MTConnect Driver Help

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MTConnect Driver Help

Help version 1.012

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Overview

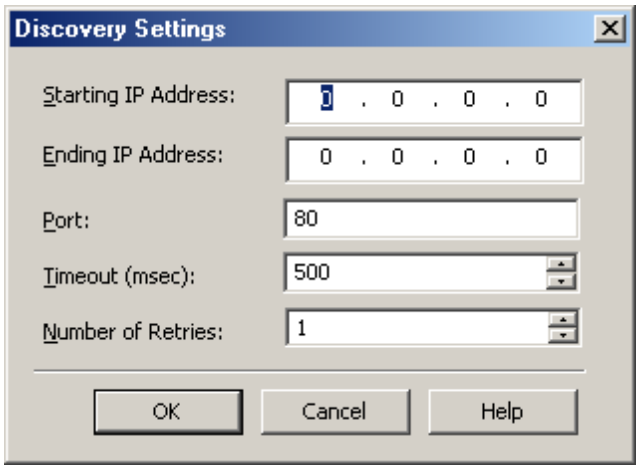
The MTConnect Client Driver provides an easy and reliable way to connect MTConnect agents to OPC Client applications, including HMI, SCADA, Historian, MES, ERP, and countless custom applications. It is intended to work with all V1.1 compliant MTConnect agents. The driver currently supports the following MTConnect commands:

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

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 V 1.1 compliant MTConnect Agent.

Maximum Number of Channels and Devices
The maximum number of channels supported is 100. The maximum number of devices supported per channel is 256.

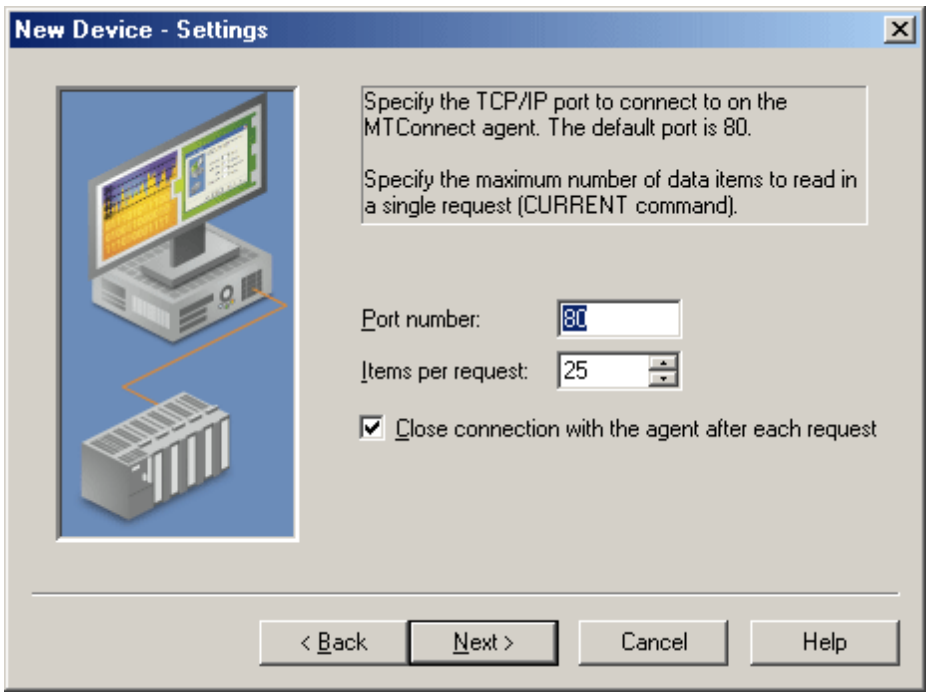
Device ID
The Device ID specifies the IP address/host name of the agent in addition to the name of the device being referenced in the agent. The format is *<IPAddress\HostName>/<Device-ID>*. The device name has to be of NMTOKEN XML type.

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

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

Address Validation

Data Type '<type>' is not valid for device address '<address>'
Device address '<address>' contains a syntax error
Device address '<address>' is read only

Device Status Messages

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'
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

Automatic Tag Database Generation Messages

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'

See Also: Error Codes

Address Validation

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

Address Validation

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 error/warning messages may be generated. Select a link from the list below for a description of the message.

Device Status Messages
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'
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 unable to collect data from the device'

Error Type:
Serious

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.

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_ 1.1.xsd/ MTConnectError_1.1.xsd schema published by MTConnect.

Solution:
Ensure that the MTConnect schemas are in the path that the driver expects them to be.

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.

Solution:
1. Ensure that the agent is running.
2. Correct the IP address/host name so that it points to a valid agent.

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, and MTConnectError_1.1.xsd.

Solution:
Use a browser to connect to the MTConnect device directly, and then find the XML code that is being used. This code will be listed in the first few lines of the XML code. Then, follow the link to the specified XSD location, and download the specified version of the MTConnectDevices_x.x.xsd, MTConnectStreams_x.x.xsd, and MTConnectError_x.x.xsd files. Copy the files to the *\Drivers\MTConnect* folder located in the server's root folder, and leave the default V1.1 XSD files in that folder.

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

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

Automatic Tag Database Generation Messages
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_1.1.xsd/ MTConnectError_1.1.xsd schema published by MTConnect.

Solution:
1. Ensure that the MTConnect schemas are in the path where the driver expects them to be.
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/hostname 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.

Error Codes

For more information on a specific type of error code, select a link from the list below.

MTConnect Error Codes
HTTP Response Codes

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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