

MTConnect® Driver Help

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MTConnect® Driver Help

Help version 1.020

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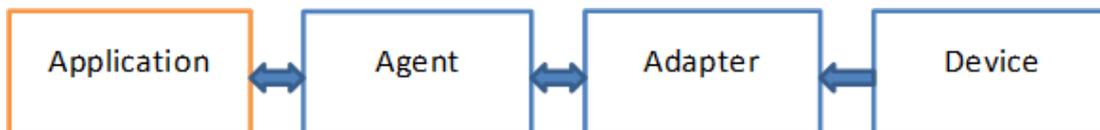
[Error Descriptions](#)

What error messages does the MTConnect Driver produce?

Overview

The MTConnect® Client Driver provides a reliable way to connect MTConnect agents to OPC Client applications, including HMI, SCADA, Historian, MES, ERP, and many custom applications.

MTConnect is a lightweight, open, and extensible protocol designed to exchange data between shop-floor equipment and software applications used for monitoring and data analysis. The standard is owned and maintained by the MTConnect Institute. The basic architecture of a MTConnect system is:



The agent, adapter, and device can be combined or separate and implemented in a device, a PC, or a combination. The MTConnect Client Driver runs at the application level. TCP/IP is used to communicate with both the adapter and the agent by addressing their IP and port numbers. The default port number for an adapter is 7878 and the default port for an agent is 5000, though 80, the default HTTP port is frequently used. An agent responds to an application request with well-formed XML, where the adapter sends pipe-separated data to an agent.

The MTConnect® Client Driver works with all V1.1 and V1.2 compliant MTConnect agents and provides partial support for V1.3. The driver currently supports the following MTConnect commands:

- **PROBE:** This command reads the device's address space (which is represented by the agent and used for automatic tag generation).
- **CURRENT:** This command reads a data item's snapshot value.

Best Practices

The MTConnect® Client Driver always connects to an agent; whatever port number is assigned to the target agent must be specified as the Port Number in the Device Properties | Settings. It is possible to connect the MTConnect® Client Driver to an adapter port, which fails because the driver requires XML format and cannot interpret pipe-separated data. It is a good practice to verify the ports by connecting to them with a browser to confirm valid data results.

Example:

If both the agent and adapter are running on a PC with IP address 10.20.21.73, connect using these addresses:

http://10.20.21.73:5000
http://10.20.21.73:7878

Port 5000 returns well-formed XML.

Port 7878 returns pipe-separated data; e.g. 2015-01-15T16:40:58.616Z|Xloadc|NORMAL|||

An XML validation error in the Event Log means the XML sent from the agent failed some facet or restriction in a schema file in the folder driver/MTConnectClient or the version of the schema file specified in the XML stream from the agent isn't in the driver/MTConnectClient folder. To temporarily bypass all schema validation for the agent stream, remove all schemas from the driver/MTConnectClient folder. The MTConnect version used to stream data between agent and driver is determined by the agent and can be set in the agent configuration file.

Notes:

1. Restart or reinitialize the server runtime to load schema changes.
2. MTConnect version 1.3, released in November 2014, added support for XML schema 1.1. This MTConnect Client Driver doesn't support enhancements that rely on XSD 1.1.

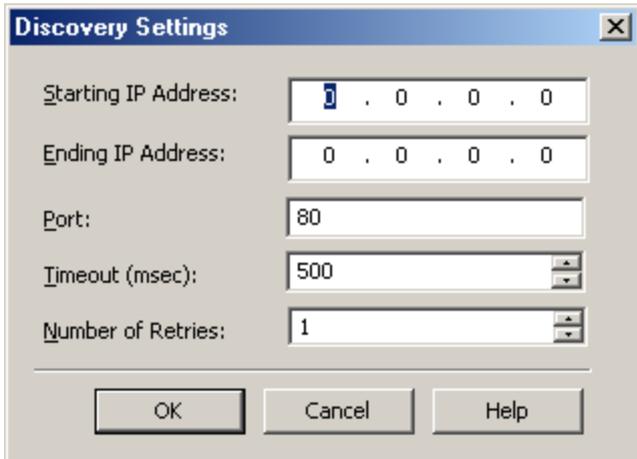
See Also:

[Error Descriptions](#)

Channel Setup

Device Discovery

The MTConnect Driver can locate agents on the network. Once agents are located, they can be added to the channel as a server device. The maximum number of agents that can be discovered at once is 65535. For more information on device discovery, refer to the server help file.



Descriptions of the parameters are as follows:

- **Starting IP Address:** This parameter specifies the starting IP address. The default setting is 0.0.0.0.
- **Ending IP Address:** This parameter specifies the ending IP address. The default setting is 0.0.0.0.
- **Port:** This parameter specifies the port number. The valid range is 1 to 65535. The default setting is 80.
- **Timeout (msec):** This parameter specifies the time that the driver will wait for a connection to be made with an agent, as well as the time that the driver will wait on a response from the agent before giving up and going on to the next request. The default setting is 500 milliseconds.
- **Number of Retries:** This parameter specifies the number of times that the driver will retry a message before giving up and going on to the next message. The default setting is 1.

Device Setup

Supported Devices

Any V1.1 compliant MTConnect Agent.

Note: Users can import additional schemas into the server's root `\Drivers\MTConnectClient` folder.

Maximum Number of Channels and Devices

The maximum number of channels supported is 100. The maximum number of devices supported per channel is 256.

Device ID

The Device ID specifies the IP address/host name of the agent in addition to the name of the device being referenced in the agent. The format is `<IPAddress\HostName>/<Device-ID>`. The device name has to be of NMTOKEN XML type.

Example

173.45.237.40/VMC-3Axis

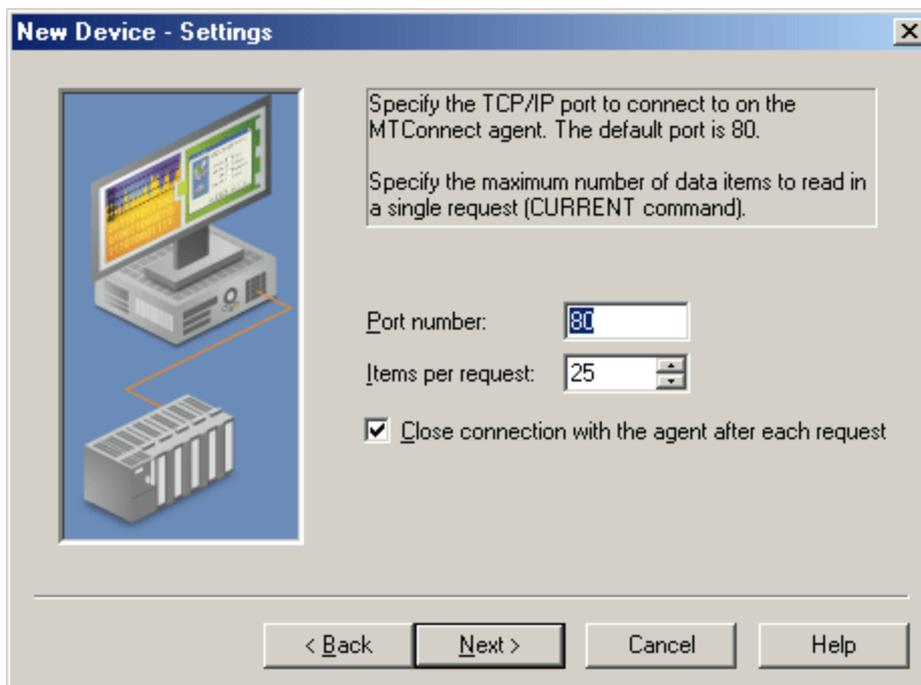
Note: For more information, refer to [Extensible Markup Language \(XML\) 1.0 \(Fifth Edition\)](#).

Auto-Demotion

A non-responsive agent with many tags may impede communications with other agents on the same channel due to the timeout period used on each successive query to the non-responsive agent. As such, it is recommended that auto-demotion be used for each agent when communications are unreliable. For more information on auto-demotion, refer to the server help file.

Settings

These parameters are used when communicating with the agent.



Descriptions of the parameters are as follows:

- **Port number:** This parameter specifies the port number. The valid range is 1 to 65535. The default setting is 80.
- **Items per request:** This parameter specifies how many data items will be bundled together in each read request. The valid range is 1 to 100. The default setting is 25.

- **Close connection with the agent after each request:** When checked, this option will close the socket connection with the agent after each read request. A new connection will be opened for the subsequent read. The default setting is checked.

Automatic Tag Database Generation

The MTConnect Driver has the ability to automatically generate tags from the MTConnect agent for the device. When doing so, the driver will use the PROBE command to receive all existing data items for the device. Tags will then be created that correspond to each received data item.

An MTConnect device is made up of components that may have further sub-components. Data items are organized inside components. The automatically generated tags will be organized in the same hierarchy; that is, in tag groups that correspond to each component or sub-component.

Note: For more information on automatic tag database generation, refer to the server help file.

Data Types Description

Data Type	Description
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
String	ASCII text string
Double	64-bit Floating point value bit 0 is the low bit bit 63 is the high bit

Assigning Data Types

Tags that are created manually must also assign the data type manually. Users must assign the correct data type because the MTConnect Driver does not have any information based on the tag address (or Data Item ID). The default data type for manually created tags is String.

Automatically generated tags will automatically assign the data type based on the MTConnect standard. For more information, refer to *MTConnect® Standard Part 2 – Components and Data Items Version 1.1.0* and *MTConnect® Standard Part 3 – Streams, Events, Samples, and Condition Version 1.1.0*.

The following data type mapping tables are for automatically generated tags.

SAMPLE Data Items

Data Item Type	Data Type
ACCELERATION	Double
AMPERAGE	Double
ANGLE	Double
ANGULAR_ACCELERATION	Double
ANGULAR_VELOCITY	Double
AXIS_FEEDRATE	Double
DISPLACEMENT	Double
FREQUENCY	Double
LOAD	Double
PATH_FEEDRATE	Double
PATH_POSITION	String
PH	String
POSITION	Double
PRESSURE	Double
SPINDLE_SPEED	Double
TEMPERATURE	Double
TORQUE	Double

Data Item Type	Data Type
VELOCITY	Double
VOLTAGE	Double
WATTAGE	Double

EVENT Data Items

Data Item Type	Data Type
ACTIVE_AXES	String
AVAILABILITY	String
BLOCK	String
CODE	String
CONTROLLER_MODE	String
COUPLED_AXES	String
AXIS_COUPLING	String
DIRECTION	String
DOOR_STATE	String
EXECUTION	String
EMERGENCY_STOP	String
LINE	DWord
MESSAGE	String
PART_COUNT	Integer
PART_ID	String
PATH_MODE	String
POWER_STATUS	String
POWER_STATE	String
PROGRAM	String
ROTARY_MODE	String
TOOL_ID	String
WORKHOLDING_ID	String

Note: All CONDITION type data items are assigned the String data type.

Address Descriptions

The MTConnect Driver specifies addresses using the Data Item ID. This ID is case sensitive, and must adhere to the W3C Standard ID type. As such, the ID must start with a colon, comma, underscore, or letter (A-Z or a-z). It can then be followed with numbers, letters, a hyphen, or a period. For more information, refer to [Extensible Markup Language \(XML\) 1.0 \(Fifth Edition\)](#).

Note: All addresses are read only.

Error Descriptions

The following categories of messages may be generated. Click on the link for a list of related messages.

[Address Validation](#)

[Device Status Messages](#)

[Automatic Tag Database Generation Messages](#)

[MTConnect Error Codes](#)

[HTTP Response Codes](#)

Address Validation

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

[Data Type <type> is not valid for device address <address>.](#)

[Device address <address> contains a syntax error.](#)

[Device address <address> is read only.](#)

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:

An invalid tag address has been specified in a dynamic request.

Solution:

Re-enter the address in the client application.

See Also:

[Address Descriptions](#)

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 agent supports for that address.

Solution:

Change the access mode in the client application.

Device Status Messages

The following messages may be generated. Select a link from the list below for a description of the message.

[Device <device name> is not responding.](#)

[Read for the data item <address> on device <device> failed. Reason: Agent unable to collect data from the device. Agent reported data is UNAVAILABLE.](#)

[Read for the data item <address> on device <device> failed. Reason: Response from agent failed schema validation.](#)

Read for the data items <address> on device <device> failed. Reason: Error in creating MTConnect packet.

Read for the data items <address> on device <device> failed. Reason: Internal error.

Read for the data items <address> on device <device> failed. Reason: Invalid data item ID.

Read for the data items <address> on device <device> failed. Reason: Invalid response from agent.

Read for the data items <address> on device <device> failed. Reason: Received HTTP error <error-code>.

Read for the data items <address> on device <device> failed. Reason: Received MTConnect error <error-string>.

Read for the data items <address> on device <device> failed. Reason: Unable to connect to the agent.

Read for the data items <address> on device <device> failed. Reason: Unable to transmit request to the agent.

Read for the data items <address> on device <device> failed. Reason: XML Validation Error: The node is neither valid nor invalid because no DTD/Schema declaration was found.

Unable to bind to adapter: <network adapter name>. Connect failed.

Device <device name> is not responding.

Error Type:

Serious

Possible Cause:

1. The connection between the driver (Host PC) and the agent is broken.
2. The connection's communication parameters are 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 Host PC and the agent.
2. Verify that the specified communication parameters match those of the agent.
3. Increase the Request Timeout setting so that the entire response can be handled.

Read for the data item <address> on device <device> failed. Reason: Agent reported data is UNAVAILABLE.

Error Type:

Warning

Possible Cause:

The value of the data item received from the agent is UNAVAILABLE. This indicates that the agent was not able to read the latest value of the data item from the device. The value is currently indeterminate. UNAVAILABLE is a valid value when the data source is not connected or the data source is unable to retrieve information. The UNAVAILABLE value persists until the connection is restored and a new value can be retrieved. This state does not imply the device is no longer operational; it only implies that the state cannot be determined.

Solution:

Wait for some time so that the agent is able to read the data item from the device. It is possible that a data item will remain in this state indefinitely (such as a temperature sensor that becomes permanently disconnected from the agent).

Read for the data item <address> on device <device> failed. Reason: Response from agent failed schema validation.

Error Type:

Serious

Possible Cause:

The XML response sent by the agent for the CURRENT request is not valid as per the MTConnectStreams_n.n.xsd/ MTConnectError_n.n.xsd schema published by MTConnect (where n.n is the version of the agent, i.e. 1.1, 1.2, 1.3).

Solution:

Ensure that the MTConnect schemas are in the path that the driver expects them (*see the MTConnect section in the [Overview](#)*).

Note:

If the solution fails, contact the agent's Technical Support.

Read for the data items <address> on device <device> failed. Reason: Error in creating MTConnect packet.

Error Type:

Serious

Possible Cause:

An unexpected internal error occurred when creating the MTConnect CURRENT packet.

Solution:

Contact Technical Support for help.

Read for the data items <address> on device <device> failed. Reason: Internal error.

Error Type:

Serious

Possible Cause:

An unexpected driver error occurred.

Solution:

Contact Technical Support for help.

Read for the data items <address> on device <device> failed. Reason: Invalid data item ID.

Error Type:

Serious

Possible Cause:

The requested Data Item ID does not exist in the agent.

Solution:

Correct the Data Item ID and ensure that it exists in the agent.

Read for the data items <address> on device <device> failed. Reason: Invalid response from agent.

Error Type:

Serious

Possible Cause:

1. A misbehaving agent sent an invalid MTConnect response.
2. The entity that the driver is assuming to be an agent is not an MTConnect agent.

Solution:

Contact the agent's Technical Support.

Read for the data items <address> on device <device> failed. Reason: Received HTTP error <error-code>.

Error Type:

Serious

Possible Cause:

The cause depends on the HTTP error code.

Solution:

The solution depends on the HTTP error code.

See Also:

[HTTP Response Codes](#)

Read for the data items <address> on device <device> failed. Reason: Received MTConnect error <error-string>.

Error Type:

Serious

Possible Cause:

The cause depends on the MTConnect error.

Solution:

The solution depends on the MTConnect error.

See Also:

[MTConnect Error Codes](#)

Read for the data items <address> on device <device> failed. Reason: Unable to connect to the agent.

Error Type:

Serious

Possible Cause:

1. The agent that the IP address/host name pointed to in the device ID is not running.
2. An incorrect IP address/host name has been specified in the device ID.
3. An incorrect port number has been specified.

Solution:

1. Ensure that the agent is running.
2. Correct the IP address/host name so that it points to a valid agent.
3. Correct the port number to match the agent at the specified IP address.

Read for the data items <address> on device <device> failed. Reason: Unable to transmit request to the agent.

Error Type:

Serious

Possible Cause:

The agent disconnected (abruptly or otherwise).

Solution:

The agent will attempt to re-connect with the agent on the subsequent read transaction. Ensure that the agent is up and running.

Read for the data items <address> on device <device> failed. Reason: XML Validation Error: The node is neither valid nor invalid because no DTD/schema declaration was found.

Error Type:

Serious

Possible Cause:

The specified MTConnectDevices_x.x.xsd XML file is a different version than the one installed with the server. The server installs:

- MTConnectDevices_1.1.xsd
- MTConnectStreams_1.1.xsd
- MTConnectError_1.1.xsd
- MTConnectDevices_1.2.xsd
- MTConnectStreams_1.2.xsd
- MTConnectAssets_1.2.xsd (new in version 1.2)
- MTConnectError_1.2.xsd
- MTConnectDevices_1.3.xsd
- MTConnectStreams_1.3.xsd
- MTConnectAssets_1.3.xsd
- MTConnectError_1.3.xsd

Solution:

Use a browser to connect to the MTConnect device directly, then find the XML code being used. This code will be listed in the first few lines of the XML code. Follow the link to the specified XSD location and download the specified versions of the MTConnect*.xsd files. Copy the files to the `\Drivers\MTConnect` folder located in the server's root folder, leaving the default V1.1 XSD files in the folder as well.

Note:

If this solution fails, contact the agent's Technical Support.

<Schema file> failed to load; may cause validation errors.

Error Type:

Serious

Possible Cause:

1. The schema file is not well formed or is invalid.
2. The schema file contains features beyond XML schema Version 1.0.

Solution:

1. Verify that the file passes XSD validation checks.
2. This driver supports XML schema Version 1.0. Remove references to newer features and re-validate.

Unable to bind to adapter: <network adapter name>. Connect failed.

Error Type:

Warning

Possible Cause:

The specified network adapter cannot be bound to for communications because it cannot be located in the system device list. This usually occurs when a project has been moved from one PC to another, and when the project specifies a network adapter instead of using the default. The server will fall back to the default adapter.

Solution:

Either change the Network Adapter property to Default or select a new adapter. Then, save the project and try connecting.

Automatic Tag Database Generation Messages

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

[Unable to generate a tag database for device <device>. Reason: Agent did not respond.](#)

[Unable to generate a tag database for device <device>. Reason: Agent returned MTConnect error: <error-string>.](#)

[Unable to generate a tag database for device <device>. Reason: Error in creating MTConnect packet.](#)

[Unable to generate a tag database for device <device>. Reason: HTTP error: <error-code>.](#)

[Unable to generate a tag database for device <device>. Reason: Internal error.](#)

[Unable to generate a tag database for device <device>. Reason: Invalid response from agent.](#)

[Unable to generate a tag database for device <device>. Reason: Response from agent failed schema validation.](#)

[Unable to generate a tag database for device <device>. Reason: Unable to connect to the agent.](#)

[Unable to generate a tag database for device <device>. Reason: Unable to transmit request to the agent.](#)

Unable to generate a tag database for device <device>. Reason: Agent did not respond.

Error Type:

Serious

Possible Cause:

The agent that the IP address/host name pointed to in the Device ID is not running.

Solution:

Ensure that the agent is running.

Unable to generate a tag database for device <device>. Reason: Agent returned MTConnect error: <error-string>.

Error Type:

Serious

Possible Cause:

1. The device name is incorrect and does not exist in the agent.
2. The cause is as indicated by the MTConnect error string.

Solution:

1. Change the device name so that the new name exists in the agent. Users should also ensure that case is correct, because the device name is case sensitive in MTConnect.
2. The solution depends on the MTConnect error string that was received.

Unable to generate a tag database for device <device>. Reason: Error in creating MTConnect packet.

Error Type:

Serious

Possible Cause:

An unexpected internal error occurred during the creation of the MTConnect PROBE packet.

Solution:

Contact Technical Support for help.

Unable to generate a tag database for device <device>. Reason: HTTP error: <error-code>.

Error Type:

Serious

Possible Cause:

The cause depends on the HTTP error code.

Solution:

The solution depends on the HTTP error code.

See Also:

[HTTP Response Codes](#)

Unable to generate a tag database for device <device>. Reason: Internal error.

Error Type:

Serious

Possible Cause:

An unexpected driver error occurred.

Solution:

Contact Technical Support for help.

Unable to generate a tag database for device <device>. Reason: Invalid response from agent.

Error Type:

Serious

Possible Cause:

1. A misbehaving agent sent an invalid MTConnect response.
2. The entity that the driver is assuming to be an agent is not an MTConnect agent.

Solution:

Consult the agent's Technical Support.

Unable to generate a tag database for device <device>. Reason: Response from agent failed schema validation.

Error Type:

Serious

Possible Cause:

The XML response sent by the agent for the PROBE request is not valid as per the MTConnectDevices_n.n.xsd/MTConnectError_n.n.xsd schema published by MTConnect (where n.n is the version of the agent, i.e. 1.1, 1.2, 1.3).

Solution:

1. Ensure that the MTConnect schemas are in the path where the driver expects them (*see the MTConnect section in the [Overview](#)*).
2. Consult the agent's Technical Support.

Unable to generate a tag database for device <device>. Reason: Unable to connect to the agent.

Error Type:

Serious

Possible Cause:

1. The agent that the IP address/host name pointed to in the Device ID is not running.
2. An incorrect IP address/host name has been specified in the Device ID.

Solution:

1. Ensure that the agent is running.
2. Ensure that the IP address/host name is correct.

Unable to generate a tag database for device <device>. Reason: Unable to transmit request to the agent.

Error Type:

Serious

Possible Cause:

The agent disconnected (abruptly or otherwise).

Solution:

The agent will attempt to re-connect with the agent on the subsequent auto generate transaction. Users should ensure that the agent is up and running.

MTConnect Error Codes

Error Code	Description
UNAUTHORIZED	The request did not have sufficient permissions to perform the request.
NO_DEVICE	The device specified in the URI could not be found.
INVALID_URI	The URI provided was incorrect.
INVALID_REQUEST	The request was not one of the three specified requests.
INTERNAL_ERROR	The agent did not behave correctly. Contact the software provider.
INVALID_PATH	The path could not be parsed. The syntax is invalid.
UNSUPPORTED	A valid request was provided but the agent does not support the feature or request type.

HTTP Response Codes

Response Code	Title	Description
400	Bad Request	The request could not be interpreted.
500	Internal Error	There was an internal error in processing the request. This will require Technical Support to resolve.
501	Not Implemented	The request could not be handled on the server because the specified functionality was not implemented.

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