Unable to read tag <address> on device <device name>: Task Error: <code>. Tag deactivated

Write Errors

Unable to write to <address> on device <device name>
Unable to write tag <address> on device <device name>: Adapter Error <code>
Unable to write tag <address> on device <device name>: Framing Error
Unable to write tag <address> on device <device name>: Secondary Error: <code>
Unable to write tag <address> on device <device name>: Task Error: <code>

Macro Specific Messages

Adapter reporting macro link error - Error 0x2020. Trigger Macro cannot be configured for auto-enable
Macro tag address <address> is invalid given new macro definition. Tag deactivated
The macro referenced in tag address <address> is no longer available. Tag deactivated
Unable to Read Macro with Source ID <ID>, macro #<num> on <device name>: Adapter Error <code>
Unable to Read Macro with Source ID <ID>, macro #<num> on <device name>: Adapter Error <code>. Block deactivated
Unable to Read Macro with Source ID <ID>, macro #<num> on <device name>: Framing Error
Unable to Read Macro with Source ID <ID>, macro #<num> on <device name>: MRSW Error <code>
Unable to Read Macro with Source ID <ID>, macro #<num> on <device name>: MRSW Error <code>. Block deactivated
Unable to Read Macro with Source ID <ID>, macro #<num> on <device name>: Secondary Error <code>
Unable to Read Macro with Source ID <ID>, macro #<num> on <device name>: Secondary Error <code>. Block deactivated
Unable to Read Macro with Source ID <ID>, macro #<num> on <device name>: Task Error <code>
Unable to Read Macro with Source ID <ID>, macro #<num> on <device name>: Task Error <code>. Tag deactivated

XML Error Messages

XML Loading Error: An existing link macro already has this macro number: <num>. Link macro not loaded
XML Loading Error: An existing read macro already has this macro number: <num>. Link macro not loaded
XML Loading Error: An existing read macro already has this macro number: <num>. Read macro not loaded
XML Loading Error: Invalid value found. Link macro not loaded
XML Loading Error: Invalid value found. Read macro not loaded
XML Loading Error: Link macro linked to missing read macro <num>. Link macro not loaded
XML Loading Error: Read macro(s) missing from file. Link macro(s) not loaded

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

Error Type:
Warning

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

Solution:
Verify the address is correct; if it is not, re-enter it 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 statically 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 statically 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.

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

Error Type:
Warning

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

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

Device address <address> contains a syntax error

Error Type:

Warning

Possible Cause:
A tag address that has been specified statically contains one or more invalid characters.

Solution:
Re-enter the address in the client application.

Device address <address> is read only

Error Type:
Warning

Possible Cause:
A tag address that has been specified statically 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.

Missing address

Error Type:
Warning

Possible Cause:
A tag address that has been specified statically has no length.

Solution:
Re-enter the address in the client application.

Communications error on <channel name> [<error mask>]

Error Type:
Serious

Error Mask Definitions:
B = Hardware break detected.
F = Framing error.
E = I/O error.
O = Character buffer overrun.
R = RX buffer overrun.
P = Received byte parity error.
T = TX buffer full.

Possible Cause:

1. The serial connection between the host adapter and the Host PC is bad.
2. The communications properties for the serial connection are incorrect.

Solution:

1. Verify the cabling between the PC and the host adapter.
2. Verify that the specified communications properties match those of the host adapter.

COMn does not exist

Error Type:
Fatal

Possible Cause:
The specified COM port is not present on the target computer.

Solution:
Verify that the proper COM port has been selected.

COMn is in use by another application

Error Type:
Fatal

Possible Cause:
The serial port assigned to a channel is being used by another application.

Solution:

1. Verify that the correct port has been assigned to the channel.
2. Shut down any other applications that are using the COM port assigned to this channel.

Error opening COMn

Error Type:
Fatal

Possible Cause:
The specified COM port could not be opened due an internal hardware or software problem on the target computer.

Solution:
Verify that the COM port is functional and may be accessed by other Windows applications.

Unable to set comm properties on COMn

Error Type:
Fatal

Possible Cause:
The serial properties for the specified COM port are not valid.

Solution:

Verify the serial properties and make any necessary changes.

Device <device name> is not responding

Error Type:

Serious

Possible Cause:

1. The secondary with the specified network address is not connected to the TIWAY network.
2. The serial connection between the device and the Host PC is broken.
3. The response from the device took longer to receive than the amount of time specified in the "Request Timeout" device property.
4. The communications properties for the serial connection are incorrect.

Solution:

1. Verify that the secondary device is connected and on line.
2. Verify the cabling between the PC and the host adapter.
3. Increase the Request Timeout property value so that the entire response can be handled.
4. Verify that the baud rate selected matches that of the host adapter.
5. Make sure that odd parity and 7 data bits are selected.
6. Make sure that RTS, DTR flow control is selected.

Adapter reporting command timeout - Error 0x001. Reconfiguring adapter

This error will occur after a request times out in the HIU. The Network Manager possibly went offline due to a malfunction or its maximum poll delay is longer than the host command timeout. Ensure that the maximum poll delay is shorter than the host command timeout.

When this condition is encountered, the driver will perform a soft reset of the adapter to properly reconfigure it. The command timeout is on the order of 30-60 seconds. If the problem is remedied, the next occurrence of this condition will perform the soft reset and communications will be resolved.

See Also:

Adapter Error Codes

Adapter reporting HIU not initialized - Error 0x100B. Reconfiguring adapter

This error will occur after the HIU has been reset or powered cycled while the driver was communicating with it. This condition results in the driver having to do a software reset of the adapter to properly reconfigure it.

See Also:

Adapter Error Codes

Adapter reporting unrecognized command - Error 0x0084. Reconfiguring adapter

Users will receive this message if the driver forms a request that the adapter does not recognize. This usually occurs after the adapter is reset. To solve this, have the driver perform a software reset of the adapter so that it will recognize it properly.

See Also:

Adapter Error Codes

Host adapter not responding

Error Type:

Serious. This error occurs when the driver times out waiting on a response from the host adapter.

Possible Cause:

1. The host adapter has been reset.
2. The host adapter is not turned on.
3. The serial connection between the host adapter and the Host PC is broken.
4. The communications properties for the serial connection are incorrect.

Solution:

1. If the host adapter was manually reset, the driver will recover and reconnect.
2. Verify that the host adapter is on.
3. Verify the cabling between the PC and the host adapter.
4. Verify that the baud rate selected matches that of the host adapter.
5. Make sure that odd parity and 7 data bits are selected.
6. Make sure that RTS, DTR flow control is selected.

Secondary device <device name> no longer connected to network. Reconnecting secondary

This message will appear if a secondary device the driver was previously communicating with is disconnected from the TIWAY network. The driver will periodically attempt to reconnect to the device to reestablish communication. This message will be accompanied by a 'Device is not responding' error message.

See Also:

Device <device name> is not responding

Unable to read block starting at <address> on device <device name>: Adapter Error <code>

Error Type:

Warning

Possible Cause:

1. The address does not exist in the device.
2. The device could not perform the read operation.

Solution:

1. Check to make sure that the address exists in device.
2. The adapter returned an error during the last block read. All tags in this block will be invalidated but will remain in the scan list.

See Also:
Adapter Error Codes

Unable to read block starting at <address> on device <device name>: Adapter Error <code>. Block deactivated

Error Type:
Warning

Possible Cause:

1. The address does not exist in the device.
2. The device could not perform the read operation.

Note:
The adapter returned an error during the last block read. Based on the error, all tags in this block will be deactivated (removed from the scan list).

See Also:
Adapter Error Codes

Unable to read block starting at <address> on device <device name>: Framing Error

Error Type:
Warning

Possible Cause:
The adapter with device <device name> responded with incorrect data possibly due to transmission errors or device malfunction.

Solution:

1. Place adapter on less noisy network if that is the case.
2. Increase the request timeout.

Note:
All tags in this block will be invalidated but will remain in the scan list.

Unable to read block starting at <address> on device <device name>: Secondary Error: <code>

Error Type:
Warning

Possible Cause:

1. The address does not exist in the device.
2. The device could not perform the read operation.

Note:
The secondary device <device name> returned an error during the last block read. All tags in this block will be invalidated but will remain in the scan list.

See Also:
Secondary Error Codes

Unable to read block starting at <address> on device <device name>: Secondary Error: <code>. Block deactivated

Error Type:
Warning

Possible Cause:

1. The address does not exist in the device.
2. The device could not perform the read operation.

Note:
The secondary device <device name> returned an error during the last block read. Based on the error, all tags in this block will be deactivated (removed from the scan list).

See Also:
Secondary Error Codes

Unable to read tag <address> on device <device name>: Task Error: <code>

Error Type:
Warning

Possible Cause:

1. The address does not exist in the device.
2. The device could not perform the read operation.

Note:
The secondary device <device name> returned a task-specific error during the last task read. Read Loop (Task 0x76) and Read Analog Alarm (Task 0x79) are used to read loop and alarm tags that are not accessible through the Read Block NIM Primitive (0x20). This tag will be invalidated but will remain in the scan list.

See Also:
Task Error Codes

Unable to read tag <address> on device <device name>: Task Error: <code>. Tag deactivated

Error Type:
Warning

Possible Cause:

1. The address does not exist in the device.
2. The device could not perform the read operation.

Note:
The secondary device <device name> returned a task-specific error during the last task read. Read Loop (Task 0x76) and Read Analog Alarm (Task 0x79) are used to read loop and alarm tags that are not accessible through the Read Block NIM Primitive (0x20). Based on the error, the tag will be deactivated (removed from the scan list).

See Also:
Task Error Codes

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

Error Type:
Warning

Possible Cause:

1. The serial connection between the device and the Host PC is broken.
2. The communications properties for the serial connection are incorrect.
3. The named device may have been assigned an incorrect Network ID.

Solution:

1. Verify the cabling between the PC and the PLC device.
2. Verify that the specified communications properties match those of the device.

3. Verify that the Network ID given to the named device matches that of the actual device.

Note:
This error will normally be preceded by a 'Device not responding' message and data for this address will already be invalid in the client application. The error occurs if the driver is not able to communicate with the adapter or secondary device.

See Also:
Device <device name> is not responding

Unable to write tag <address> on device <device name>: Adapter Error <code>

Error Type:
Warning

Possible Cause:
The adapter returned an error during the last write operation.

See Also:
Adapter Error Codes

Unable to write tag <address> on device <device name>: Framing Error

Error Type:
Warning

Possible Cause:
The adapter with device <device name> responded with incorrect data during the last write operation, possibly due to transmission errors or device malfunction.

Solution:

1. Place adapter on a less noisy network (if that is the case).
2. Increase the request timeout.

Unable to write tag <address> on device <device name>: Secondary Error: <code>

Error Type:
Warning

Possible Cause:
The secondary device <device name> returned an error during the last write operation.

See Also:
Secondary Error Codes

Unable to write tag <address> on device <device name>: Task Error: <code>

Error Type:
Warning

Possible Cause:
The secondary device <device name> returned a task-specific error during the last task write operation. Write Loop (Task 0x60) and Write Analog Alarm (Task 0x64) are used to write to loop and alarm tags that are not accessible through the Write Block NIM Primitive (0x30).

See Also:
Task Error Codes

Adapter reporting macro link error - Error 0x2020. Trigger Macro cannot be configured for auto-enable

Error Type:
Warning

Possible Cause:
It is invalid to configure a Trigger Macro to be auto-enabled. Trigger Macros must be explicitly enabled.

Solution:
Deselect "Automatically Enable?" in the Link Macro definition.

See Also:
UNILink Macros

Macro tag address <address> is invalid given new macro definition. Tag deactivated

Error Type:
Warning

Possible Cause:
The macro definition for the given macro tag has been changed. The address type, address range, or a combination of the two have been edited such that the address <address> is no longer valid.

Solution:
1. Change the address type/address range so the address <address> is valid.
2. Remove the macro tag from the client. This macro tag will be deactivated (removed from the scan list).

See Also:
UNILink Macros
Macro Addressing

The macro referenced in tag address <address> is no longer available. Tag deactivated

Error Type:
Warning

Possible Cause:
The macro definition for the given macro tag has been removed or macro number changed. As a result, the address <address> is no longer valid.

Solution:
1. Re-add the macro definition.
2. Change the macro number so the address <address> is valid.
3. Remove this macro tag from the client. This macro tag will be deactivated (removed from the scan list).

See Also:
UNILink Macros
Macro Addressing

Unable to Read Macro with Source ID <ID>, macro #<num> on <device name>: Adapter Error <code>

Error Type:
Warning

Possible Cause:
1. The address specified in the given macro (macro num/Source ID) does not exist in the device.
2. The device could not perform the read operation.

Solution:
Check to make sure that the address exists in the device.

Note:
The adapter returned an error during the last gather macro response for the given macro. All tags in this macro block will be invalidated but will remain in the scan list.

See Also:
Adapter Error Codes
UNILink Macros
Macro Addressing

Unable to Read Macro with Source ID <ID>, macro #<num> on <device name>: Adapter Error <code>. Block deactivated

Error Type:
Warning

Possible Cause:
1. The address specified in the given macro (macro num/Source ID) does not exist in the device.
2. The device could not perform the read operation.

Solution:
Check to make sure that the address exists in the device.

Note:
The adapter returned an error during the last gather macro response for the given macro. Based on the error, all tags in this macro block will be deactivated (removed from the scan list).

See Also:
Adapter Error Codes
UNILink Macros
Macro Addressing

Unable to Read Macro with Source ID <ID>, macro #<num> on <device name>: Framing Error

Error Type:
Warning

Possible Cause:
The adapter with device <device name> responded with incorrect data possibly due to transmission errors or device malfunction.

Solution:
1. Place adapter on less noisy network if that is the case.
2. Increase the request timeout.

Note:
All tags in this macro block will be invalidated but will remain in the scan list.

Unable to Read Macro with Source ID <ID>, macro #<num> on <device name>: MRSW Error <code>

Error Type:
Warning

Possible Cause:

1. Secondary specified in macro is offline.
2. HIU was reinitialized.
3. HIU was disconnected from the network.

Note:
The adapter returned a Termination Code in the Macro Response Status Word during the last gather macro response for the given macro. The macro will be disabled in the UHA. All tags in this macro block will be invalidated but will remain in the scan list.

See Also:
MRSW Termination Codes
UNILink Macros
Macro Addressing
Macro Response Status Word (MRSW)

Unable to Read Macro with Source ID <ID>, macro #<num> on <device name>: MRSW Error <code>. Block deactivated

Error Type:
Warning

Possible Cause:

1. Secondary specified in macro is offline.
2. HIU was reinitialized.
3. HIU was disconnected from the network.

Note:
The adapter returned a Termination Code in the Macro Response Status Word during the last gather macro response for the given macro. The macro will be disabled in the UHA. Based on the error, all tags in this macro block will be deactivated and removed from the scan list.

See Also:
MRSW Termination Codes
UNILink Macros
Macro Addressing
Macro Response Status Word (MRSW)

Unable to Read Macro with Source ID <ID>, macro #<num> on <device name>: Secondary Error <code>

Error Type:
Warning

Possible Cause:

1. The address specified in the given macro (macro num/Source ID) does not exist in the device.
2. The device could not perform the read operation.

Solution:
Check to make sure that the address exists in the device.

Note:
The secondary device <device name> returned an error during the last gather macro response for the given macro. All tags in this macro block will be invalidated but will remain in the scan list.

See Also:
Secondary Error Codes
UNILink Macros
Macro Addressing

Unable to Read Macro with Source ID <ID>, macro #<num> on <device name>: Secondary Error <code>. Block deactivated

Error Type:
Warning

Possible Cause:

1. The address specified in the given macro (macro num/Source ID) does not exist in the device.
2. The device could not perform the read operation.

Solution:
Check to make sure that the address exists in the device.

Note:
The secondary device <device name> returned an error during the last gather macro response for the given macro. Based on the error, all tags in this macro block will be deactivated (removed from the scan list).

See Also:
Secondary Error Codes
UNILink Macros
Macro Addressing

Unable to Read Macro with Source ID <ID>, macro #<num> on <device name>: Task Error <code>

Error Type:
Warning

Possible Cause:

1. The address specified in the given macro (macro num/Source ID) does not exist in the device.
2. The device could not perform the read operation.

Note:
The secondary device <device name> returned a task-specific error during the last task read. Read Loop (Task 0x76) and Read Analog Alarm (Task 0x79) are used to read loop and alarm tags that are not accessible through the Read Block NIM Primitive (0x20). This tag will be invalidated but will remain in the scan list.

See Also:
Task Error Codes
UNILink Macros
Macro Addressing

Unable to Read Macro with Source ID <ID>, macro #<num> on <device name>: Task Error <code>. Tag deactivated

Error Type:
Warning

Possible Cause:

1. The address specified in the given macro (macro num/Source ID) does not exist in the device.
2. The device could not perform the read operation.

Note:
The secondary device <device name> returned a task-specific error during the last task read. Read Loop (Task 0x76) and Read Analog Alarm (Task 0x79) are used to read loop and alarm tags that are not accessible through the Read Block NIM Primitive (0x20). Based on the error, the tag will be deactivated and removed from the scan list.

See Also:
Task Error Codes
UNILink Macros
Macro Addressing

XML Loading Error: An existing link macro already has this macro number: <num>. Link macro not loaded

Error Type:
Warning

Possible Cause:

1. The XML file contains two or more link macros with the same macro number (ActionMacroNumber).
2. One or more link macros are missing macro numbers.

Solution:
Verify that each link macro in the XML file has a unique macro number.

See Also:
Adapter Error Codes
UNILink Macros
Macro Addressing

XML Loading Error: An existing read macro already has this macro number: <num>. Link macro not loaded

Error Type:
Warning

Possible Cause:

1. The XML file contains two or more read macros with the same macro number (ReadMacroNumber) being used as the link macro number (ActionMacroNumber).
2. One or more read macros or link macros are missing macro numbers.

Solution:
Verify that each read macro and link macro has a unique macro number in the XML file.

See Also:
Adapter Error Codes
UNILink Macros
Macro Addressing

XML Loading Error: An existing read macro already has this macro number: <num>. Read macro not loaded

Error Type:
Warning

Possible Cause:

1. The XML file contains two or more read macros with the same macro number (ReadMacroNumber).
2. One or more read macros are missing macro numbers.

Solution:
Verify that each read macro has a unique macro number in the XML file.

See Also:
Adapter Error Codes
UNILink Macros
Macro Addressing

XML Loading Error: Invalid value found. Link macro not loaded

Error Type:
Warning

Possible Cause:
The link macro in the XML file contains invalid values.

Solution:
Verify that the link macro has valid values.

See Also:
Adapter Error Codes
UNILink Macros
Macro Addressing

XML Loading Error: Invalid value found. Read macro not loaded

Error Type:
Warning

Possible Cause:

1. The read macro's starting address (StartingAddress) is greater than its ending address (EndingAddress) in the XML file.
2. The read macro contains invalid values in the XML file.

Solution:

1. Make sure that the read macro's starting address is less than its ending address.
2. Verify that the read macro has valid values.

See Also:
Adapter Error Codes
UNILink Macros
Macro Addressing

XML Loading Error: Link macro linked to missing read macro <num>. Link macro not loaded

Error Type:
Warning

Possible Cause:

1. The linked read macro does not exist.
2. The read macro has an incorrect macro number (ReadMacroNumber).

3. The link macro has an incorrect trigger macro (TriggerMacroNumber).

Solution:

1. Verify that the linked read macro exists in the XML file.
2. Verify that the trigger macro corresponds to the desired read macro.

See Also:

Adapter Error Codes
UNILink Macros
Macro Addressing

XML Loading Error: Read macro(s) missing from file. Link macro(s) not loaded

Error Type:

Warning

Possible Cause:

The read macro does not exist in the XML file.

Solution:

1. Verify that there is a ReadMacroList element in the XML file.
2. Verify that there is a valid ReadMacro element in the XML file.

See Also:

Adapter Error Codes
UNILink Macros
Macro Addressing

Error Codes

The following error codes may be generated. Click on the link for a description of the specific error codes.

Adapter Error Codes

Error Code	Description
0x0001	The command timed out by the HIU function. The NM function is possibly offline due to a malfunction or its maximum poll delay is longer than the host command timeout in the HIU. This error could be the result of a global connect or global disconnect.
0x0002	A TIWAY I HDLC error occurred with the addressed secondary that could not be corrected. Reset the secondary device.
0x0003	The wrong secondary device address was returned to the HIU in the response. Reissue the command. If this error continues to occur, users will need to reset the Network Manager (which also resets the TIWAY I network).
0x0006	The command string tried to use secondary address 00. Retransmit the command with the correct secondary address.
0x0008	The NM could not process the stream of bits from the secondary fast enough. Resetting the adapter with the NM function should clear this problem.
0x0009	The adapter continued to receive an incorrect HDLC Block Checksum from the secondary after the maximum number of retries.
0x000A	The secondary timed out in the middle of the message.
0x000B	The secondary device timed out because the maximum poll time expired. The value for the maximum poll time may need to be adjusted.
0x000E	An uneven number of bytes was received from the secondary.
0x0010	Lost Data Carrier Detect (DCD) from the TIWAY I interface port(s).
0x0011	Lost Clear To Send (CTS) from the TIWAY I interface port(s).
0x0084	The command processor found an unrecognized command code in the command string. This also indicates that the command code is not valid for the currently configured operating mode. If this error is received after issuing one of the Extended HIU or NM commands, assume that the adapter was reset and needs to be reconfigured.
0x0085	An invalid field was received with the command code.
0x0086	The length of the command frame received from the host was too long for the specified command code.
0x0087	The length of the command frame received from the host was too short. The minimum length for an NITP protocol frame is 11 bytes. The minimum length for a BDLC protocol frame is 9 bytes.
0x0088	The secondary device addressed in the command string is not connected to the TIWAY I network. Recheck the address in the command string and the address of the secondary devices. Then, issue a CONNECT SECONDARY command or enable a macro that was previously defined to connect that secondary.

Error Code	Description
0x0089	The colon that begins an NITP message frame was missing. Correct the frame and retransmit it.
0x008B	The character count field value did not match the number of characters received. This could be caused by an error in the software driver. In either case, the application's software should retry the message at least 3 times. If this same error returns all 3 times, check for an error in the software driver.
0x008C	The checksum calculated by the adapter did not match the Error-Checking Code or the Block Checksum field value. Retry the message at least 3 times. If the same error returns all 3 times, check for an error in the software driver.
0x008D	One of the ASCII characters between the beginning and ending delimiters was not in the NITP character set. Valid NITP characters are the ASCII values 0, 1, 2, 3,4, 5, 6, 7, 8, 9, A, B, C, D, E, and F. Retry the message at least 3 times. If the same error returns all 3 times, check for an error in the software driver.
0x100B	The NM causing the adapter to be offline has not initialized the HIU. Retransmit the command.
0x100C	There is not enough memory available to allocate an area to hold status information for the requested secondary. Users can de-allocate resources for another Source ID to gain enough memory for the secondary status information.
0x100D	There is not enough memory available to allocate another Source ID. Users can de-allocate resources for another Source ID to gain enough memory to allocate this one.
0x100E	The bandwidth statistics for the requested HIU are not available because the NM has not initialized the HIU.
0x100F	Users requested auto redundant mode without signifying that Channel B was available or tried issuing the SWITCH CHANNEL command without making Channel B.
0x2002	The NM and HIU are not configured for an MHIU.
0x2003	The NM is not configured.
0x2004	The HIU of the MHIU is not configured.
0x2006	The command string contained the same option code twice. Correct and reissue the command.
0x2007	The HIU is already configured. Users can only issue command code 11 once after each adapter reset.
0x2008	Users tried to specify that one TIWAY I port uses Local Line media and that the other TIWAY I Port uses RS-232-C media. The media for either ports or channels must be the same.
0x2009	The device addressed in the command string was not an HIU.
0x200A	There is not enough memory for the number of secondary devices specified with the maximum secondary address parameter. The maximum secondary address defaults to 254. If this many devices will not be used, memory space can be saved by specifying a value equal to the number of devices in the TIWAY I network plus a few for growth.
0x2010	Users tried to allocate a Source ID with a value of 0. The valid range for Source IDs is 1 to 255.
0x2011	Users already allocated 32 Source IDs. A Source ID that has already been allocated must be used or a Source ID's resources must be cleared to begin another.
0x2012	The Source ID specified in the command string has not been allocated. Check the Source ID value and use the ALLOCATE Source ID command to allocate it if necessary.

Error Code	Description
0x2013	The macro type specified in the command string is invalid. The valid macro types are 1, 2, and 3.
0x2014	The macro command buffer is too small for the macro specified with the DEFINE MACRO command. Users will need to shorten the macro data or allocated another macro buffer with sufficient size. Remember that macro buffers cannot be explicitly deleted. Users must de-allocate the Source ID or reset the adapter to recover macro buffers.
0x2015	The macro buffer number in the command string has not been allocated. Verify the macro buffer number and issue the ALLOCATE MACRO STORAGE BUFFFERS command if necessary.
0x2016	The macro buffer number in the command string is already enabled. This error will be returned when users try to redefine or initialize the response buffer of a macro that is currently enabled.
0x2017	The Source ID in the macro buffer did not match the Source ID in the command string. Check the Source ID number and reissue the command with the correct value.
0x2018	The INITIALIZE MACRO RESPONE BUFFER command is not valid because this is a non-repetitive macro.
0x2019	The exception flag was set on this macro.
0x201A	Too much data was requested in the GATHER MACRO RESPONSE command.
0x201B	The Action Macro is enabled.
0x201C	The Action Macro Primitive must be either Primitive 30 or Primitive B0.
0x201D	The data types in the Trigger Macro do not match the data types defined in the Action Macro.
0x201E	A macro link already exists between the macro buffers specified.
0x201F	No macro link exists between the specified macro buffers.
0x2020	The Trigger Macro is enabled and must be explicitly disabled before the macro link can be terminated.
0x2021	The Trigger Macro Primitive must be either Primitive 20 or Primitive A0.
0x2022	Users cannot explicitly define the number of NM buffers to allocate to the HIU because the default number of buffers specified in Option-9 in the CONFIGURE NETWORK MANAGER command is not zero. The background monitor will bring the HIU online with the default number of buffers.
0x2023	The NM buffers have already been allocated.
0x2024	The macro command buffer has been allocated, but not defined. Users cannot initialize the macro response buffer until the macro has been defined.
0x3001	A message length error occurred in a message between the NM and the HIU. Users should reset the NM if this error continues.
0x4001	An HIU to NM message command was out of range. Users should reset the HIU and/or the NM if this error continues.
0x4002	An HIU to NM message address field was out of range. Users should reset the HIU and/or the NM if this error continues.
0x4003	A broadcast mode error occurred in an HIU to NM message. Users should reset the HIU and/or the NM if this error continues.
0x4004	The secondary response included an incorrect HDLC field

Secondary Error Codes

Error Code	Description
0x0000	Primitive code is not implemented.
0x0001	Data type is not defined on the attached device.
0x0002	Data element is out of range.
0x0003	Primitive has excess data unit bytes.
0x0004	Primitive has insufficient data unit bytes.
0x0005	Number of information bytes received does not match the number of bytes specified in the field length.
0x0006	Attached device is in wrong mode for primitive execution.
0x0007	User program in the attached device has disabled communications to the NIM via the lock-out bit
0x000A	Attached device fails to respond
0x000E	Primitive not valid for the specified data type.
0x0010	Number of locations requested exceeds the maximum allowed.
0x0011	Number assigned to a data acquisition block or record is not within supported block or record range.
0x0012	Block or record number requested has not been defined.
0x0013	Number of data bytes in the requested blocks or records exceeds the maximum number of bytes allowed by the primitive.
0x0015	Primitive not allowed while the device is in local mode.
0x0016	Data type not programmed in attached device.
0x0017	Attached device did not respond properly.
0x0019	The resulting data element location formed by the starting address, plus the number of data elements to access, is out of range.
0x001A	Communication has not been established with the attached device.
0x001B	Store and forward buffer is full and the store and forward message was discarded.
0x001C	Data element field is improperly formatted.
0x001D	Number of locations to access equals zero.
0x0023	Number of data blocks defined in a data acquisition record exceeds the maximum supported.
0x80DD	Exception generated in the attached device is not identified.

Task Error Codes

Error Code	Description
0x0001	Reset Current Transaction.
0x0002	Address out of range (other than ladder logic).
0x0003	Requested data not found.
0x0004	Illegal task code request (such as the task code is not supported).

Error Code	Description
0x0005	Request exceeds program memory size (ladder logic).
0x0006	Diagnostic fail upon power up.
0x0007	Fatal error detected.
0x0008	Key lock protect error.
0x0009	Incorrect amount of data sent with request.
0x000A	Illegal request in current operational mode.
0x000B	Network was not deleted.
0x000C	Attempted write operation did not verify.
0x000D	Illegal number of ASCII characters received.
0x000E	Illegal write to program memory (non volatile).
0x000F	Data not inserted.
0x0010	Data not written.
0x0011	Invalid data sent with the command.
0x0012	Invalid operation with the Local/Remote Mode.
0x0013	The Store and Forward Buffer is busy.
0x0014	No response from the Special Function Module.
0x15XXXX	Illegal instruction found in program memory on a program in Run transition. Address of error returned in XXXX by some series 500 P/Cs.
0x0016	Attempted write to a protected variable (such as TCC, TCP).
0x0017	No response from P/C (such as single scan not performed).
0x0018	Memory configuration error: Requested memory size exceeds total available memory.
0x0019	Memory configuration error: Requested memory size is not multiple of block allocation size.
0x001A	Memory configuration error: Requested memory size is less than minimum defined value.
0x001B	Memory configuration error: Requested memory size is larger than maximum defined value.
0x001C	P/C busy, cannot complete the requested transaction.
0x001D	Comm error in HOLD mode, transition to Run not allowed.
0x001E	Port Lockout is active.
0x001F-0x0020	Spare.
0x0021	I/O configuration error, too many points.
0x0022-0x003F	Spare.
0x0040-0x005F	Reserved for SF/Loop.
0x0060-0x00FF	Spare.

MRSW Termination Codes

Error Code	Description
0x8000	The requested macro buffer is undefined.
0x8001	The macro was disabled by either defining it as not enabled in the DEFINE MACRO command or explicitly disabling it with the ENABLE/DISABLE MACRO command.
0x8002	An exception occurred for this macro and it has been frozen.
0x8003	This non-repetitive macro has completed execution.
0x8004	This connect secondary macro has completed execution.
0x8005	This disconnect secondary macro has completed execution.
0x8010	This macro is disabled because the associated secondary is offline; no exception occurred before it went offline, so there is no new buffer data.
0x8011	This macro is disabled because the associated secondary is offline; the exception flag was set prior to being disabled.
0x8012	This macro is disabled because the HIU was reinitialized (the network was reset); no exception occurred before being disabled.
0x8013	This macro is disabled because the HIU was reinitialized (the network was reset); an exception occurred did occur before being disabled.
0x8014	This macro is disabled because the HIU was disconnected from the network; no exception occurred before being disabled.
0x8015	This macro is disabled because the HIU was disconnected from the network; an exception occurred before being disabled.
0x8016	This macro is disabled because another direct command or macro was issued to disconnect the secondary from the network.
0x8017	This macro is disabled because the host issued a disconnect to its HIU and an exception occurred prior to the disconnect.
0x8020	The macro response was too large to fit into the buffer.
0x8021	The wrong secondary address was in the macro response.
0x8023	Received the wrong TIWAY I Primitive in the link action response. The secondary device should have returned a response for either Primitive 20 or Primitive A0.
0x8024	Received the wrong TIWAY I Primitive in the link trigger response. The secondary device should have returned a response for either Primitive 30 or Primitive B0.

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