Yokogawa HR Driver

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Yokogawa HR Driver

Help version 1.024

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Overview

The Yokogawa HR Driver provides a reliable way to connect Yokogawa HR2400 Serial devices to OPC client applications; including HMI, SCADA, Historian, MES, ERP, and countless custom applications. It is intended for use with Yokogawa Data Acquisition and Data Recorder devices that support RS232 or RS422 communications.

Setup

Supported Yokogawa Devices

HR2400 (10CH)
HR2400 (20CH)
HR2400 (30CH)

Supported Communication Parameters

Baud Rate: 300, 600, 1200, 2400, 9600
Parity: None, Even or Odd
Data Bits: 8
Stop Bits: 1 or 2
Flow Control: None, RTS or DTR. Software handshaking is not available.
Note: This driver makes use of binary data formatting when reading information from Yokogawa devices. This requires that a data bit setting of 8 be used.

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 31 per channel.

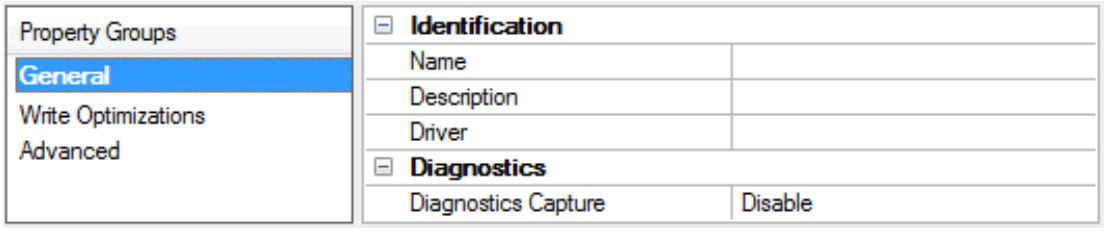
RS-232 and RS-422/485 Operation

Yokogawa HR2400 Serial devices can support RS-232 or RS-422/485 operation. The mode used depends on the OPC server project's configuration.

If intending to connect to a HR2400 Serial device using RS-232, select a Device ID of zero (0). This tells the driver to use the RS-232 mode for communications. If intending to use either RS-422 or RS-485 communications, select a Device ID for each station that is between 1 and 16 for RS-422 and 1 and 31 for RS-485. When using RS-232, only configure one device on the channel.

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.

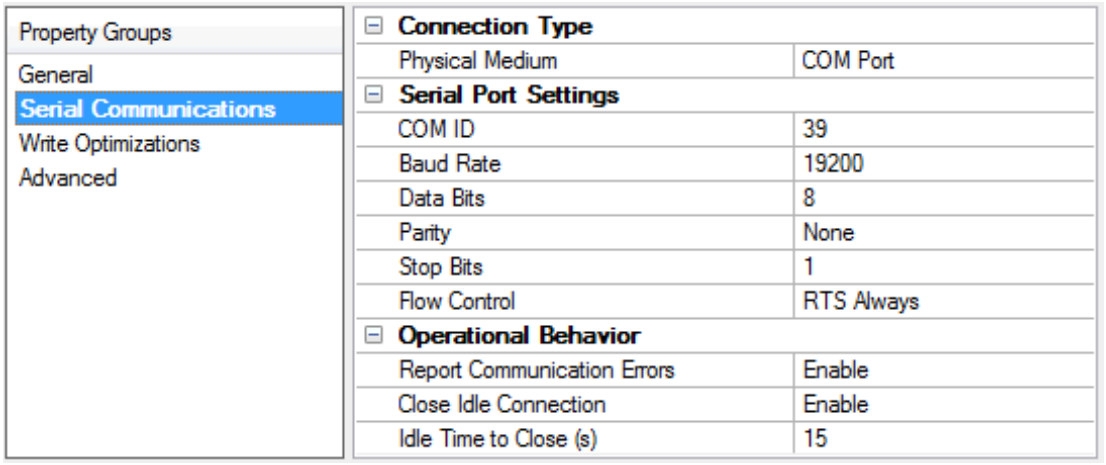
Diagnostics

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

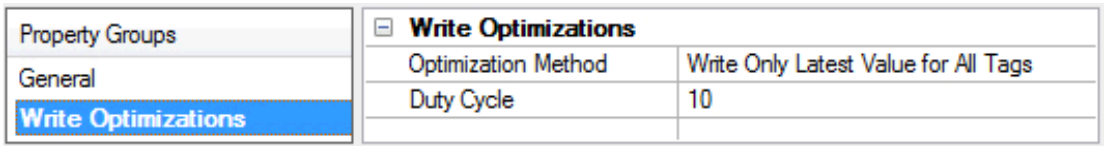
- **Modem**: Specify the installed modem to be used for communications.
- **Connect Timeout**: Specify the amount of time to wait for connections to be established before failing a read or write. The default is 60 seconds.
- **Modem Properties**: Configure the modem hardware. When clicked, it opens vendor-specific 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

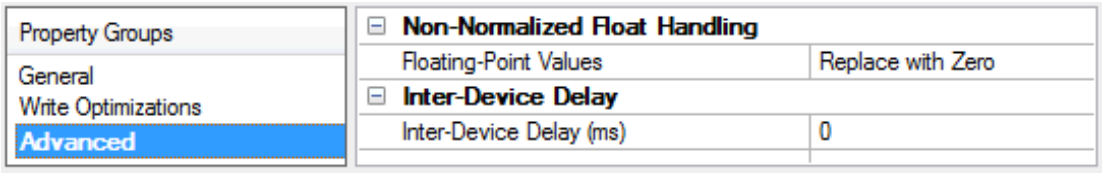
Optimization Method: Controls how write data is passed to the underlying communications driver. The options are:

- **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.

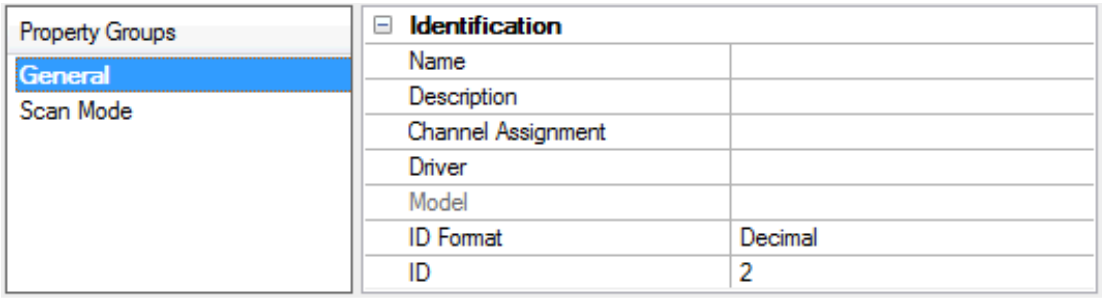
For more information on the floating-point values, refer to "How To ... Work with Non-Normalized Floating-Point Values" in the server help.

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.

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.

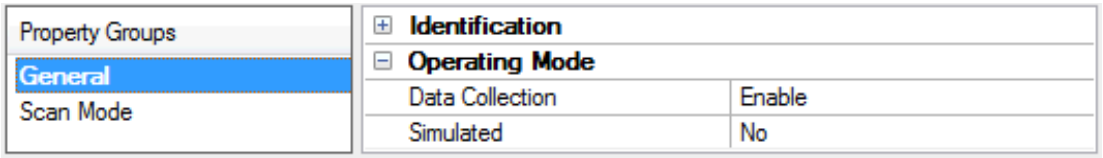
Channel Assignment: Specify the user-defined name of the channel to which this device currently belongs.

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.

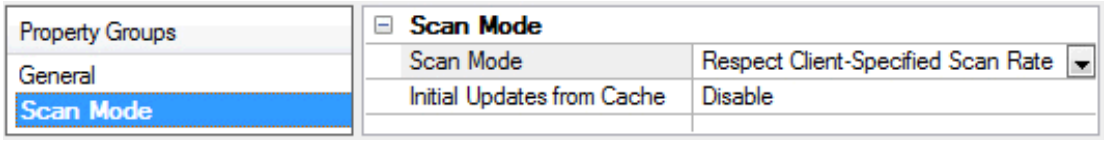
Notes:

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.



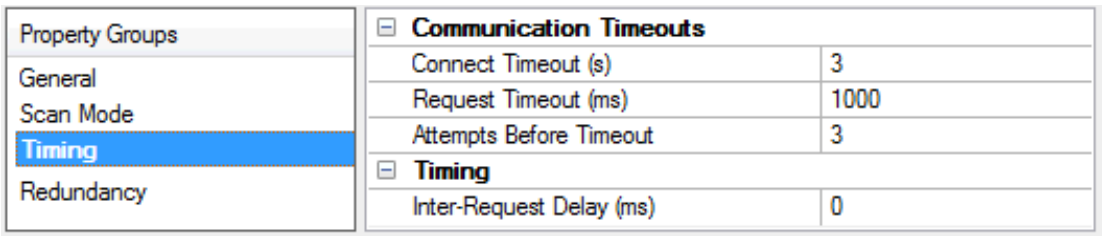
Scan Mode: Specify how tags in the device are scanned for updates sent to subscribing clients. Descriptions of the options are:

- **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.

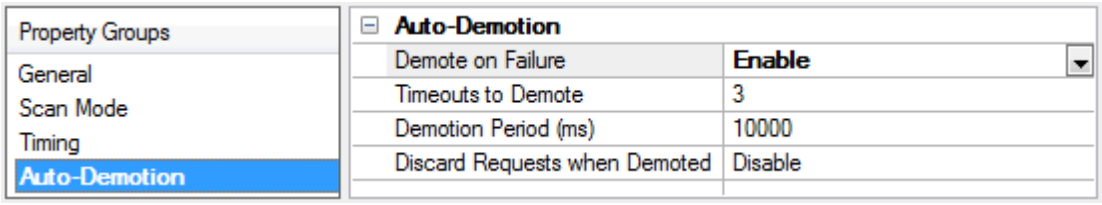
Timing

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 — Tag Generation

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

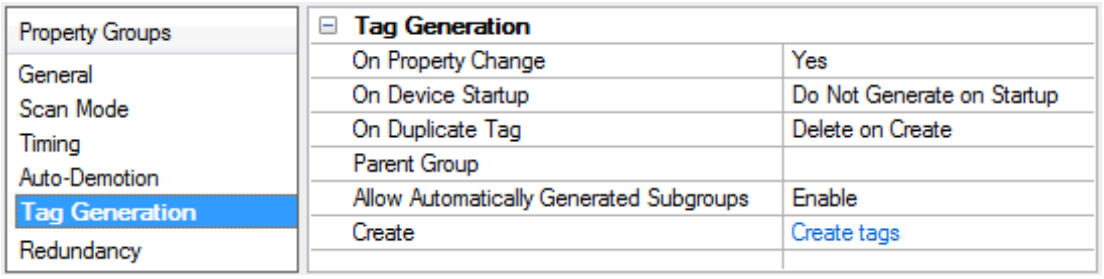
Not all devices and drivers support full automatic tag database generation and not all support the same data types. Consult the data types descriptions or the supported data type lists for each driver for specifics.

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

1. If a data acquisition system supports its own local tag database, the communications driver uses the tag names found in the device to build the server's tags.

2. If an Ethernet I/O system supports detection of its own available I/O module types, the communications driver automatically generates tags in the server that are based on the types of I/O modules plugged into the Ethernet I/O rack.

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



On Property Change: If the device supports automatic tag generation when certain properties change, the **On Property Change** option is shown. It is set to **Yes** by default, but it can be set to **No** to control over when tag generation is performed. In this case, the **Create tags** action must be manually invoked to perform tag generation. To invoke via the Configuration API service, access /config/v1/project/channels/{name}/devices/{name}/services/TagGeneration.

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

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

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

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

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

- **Delete on Create**: This option deletes any tags that were previously added to the tag space before any new tags are added. This is the default setting.

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

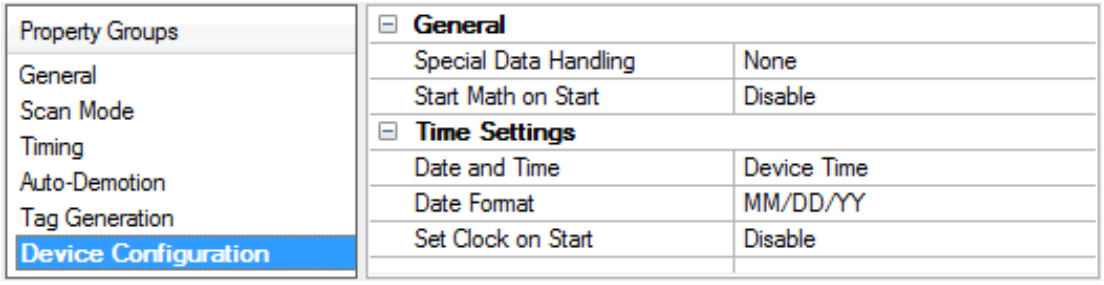
Note: Removing OPC tags affects tags that have been automatically generated by the communications driver as well as any tags that have been added using names that match generated tags. Users should avoid adding tags to the server using names that may match tags that are automatically generated by the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

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

Allow Automatically Generated Subgroups: This property controls whether the server automatically creates subgroups for the automatically generated tags. This is the default setting. If disabled, the server generates the device's tags in a flat list without any grouping. In the server project, the resulting tags are named with the address value. For example, the tag names are not retained during the generation process.
Note: If, as the server is generating tags, a tag is assigned the same name as an existing tag, the system automatically increments to the next highest number so that the tag name is not duplicated. For example, if the generation process creates a tag named "AI22" that already exists, it creates the tag as "AI23" instead.

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

Device Properties — Device Configuration



General

Special Data Handling: This setting allows the driver to be configured to return specific data values for numerical out of range and error conditions returned from the device. Special Data Handling options are **None**, **+INF** and **-INF**. If set to None, special data values will be returned with the actual data value received from the device. For example, the data value of a measuring channel Over Range would be returned as 32,767 and the data value of a math channel Over Range would be returned as 2,147,450,879. If set to +INF,

special data values will be returned as a numerical representation of positive infinity (#INF), with the exception of an Under Range condition that is always returned as negative infinity. When Special Data Handling is set to -INF, special data values will be returned as a numerical representation of negative infinity (-#INF), with the exception of an Over Range condition that is always returned as positive infinity.

Start Math on Start: When Enable is specified, this property will inform the driver to send a command to the device at communication startup that will start the math computation.

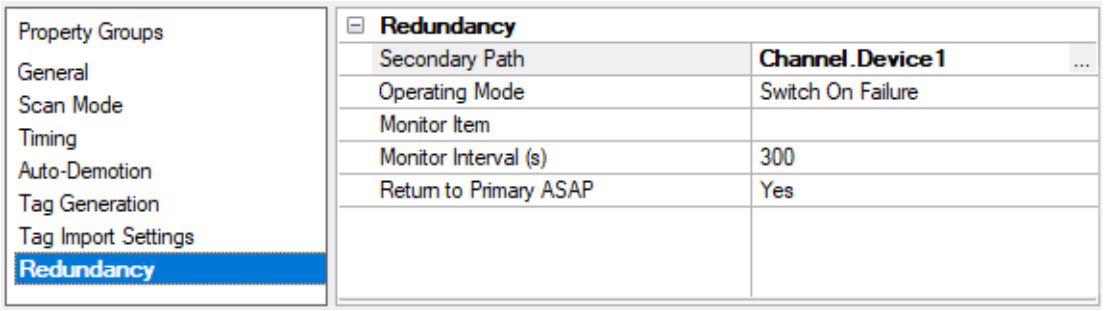
Time Settings

Date and Time: Specify the origin of the data value of the Date and Time data types which represent the date and time of the latest data. Date and Time options are **Device Time** and **System Time**. If Device Time is selected, the Date and Time tags will return the date and time read from the device. This date and time represents the date and time that the latest data was measured or computed based on the internal device clock. If System Time is selected, the Date and Time tags will return the date and time that the requested data was returned from the device based on the PC system clock.

Date Format: Specify the format of the return string for the Date data type. Date formats can be specified as **MM/DD/YY** (month/day/year), **YY/MM/DD** (year/month/day) or **DD/MM/YY** (day/month/year).

Set Clock on Start: When Enable is specified, this property instructs the driver to send a command to the device at communication startup that will set the device clock to the date and time settings of the system clock.

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
Byte	Unsigned 8-bit value
Word	Unsigned 16-bit value
DWord	Unsigned 32-bit value
Short	Signed 16-bit value
Float	32-bit floating point value
Double	64-bit floating point value
String	Null-terminated ASCII string

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.

HR2400 (10CH) Addressing
HR2400 (20CH) Addressing
HR2400 (30CH) Addressing

HR2400 (10CH) Addressing

The driver supports the following addresses for this device. The default data type for each address type is shown in **bold**.

Measuring and Math Channels

Address Type	Format	Range	Data Types	Access
Process Value of Channel	CHxx or CHxx.PV	01-10, 31-60	**Double**, Float	Read Only
Alarm Summary of Channel	CHxx.Alarm	01-10, 31-60	**DWord**, Short, Word, Byte	Read Only
Alarm Level1 Status of Channel	CHxx.Alarm1	01-10, 31-60	**Short**, Word, Byte	Read Only
Alarm Level2 Status of Channel	CHxx.Alarm2	01-10, 31-60	**Short**, Word, Byte	Read Only
Alarm Level3 Status of Channel	CHxx.Alarm3	01-10, 31-60	**Short**, Word, Byte	Read Only
Alarm Level4 Status of Channel	CHxx.Alarm4	01-10, 31-60	**Short**, Word, Byte	Read Only
Alarm Level5 Status of Channel	CHxx.Alarm5	01-10, 31-60	**Short**, Word, Byte	Read Only
Alarm Level6 Status of Channel	CHxx.Alarm6	01-10, 31-60	**Short**, Word, Byte	Read Only
Level1 Alarm Setpoint*	CHxx.ASP1	01-10, 31-60	**Double**, Float	Read Only
Level2 Alarm Setpoint*	CHxx.ASP2	01-10, 31-60	**Double**, Float	Read Only
Level3 Alarm Setpoint*	CHxx.ASP3	01-10, 31-60	**Double**, Float	Read Only
Level4 Alarm Setpoint*	CHxx.ASP4	01-10, 31-60	**Double**, Float	Read Only
Level5 Alarm Setpoint*	CHxx.ASP5	01-10, 31-60	**Double**, Float	Read Only
Level6 Alarm Setpoint*	CHxx.ASP6	01-10, 31-60	**Double**, Float	Read Only
Upper Scale Value of Channel*	CHxx.scale_Hi	01-10, 31-60	**Double**, Float	Read Only
Lower Scale Value of Channel*	CHxx.scale_Lo	01-10, 31-	**Double**, Float	Read

Address Type	Format	Range	Data Types	Access
		60		Only
Unit String of Channel*	CHxx.unit	01-10, 31-60	**String**	Read Only
Tagname of Channel*	CHxx.tag	01-10, 31-60	**String**	Read Only
Status of Channel*	CHxx.status	01-10, 31-60	**String**	Read Only
Lowest Measuring Channel*	CH.Low		**Short**, Word, Byte	Read Only
Highest Measuring Channel*	CH.High		**Short**, Word, Byte	Read Only
Lowest Math Channel*	CHA.Low		**Short**, Word, Byte	Read Only
Highest Math Channel*	CHA.High		**Short**, Word, Byte	Read Only

***** Data associated with these addresses are read from the device only at the start of a communications session. Once read, the values will not be refreshed until the server has been restarted or the "Reset" tag has been invoked. To invoke a reset, a non-zero value must be written to the Reset tag. Once the Reset tag has been invoked, the driver will reinitialize all startup data from the device.

Alarm Setpoints
Data values for Alarm Setpoints that are undefined in the device will be returned as +INF.

Scales
Data values for Scale_Hi and Scale_Lo for channels that are skipped will be returned as +INF.

Tag Names
For devices that do not support tag names and channels that have unspecified tag names, the driver will construct an internal tag name based on the channel number. For example, the tag name of address 'CH01' will be returned as 'CH01'.

General Device Data

Address Type	Format	Range	Data Types	Access
Date of Last Data	Date		**String**	Read Only
Time of Last Data	Time		**String**	Read Only
Model Name of Device*	Model		**String**	Read Only
Math Communication Data*	CDxx	01-30	**Float**	Write Only
Control Math Execution	MathControl		**Short**, Word, Byte	Write Only
Reset Alarms	AlarmReset		**Boolean**	Write Only
Direct Reloading of Configuration	Reset		**Boolean**	Write Only

Math Communication Data
The CD address type is only valid for devices equipped with the math option. Write operations to CD addresses for non-math equipped devices will return an error.

Model Name of Device
The Model address type will have a string value of 'HR2400' for all models.

Control Math Execution
The MathControl address type is only available for devices equipped with the math option. Write operations to the MathControl tag for non-math equipped devices will return an error.

Notes:

1. The actual number of addresses available for of each type depends on the configuration of the Yokogawa device. If the driver finds at Runtime that an address is not present in the device, it will post an error message and remove the tag from its scan list.
2. Addresses that have Write Only access are assigned a default access of Read/Write. However, data values are unreadable for these addresses and the associated tags are not included in the scan list. The current data value for these tags will always be 0 for numeric data types and null string for string data types.

HR2400 (20CH) Addressing

The driver supports the following addresses for this device. The default data type for each address type is shown in **bold**.

Measuring and Math Channels

Address Type	Format	Range	Data Types	Access
Process Value of Channel	CHxx or CHxx.PV	01-20, 31-60	**Double**, Float	Read Only
Alarm Summary of Channel	CHxx.Alarm	01-20, 31-60	**DWord**, Short, Word, Byte	Read Only
Alarm Level1 Status of Channel	CHxx.Alarm1	01-20, 31-60	**Short**, Word, Byte	Read Only
Alarm Level2 Status of Channel	CHxx.Alarm2	01-20, 31-60	**Short**, Word, Byte	Read Only
Alarm Level3 Status of Channel	CHxx.Alarm3	01-20, 31-60	**Short**, Word, Byte	Read Only
Alarm Level4 Status of Channel	CHxx.Alarm4	01-20, 31-60	**Short**, Word, Byte	Read Only
Alarm Level5 Status of Channel	CHxx.Alarm5	01-20, 31-60	**Short**, Word, Byte	Read Only
Alarm Level6 Status of Channel	CHxx.Alarm6	01-20, 31-60	**Short**, Word, Byte	Read Only
Level1 Alarm Setpoint*	CHxx.ASP1	01-20, 31-60	**Double**, Float	Read Only
Level2 Alarm Setpoint*	CHxx.ASP2	01-20, 31-60	**Double**, Float	Read Only
Level3 Alarm Setpoint*	CHxx.ASP3	01-20, 31-60	**Double**, Float	Read Only
Level4 Alarm Setpoint*	CHxx.ASP4	01-20, 31-60	**Double**, Float	Read Only

Address Type	Format	Range	Data Types	Access
Level5 Alarm Setpoint*	CHxx.ASP5	01-20, 31-60	**Double**, Float	Read Only
Level6 Alarm Setpoint*	CHxx.ASP6	01-20, 31-60	**Double**, Float	Read Only
Upper Scale Value of Channel*	CHxx.scale_Hi	01-20, 31-60	**Double**, Float	Read Only
Lower Scale Value of Channel*	CHxx.scale_Lo	01-20, 31-60	**Double**, Float	Read Only
Unit String of Channel*	CHxx.unit	01-20, 31-60	**String**	Read Only
Tagname of Channel*	CHxx.tag	01-20, 31-60	**String**	Read Only
Status of Channel*	CHxx.status	01-20, 31-60	**String**	Read Only
Lowest Measuring Channel*	CH.Low		**Short**, Word, Byte	Read Only
Highest Measuring Channel*	CH.High		**Short**, Word, Byte	Read Only
Lowest Math Channel*	CHA.Low		**Short**, Word, Byte	Read Only
Highest Math Channel*	CHA.High		**Short**, Word, Byte	Read Only

***** Data associated with these addresses are read from the device only at the start of a communications session. Once read, the values will not be refreshed until the server has been restarted or the "Reset" tag has been invoked. To invoke a reset, a non-zero value must be written to the Reset tag. Once the Reset tag has been invoked, the driver will reinitialize all startup data from the device.

Alarm Setpoints
Data values for Alarm Setpoints that are undefined in the device will be returned as +INF.

Scales
Data values for Scale_Hi and Scale_Lo for channels that are skipped will be returned as +INF.

Tag Names
For devices that do not support tag names and channels that have unspecified tag names, the driver will construct an internal tag name based on the channel number. For example, the tag name of address 'CH01' will be returned as 'CH01'.

General Device Data

Address Type	Format	Range	Data Types	Access
Date of Last Data	Date		**String**	Read Only
Time of Last Data	Time		**String**	Read Only
Model Name of Device*	Model		**String**	Read Only
Math Communication Data*	CDxx	01-30	**Float**	Write Only

Address Type	Format	Range	Data Types	Access
Control Math Execution	MathControl		**Short**, Word, Byte	Write Only
Reset Alarms	AlarmReset		**Boolean**	Write Only
Direct Reloading of Configuration	Reset		**Boolean**	Write Only

Math Communication Data
The CD address type is only valid for devices equipped with the math option. Write operations to CD addresses for non-math equipped devices will return an error.

Model Name of Device
The Model address type will have a string value of 'HR2400' for all models.

Control Math Execution
The MathControl address type is only available for devices equipped with the math option. Write operations to the MathControl tag for non-math equipped devices will return an error.

Notes:

1. The actual number of addresses available for of each type depends on the configuration of the Yokogawa device. If the driver finds at Runtime that an address is not present in the device, it will post an error message and remove the tag from its scan list.
2. Addresses that have Write Only access are assigned a default access of Read/Write. However, data values are unreadable for these addresses and the associated tags are not included in the scan list. The current data value for these tags will always be 0 for numeric data types and null string for string data types.

HR2400 (30CH) Addressing

The driver supports the following addresses for this device. The default data type for each address type is shown in **bold**.

Measuring and Math Channels

Address Type	Format	Range	Data Types	Access
Process Value of Channel	CHxx or CHxx.PV	01-30, 31-60	**Double**, Float	Read Only
Alarm Summary of Channel	CHxx.Alarm	01-30, 31-60	**DWord**, Short, Word, Byte	Read Only
Alarm Level1 Status of Channel	CHxx.Alarm1	01-30, 31-60	**Short**, Word, Byte	Read Only
Alarm Level2 Status of Channel	CHxx.Alarm2	01-30, 31-60	**Short**, Word, Byte	Read Only
Alarm Level3 Status of Channel	CHxx.Alarm3	01-30, 31-60	**Short**, Word, Byte	Read Only
Alarm Level4 Status of Channel	CHxx.Alarm4	01-30, 31-60	**Short**, Word, Byte	Read Only
Alarm Level5 Status of Channel	CHxx.Alarm5	01-30, 31-60	**Short**, Word, Byte	Read Only

Address Type	Format	Range	Data Types	Access
Alarm Level6 Status of Channel	CHxx.Alarm6	01-30, 31-60	**Short**, Word, Byte	Read Only
Level1 Alarm Setpoint*	CHxx.ASP1	01-30, 31-60	**Double**, Float	Read Only
Level2 Alarm Setpoint*	CHxx.ASP2	01-30, 31-60	**Double**, Float	Read Only
Level3 Alarm Setpoint*	CHxx.ASP3	01-30, 31-60	**Double**, Float	Read Only
Level4 Alarm Setpoint*	CHxx.ASP4	01-30, 31-60	**Double**, Float	Read Only
Level5 Alarm Setpoint*	CHxx.ASP5	01-30, 31-60	**Double**, Float	Read Only
Level6 Alarm Setpoint*	CHxx.ASP6	01-30, 31-60	**Double**, Float	Read Only
Upper Scale Value of Channel*	CHxx.scale_Hi	01-30, 31-60	**Double**, Float	Read Only
Lower Scale Value of Channel*	CHxx.scale_Lo	01-30, 31-60	**Double**, Float	Read Only
Unit String of Channel*	CHxx.unit	01-30, 31-60	**String**	Read Only
Tagname of Channel*	CHxx.tag	01-30, 31-60	**String**	Read Only
Status of Channel*	CHxx.status	01-30, 31-60	**String**	Read Only
Lowest Measuring Channel*	CH.Low		**Short**, Word, Byte	Read Only
Highest Measuring Channel*	CH.High		**Short**, Word, Byte	Read Only
Lowest Math Channel*	CHA.Low		**Short**, Word, Byte	Read Only
Highest Math Channel*	CHA.High		**Short**, Word, Byte	Read Only

***** Data associated with these addresses are read from the device only at the start of a communications session. Once read, the values will not be refreshed until the server has been restarted or the "Reset" tag has been invoked. To invoke a reset, a non-zero value must be written to the Reset tag. Once the Reset tag has been invoked, the driver will reinitialize all startup data from the device.

Alarm Setpoints
Data values for Alarm Setpoints that are undefined in the device will be returned as +INF.

Scales
Data values for Scale_Hi and Scale_Lo for channels that are skipped will be returned as +INF.

Tag Names

For devices that do not support tag names and channels that have unspecified tag names, the driver will construct an internal tag name based on the channel number. For example, the tag name of address 'CH01' will be returned as 'CH01'.

General Device Data

Address Type	Format	Range	Data Types	Access
Date of Last Data	Date		**String**	Read Only
Time of Last Data	Time		**String**	Read Only
Model Name of Device*	Model		**String**	Read Only
Math Communication Data*	CDxx	01-30	**Float**	Write Only
Control Math Execution	MathControl		**Short**, Word, Byte	Write Only
Reset Alarms	AlarmReset		**Boolean**	Write Only
Direct Reloading of Configuration	Reset		**Boolean**	Write Only

Math Communication Data
The CD address type is only valid for devices equipped with the math option. Write operations to CD addresses for non-math equipped devices will return an error.

Model Name of Device
The Model address type will have a string value of 'HR2400' for all models.

Control Math Execution
The MathControl address type is only available for devices equipped with the math option. Write operations to the MathControl tag for non-math equipped devices will return an error.

Notes:

1. The actual number of addresses available for of each type depends on the configuration of the Yokogawa device. If the driver finds at Runtime that an address is not present in the device, it will post an error message and remove the tag from its scan list.
2. Addresses that have Write Only access are assigned a default access of Read/Write. However, data values are unreadable for these addresses and the associated tags are not included in the scan list. The current data value for these tags will always be 0 for numeric data types and null string for string data types.

Error Descriptions

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

Address Validation

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

Serial Communications

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

Device Status Messages

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

Missing address

Error Type:

Warning

Possible Cause:

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

Solution:

Re-enter the address in the client application.

Device address '<address>' contains a syntax error

Error Type:

Warning

Possible Cause:

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

Solution:

Re-enter the address in the client application.

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

Error Type:

Warning

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

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

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

Error Type:
Warning

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

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

Device address '<address>' is Read Only

Error Type:
Warning

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

Solution:
Change the access mode in the client application.

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 COMN port has been selected.

Error opening COMn

Error Type:
Fatal

Possible Cause:
The specified COM port could not be opened due to 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.

COMn is in use by another application

Error Type:
Fatal

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

Solution:
1. Verify that the correct port has been assigned to the channel.
2. Verify that only one copy of the current project is running.

Unable to set comm parameters on COMn

Error Type:
Fatal

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

Solution:
Verify the serial parameters and make any necessary changes.

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 device and the Host PC is bad.
2. The communications parameters for the serial connection are incorrect.

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

Device '<device name>' is not responding

Error Type:

Serious

Possible Cause:

1. The connection between the device and the Host PC is broken.
2. The communication port specified is incorrect.
3. The response from the device took longer to receive than the amount of time specified in the "Request Timeout" device setting.

Solution:

1. Verify the cabling between the PC and the PLC device.
2. Verify that the specified communication parameters match those of the device.
3. Increase the Request Timeout setting so that the entire response can be handled.

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

Error Type:

Serious

Possible Cause:

1. The connection between the device and the Host PC is broken.
2. The named device may have been assigned an incorrect IP address.
3. The address specified may be Read Only or may not exist in the current device.

Solution:

1. Verify the cabling between the PC and the PLC device.
2. Verify the IP address given to the named device matches that of the actual device.
3. Check address availability for the device.

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