

DAServer Manager User's Guide

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Before You Begin

About This Book

This book describes the user interface and functions of the DAServer Manager. This book is organized in the following fashion:

- Table of Contents
- DAServer Manager: contains instructions for understanding the user interface and using the DAServer Manager.
- Index

You can view this document online or you can print it, in part or whole, by using the Adobe Acrobat Reader's print facility.

CHAPTER 1

DAServer Manager

This documentation describes the runtime Configuration, Diagnostics, and Activation/Deactivation aspects of a Data Access Server (DAServer). These aspects of any DAServer are maintained through the generic component called the DAServer Manager.

Contents

- Overview
- Common Components
- Activation/Deactivation/Service Component
- License Status
- Enable/Disable Hierarchy Node Component
- Reset Hierarchy Node Component
- Delete Hierarchy Node Component
- Rename Hierarchy Node Component
- Configuration Component
- Diagnostics Component

Overview

The DAServer Manager is a part of the System Management Console (SMC) suite of utilities. It enables the configuration, diagnosis and activation/deactivation of a local DAServer located on the same platform as the DAServer Manager, or a remote DAServer located on a different platform as the DAServer Manager.

Important! Multiple instances of the DAServer Manager can be opened at the same time. Only the first instance can be used to create device hierarchies and configure DAServers. In all other instances of the DAServer Manager, hierarchy and configuration settings are set to read-only.

Servers developed with the Data Access Server Toolkit can be used as standalones or with Arcestra™-based products. Either way, they are viewed and configured in the DAServer Manager.

This document describes the DAServer Manager utility. This description is divided into six major sections: Common Components, the Activation/Deactivation/Service Component, the Enable/Disable Hierarchy Node Component, the Reset Hierarchy Node component, the Configuration Component, and the Diagnostics Component. Each section contains descriptions of its user interface elements.

Note The DAServer Manager user interface may look different when installed on different versions of Microsoft® Windows®. Also, the version of MMC installed on your computer may affect the content and behavior of the user interface.

Common Components

This section presents the basics of the MMC user interface, which are common to all three aspects of the DAServer Manager. MMC is a Windows Explorer-like user interface that consists of two panes (the Tree pane on the left and the Details pane on the right) and standard menu and toolbar features. See the examples in Figures 1 and 2. For more information about the MMC in general, refer to the MMC's help file, MMC.CHM, typically located in the \\WINNT\Help folder.

Tree Pane

The Tree pane is a hierarchical structure that displays the items available in a snap-in. On the top end of the hierarchy is the snap-in root, the DAServer Manager, which is a container to which items are added.

Immediately under the DAServer Manager, the hierarchy contains two items, Default Group and Remote Network.

Default Group can be expanded to list all PC nodes on the local domain, beginning with Local, the PC on which the DAServer Manager snap-in is running.

Remote Network similarly can be expanded to list all PC nodes under the various available network protocols shared on a remote network (for example, Microsoft Windows Network). Each PC node is itself a container if one or more DAServers are running on that node.

Throughout this document, Local is used for example purposes. All of the snap-in functionality described is the same no matter whether the DAServer Manager and any DAServers are located on local or remote nodes and no matter whether they are both located on the same node.

On the other end of the Tree hierarchy are leaves. These items are not containers.

Details Pane

When you select a container item in the Tree pane, the Details pane displays the hierarchy contained by that item. When you select a leaf, the Details pane displays information about and functions pertaining to that leaf. As you click different leafs in the Tree pane, the information in the Details pane changes. The Details pane can display many types of information including HTML pages, ActiveX faceplate components, tables, and columns.

Standard Features

Each MMC snap-in has its own menu and toolbar, separate from those of the main MMC window. The DAServer Manager adds the following five commands to the user interface:

- The Activate Server/Deactivate Server command on the Action menu. This toggle command allows you to activate the selected DAServer if it is currently deactivated, and vice versa. See Activation/Deactivation/Service Component on page 11
- The Configure as Service command on the Action menu. This command allows you to change the way the DAServer is started. See Activation/Deactivation/Service Component on page 11 for more information about this setting.
- The Time Zone command on the View menu. This command allows you to change the time zone reference for the DAServer. See Time Zone Format on page 29 for more information about this function.
- The Reset command on the Action menu. This command allows you to reset the configured parameter values at the given hierarchy node and its child nodes at runtime. See Reset Hierarchy Node Component on page 13.
- The Enable and Disable commands on the Action menu. This toggle command allows you to enable the selected DAServer hierarchy node if it is currently disabled, and vice versa. See Enable/Disable Hierarchy Node Component on page 12.

The DAServer Manager components added to the MMC user interface help you perform configuration, diagnostic, and activation tasks. Also, right-clicking on any container or leaf item displays a menu with similar tasks. Each DAServer may display different features, depending on the DAServer design implemented by the DAServer developer.

Examples

The image in Figure 1 shows the DAServer ArchestrA.DASOME5C.1 installed on a PC node, in this case the local PC. The icon displayed next to the DAServer name indicates that the DAServer is inactive. As indicated, inactive DAServers contain only Configuration branch nodes.

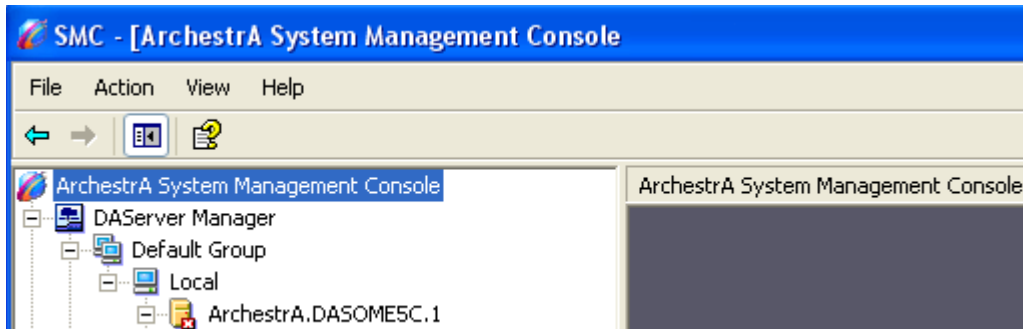


Figure 1. Inactive DAServer

The image in Figure 2 shows the same ArchestrA.DASOME5C.1 DAServer in an active state. The icon next to the DAServer name indicates this condition. When expanded as shown, an active DAServer contains both Configuration and Diagnostics branch nodes.

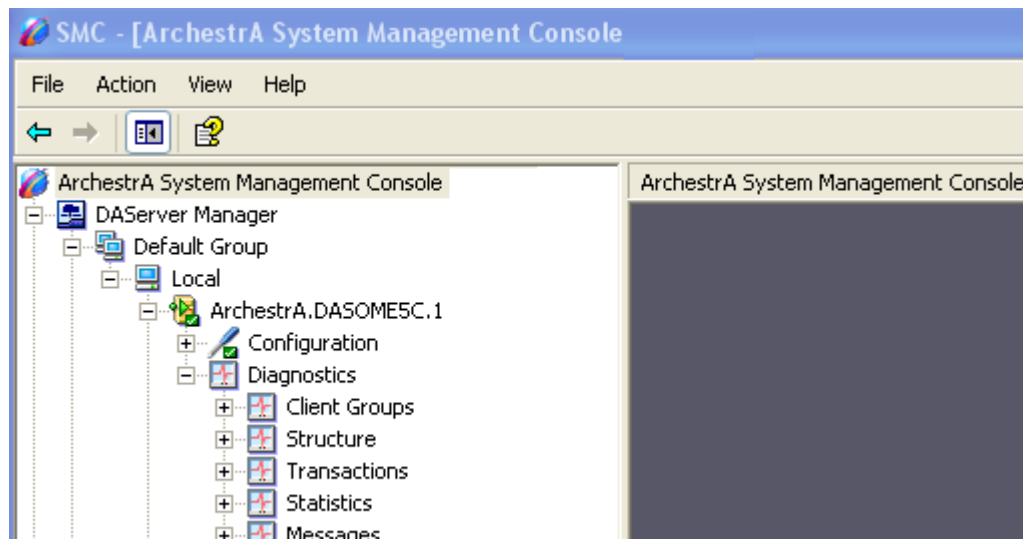


Figure 2. Active DAServer

Activation/Deactivation/Service Component

A DAServer can be in four basic states: Activated, Deactivated, Running as a Service, and Running Not as a Service. These are indicated by the following icons associated with any DAServer shown under the DAServer Manager:



DAServer in ACTIVE state, running NOT as a service



DAServer in DEACTIVATED state, NOT as a service





DAServer in ACTIVE state, running as a service



DAServer in DEACTIVATED state, as a service

To activate a DAServer, first select it in the node tree and then click Activate Server on the Action menu. To deactivate it, select it and then click Deactivate Server on the Action menu. The same action can be performed with the

Activate Server  and Deactivate Server  icons on the toolbar.

When activated, a DAServer provides the communication capabilities expected by a client. When deactivated, a DAServer ceases to communicate.

A service is a program, routine, or process that performs a specific function to support other programs, typically at a low (close to the hardware) level. A service runs whether or not someone is logged on to the computer.

To activate a DAServer that is currently deactivated, right-click on the DAServer name or its icon and select the Activate Server command from the context menu. The opposite (Deactivate Server command) is valid for an active DAServer. If a DAServer is activated as a service, it cannot be activated as a non-service.

Note The Deactivate Server command is not available if the DAServer is invoked inproc by another OPC client.

A DAServer can be set to run as a service only when it is in deactivated state. Otherwise, context menu commands for running as a service are unavailable. If the DAServer is currently in activated state, the Configure as Service command mentioned below is unavailable.

To configure a DAServer as a service, right-click on the DAServer name or its icon in the DAServer Manager, and point to the Configure as Service command on the context menu. From the submenu, select either the Auto Service or Manual Service command. Configuring a DAServer in the Auto Service state automatically runs the DAServer as a service when the PC is booted. Manual Service requires that you or a client run the DAServer after the PC is booted.

To configure a DAServer to run not as a service, select the Not a Service command. When configured this way, the DAServer will not connect via DDE. The checkmark on the context menu indicates the current configuration.

Activation/deactivation of a DAServer running as a service is allowed if it is configured for either Manual or Auto Service. When the state of a DAServer is changed, the icon associated with it changes to reflect its new state.

The remainder of the context menu commands for DAServer hierarchy nodes in the DAServer Manager are standard for Windows or the Microsoft Management Console (MMC). See MMC help (MMC.CHM) for more information.

License Status

The license status of DAServers can be determined by looking at the DAServer icon while the DAServer is active.

- If the license is valid, a certificate is shown.
- If the license is in Demo mode, a green arrow is shown.
- If the license is not valid, a red arrow is shown.



DAServer in ACTIVE state, running as not a service, license valid



DAServer in ACTIVE state, running as not a service, running in Demo mode



DAServer in ACTIVE state, running as not a service, license not valid

Enable/Disable Hierarchy Node Component

You can disable and enable hierarchy nodes. Hierarchy nodes can be enabled and disabled when the DAServer is active or inactive. The default state of a node is enabled.

The DAServer and Configuration nodes, and the nodes between them, cannot be disabled. However, nodes that model busses, ports, or bridges can be disabled.

System items remain valid for disabled nodes. All other items have "Out-of-Service" quality updated to the client. No messages are sent to disabled nodes. Write transactions for a disabled node fail immediately with a bad HRESULT.

Disabling a node disables all its child nodes. The tree pane does not show child nodes as disabled. When you enable a node, all child nodes are enabled, except those nodes you explicitly disabled. Explicitly disabled child nodes remain disabled until you enable them.

To enable a disabled node, left click the node name or its icon, right click and select Enable.

To disable an enabled node, left click the node name or its icon, right click and select Disable.



Enabled node



Disabled node

A change in the Enable/Disable state of a hierarchy node will not be reflected on a remote DAServer Manager viewing the same DAServer. Collapsing and expanding the DAServer hierarchy tree on the remote DAServer will update the display.

Reset Hierarchy Node Component

You can reset a hierarchy node to make modified configuration parameters take effect without deactivating and reactivating the DAServer. Resetting a node causes all of its child nodes to be reset as well.

The DAServer and Configuration nodes, and the nodes between them, cannot be reset.

To reset a node, left click the node, right click and select Reset.

Delete Hierarchy Node Component

You can delete a hierarchy node any time. When a node is deleted while the DAServer is running, the deletion takes effect right away. Any existing items on subscription will be changed to a bad quality. The item quality will remain the same until the item is deleted.

To delete a node, left click the node, right click and select Delete

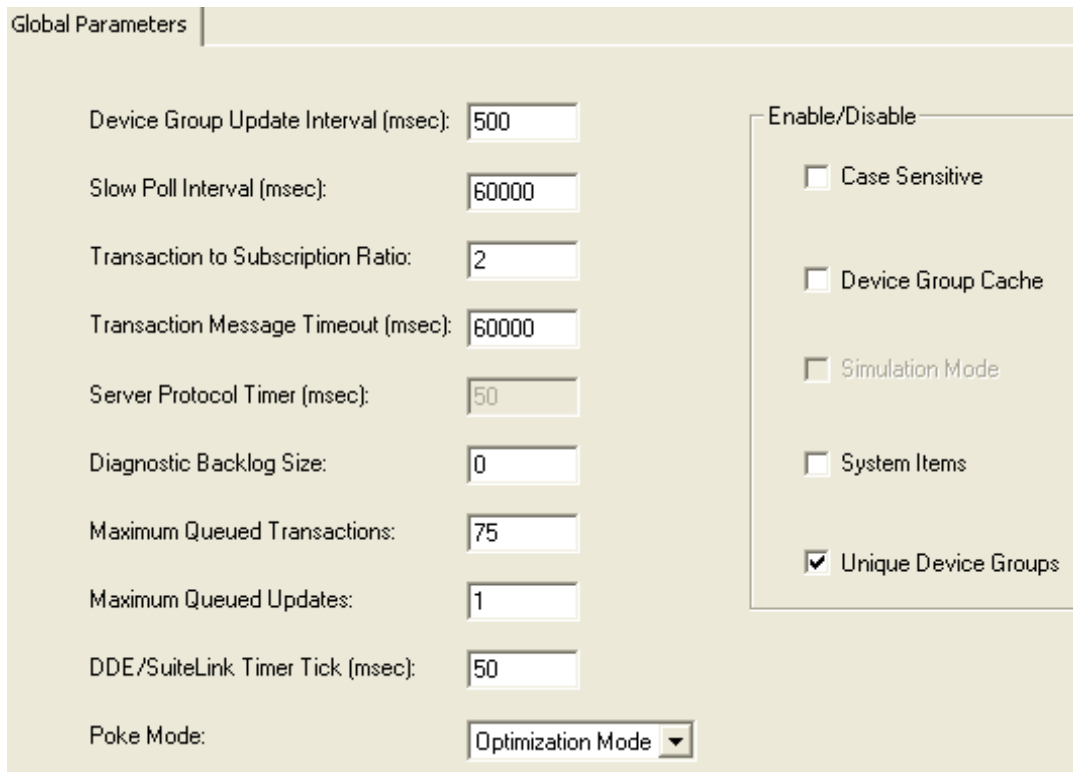
Rename Hierarchy Node Component

You can rename a hierarchy node any time. If a node is renamed while the DAServer is running, the change takes effect immediately. Any existing items on subscription will be changed to a bad quality. The item quality will remain the same until the item is deleted.

To rename a node, left click the node, right click and select Rename

Configuration Component

Each DAServer has a unique set of configuration parameters. For descriptions of those parameters, see your DAServer-specific documentation. The DAServer Manager also displays a set of common or global configuration parameters for each DAServer. Click Configuration in the Tree hierarchy just below the DAServer name to display the dialog box shown in Figure 3 in the Details pane.



Global Parameters

Device Group Update Interval (msec): 500

Slow Poll Interval (msec): 60000

Transaction to Subscription Ratio: 2

Transaction Message Timeout (msec): 60000

Server Protocol Timer (msec): 50

Diagnostic Backlog Size: 0

Maximum Queued Transactions: 75

Maximum Queued Updates: 1

DDE/SuiteLink Timer Tick (msec): 50

Poke Mode: Optimization Mode

Enable/Disable

- Case Sensitive
- Device Group Cache
- Simulation Mode
- System Items
- Unique Device Groups

Figure 3. Global Configuration Parameters

Click the **Save** icon to write the current data to the DAServer's configuration set.

Note Leading zeroes are always truncated from entries typed in numerical fields. In the Global Parameters dialog box, the zeroes are truncated when you click the **Save** icon. The behavior in the remainder of a DAServer's configuration hierarchy depends on the refresh mechanism of the server-specific programming logic.

Under Configuration, the DAServer's configuration hierarchy is displayed. Click each to display its associated configuration dialog box in the Details pane. The configuration hierarchy behaves as follows: Clicking on the Local node or a specific DAServer node rebuilds the list below and collapses the tree. This behavior allows display of new DAServers or nodes that may have been edited or added by other users on the network.

Global parameters include the following:

- **Device Group Update Interval.** This parameter specifies the update interval of the <Default> device group. If it is not specified, all unnamed device groups have an update interval of 1000ms. The value is an integer representing the time in milliseconds. Default is 1000.
 - **Slow Poll Interval.** This parameter controls the interval that the DAServer polls the field device after it goes into slow poll mode. This occurs when certain connectivity problems occur, such as an unplugged PLC. When the DAServer again achieves connectivity with the field device, it returns to normal operation and is governed by configured device group update intervals. The slow poll interval value is an integer representing the interval between polls in milliseconds per transaction item. Default is 10000.
 - **Transaction to Subscription Ratio.** This parameter controls the ratio of transaction to subscription messages in a DAServer at the time when several transaction messages are pending. The value is an integer representing the maximum number of transaction messages sent before sending a subscription message. Default is 2. The second half of the ratio is always 1. Therefore, the default ratio is 2:1, transaction messages to subscription messages. Transactions have a higher priority than subscriptions. If only one transaction message is pending, that message is sent first no matter how many subscription messages are due to be sent. If one or more transactions generate several transaction messages, this ratio applies to the number of generated transaction messages. This ratio ensures that a certain amount of subscription activity is guaranteed even in a transaction overloaded state. The value sets the number of allowed transaction messages to be arbitrated on the protocol before evaluation of due subscription messages is enforced. If subscription messages are due, one of them is sent before sending transaction messages again.
-

- **Transaction Message Timeout.** This parameter sets the timeout for transactions (read/write/refresh/property) per message. The value is an integer representing the timeout in milliseconds per transaction message. Default is 60000 (corresponds to the default ValidDataTimeout in legacy I/O servers). A properly operating DAServer should never encounter this timeout because a transaction will always be completed by the protocol engine (successful or not). This timeout only prevents a client from hanging in a transaction forever if for some reason (bug in the DAServer specific code) the transaction messages are never scheduled until completion. The timeout is specified on an individual message level. It is not the maximum amount of time a transaction can take. It is the maximum amount of time between message updates within a transaction. The timeout has to be set in such a way that under no circumstances can data acquisition on an individual message take longer than this timeout. The time it might take for a transaction containing several messages theoretically can be multiples of this timeout.
- **Server Protocol Timer.** This parameter controls the interval between protocol activities for timer driven DAServers. Your DAServer documentation should state whether this value is used or not. The value is an integer representing the time in milliseconds between protocol activities for timer driven DAServers. Default is 50. This parameter corresponds to the default ProtocolTimerTick in legacy I/O servers. This value is ignored by DAServers with an entirely event driven protocol engine.
- **Diagnostic Backlog Size.** This parameter controls the maximum number of transactions allowed in the Transactions diagnostic root. When the maximum value is reached, transactions shown in the diagnostic root are deleted, beginning with the oldest transaction. Default value for this parameter is DAServer-specific.

Note The **Diagnostic Backlog Size** parameter does not affect the number of transactions allowed by the DAServer. It strictly affects the number of transactions shown in the Transactions diagnostic root.

- **Maximum Queued Transactions.** With this parameter you control the maximum number of outstanding transactions in each of the three transaction queues (read, write, refresh). When a queue becomes full, new transactions are rejected. The minimum value is 1. The maximum value is 300. The default is 75.
 - **Maximum Queued Updates.** With this parameter you control the number of outstanding subscription updates for an individual item. When the limit is exceeded, the oldest subscription is replaced with the new subscription. The minimum value is 1. The maximum value is 1000. The default is 1.
 - **DDE/SL Timer Tick.** With this parameter you control the time between processing DDE/SL client requests. The parameter is an integer representing time in milliseconds. The minimum value is 20ms. The maximum is 6000ms. The default is 50ms. Setting this value to a smaller number increases responsiveness, but may reduce throughput. The default value works well for most installations.
-

-
- **Poke Mode.** This parameter controls how the DAServer treats pokes within a transaction with respect to optimization and folding. Choose between three modes: **Control Mode**, **Transition Mode** and **Optimization Mode**. Default mode displayed is DAServer dependent.
 - **Control Mode** preserves the poke order without folding. Typically used by batch and control applications that depend on order of the pokes and processing every item poked.
 - **Transition Mode** preserves the poke order with minimum folding by keeping the first, second and last poke values of an item. Typically used by batch and control applications that depend on the order of pokes but not processing every item poked.
 - **Optimization Mode** does not preserve the poke order and has maximum folding by only poking the last value of an item. Typically used by HMI applications.
 - **Case Sensitive.** This parameter controls how the DAServer scans item (fully qualified item IDs) and device group names with respect to upper/lower case. Default is unchecked (case insensitive), which is recommended for working with legacy applications. Case sensitivity applies to item names (fully qualified item ID including hierarchy names) and device group names.
 - **Device Group Cache.** This parameter is for future use only, and should not be selected. Some DAServers, in fact, may disable this option. In the future, this parameter will control whether the VTQ cache for items with the same ItemID is shared across device groups.
 - **Simulation Mode.** This parameter sets the DAServer's operation mode. Checking this element sets the DAServer in simulation mode, in which it simulates communication with a configured field device. Clearing this element sets the DAServer in normal operation mode. Default value is normal operation (unchecked). Availability of simulation mode is DAServer-specific. If it is not supported, this element is disabled.
 - **System Items.** This parameter controls whether the system items appear in the browse interface and if they are recognized as valid ItemIDs by the DAServer's data acquisition interfaces. Default is selected (checkbox checked), for system items enabled. Unchecking this option means that no system items exist in the DAServer's namespace.
 - **Unique Device Groups.** This parameter controls whether the device group names are checked for uniqueness across all device nodes of a DAServer. In other words, when this option is checked, all device groups on a server node are considered one list across the namespace. And since device group names are not case sensitive, a specific name is allowed only once, regardless of case. When this option is deselected, you can have the same device group name in different device nodes but not in the same node (inside device groups, names are not case sensitive). In other words, deselecting this option means that device group names are unique on one hierarchy level only. Default for this option is selected (checkbox checked). Selected is required for working with DDE/SuiteLink legacy installations.
-

Common Device Groups

Most DAServer-specific items in the Tree pane hierarchy under Configuration display another common component in the Details pane: Device Groups. Click any PLC device under Configuration to display the dialog box shown in Figure 4 in the Details pane.

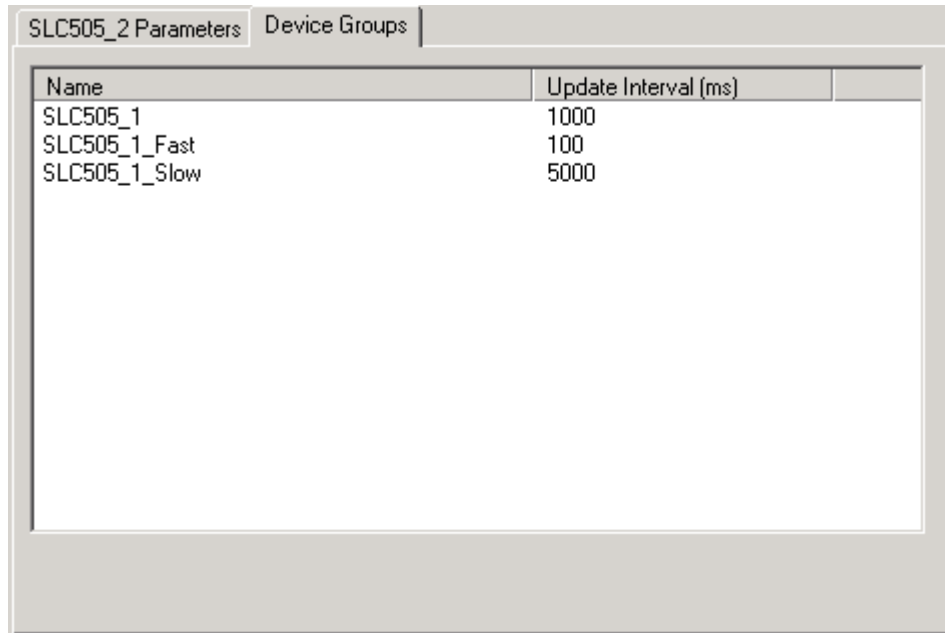


Figure 4. Device Groups Dialog Box

Caution! Device group names are not case sensitive. Therefore, two device groups with the same name with different case should not be used.

Importing/Exporting Device Items

You can import a pre-generated set of device items into a DAServer configuration hierarchy. First, create a comma-separated variable (.csv) file by doing one of the following:

- Use a text editor like Notepad or an application that supports .csv format files like Microsoft Excel to create a new file.
- Export items from another DAServer configuration set to a .csv file. For information about exporting, browse down three paragraphs.

Each row in the resulting .csv file represents an item and each row contains two elements. The first element must be the item name; the second element must be the item reference string. The item name can be the same as the reference string or it can be an alias. If either the item name or reference string element contains a comma, use quotation marks around the element to avoid collision with the comma delimiters.

To import the .csv file, right-click in the Device Items configuration dialog and click **Import**. Browse to the desired .csv file. The items contained in the .csv file now populate the Device Items configuration dialog.

You can also export a set of device items to a .csv file. To do so, right-click in the Device Items configuration dialog and click **Export**. Provide a path and filename for the new file.

Caution! Item names are not case sensitive. Therefore, two items with the same name except for capitalization are now allowed. This restriction does not apply to item reference strings.

Configuration Context Menus

Right-click on the main Configuration tree item of a DAServer, and the following items are displayed in the context menu:

- **Archive Configuration Set.** This command allows you to save the current configuration to a different configuration file. The new configuration set can be used at a later time or shared with another user on a different machine. This command is available for both active and inactive DAServers.

Important! COM1 through COM9 are not valid Archive Configuration Set names. These names are reserved for system functions, and using them for Archive Configuration Set names either fails to create an archived set or causes error conditions.

- **Clear Configuration Set.** This command clears the contents of the current configuration file. You will be warned before this operation is completed. This command is available for only inactive DAServers.
- **Use Another Configuration Set.** This command displays a submenu list of all configuration set files in the DAServer's configuration file folder. This command is available for only inactive DAServers.
- **Delete Configuration Set.** This command displays a submenu list of all configuration set files in the DAServer's configuration file folder. You can select one of these configuration files for deletion. This command is available for only inactive DAServers.

Also, depending on the DAServer and configuration hierarchy level, additional context menu commands may be displayed, each beginning with the word "Add." This command adds the appropriate child object into the hierarchy, depending on allowable items on the hierarchy tree (as determined by the DAServer's original rules file). The Add command varies depending where in the DAServer configuration hierarchy you are. The new child object is given a generic name, which can be renamed.

Note The remainder of the context menu commands for DAServer configuration items in the DAServer Manager are standard for Windows or the Microsoft Management Console (MMC). Also, the context menus available in the Global Parameters dialog are standard Windows menus. See MMC help (MMC.CHM) for more information.

Right-click on the Device Groups dialog box, and the following items are displayed in the context menu:

- **Add.** This command allows you to add a new device group to the Device Group List. It is automatically provided with the Update Interval set for Device Groups in the Global Parameters dialog box (Configuration item in the Tree view hierarchy).
- **Delete.** This command allows you to delete a device group from the Device Group List. You are prompted for confirmation before the device group is deleted.
- **Edit.** This command allows you to configure additional device group information. Clicking this command launches a dialog box in which you can do additional configuration. Availability of this command is server-specific.
- **Config Default Update Interval.** This command allows you to configure an update interval for the default device group. This setting does not impact the update intervals for any other device groups.

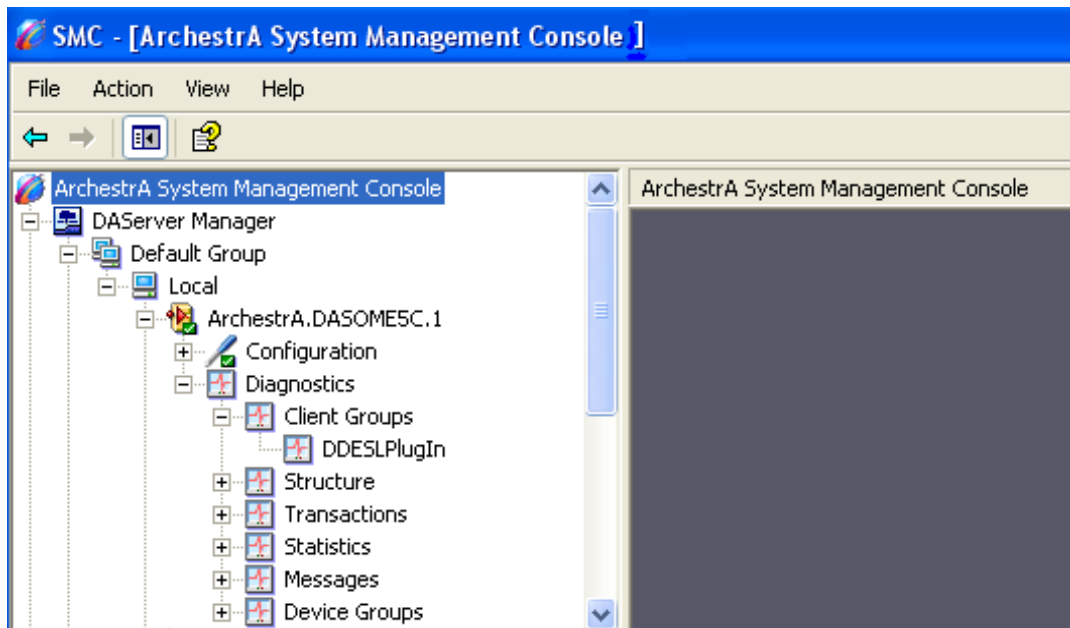
Hot Configuration

Hot configuration depends on the DAServer-specific code and the type of configuration parameter. In most cases only a selected number of parameters can be configured while the DAServer is running, depending on the state of the object the parameter belongs to. In some cases, a significant amount of DAServer-specific code is required to handle a changed configuration (for example, changing the baud rate of an open COM port requires closing the port and reopening it with the new baud rate). If this functionality was not written into the code, it is not supported. Some parameter values simply need a new assignment to go into effect immediately (for example, if the response timeout for a port is changed it is compared in the next timeout checking cycle).

Diagnostics Component

All DAServers display at least six diagnostic roots: Client Groups, Structure, Transactions, Statistics, Messages, and Device Groups. Each diagnostic root is described below. See Figure 5 for an example of the diagnostic hierarchy. Your DAServer may have additional diagnostic roots and additional data displayed for the common diagnostic roots described below. See your DAServer documentation for descriptions of those features.

Figure 5.Diagnostic Roots



The Client Groups item contains diagnostic items for each plug-in that has been installed. In the example above, the DDE/SuiteLink plug-in is shown. Your display may vary depending on which plug-in(s) you have installed.

When you select individual diagnostic roots or items contained in one, the Details pane displays data for that root or item. Descriptive icons accompany each data element and indicate the quality of the information presented. These icons are described below.



Clock: Indicates that the data displayed on that line was not updated during the last update interval and the data item has just been scrolled into view. It is displayed until the next update interval, at which time it changes to one of the icons below.



White: Initializing (no VTQ available yet, no timeout yet)



Red: Error active



Yellow: Warning active



Green: Normal active



Red Marked: Bad Inactive



Yellow Marked: warning Inactive



Green: Normal Inactive

Client Groups Diagnostic Root

The Client Groups root displays all individual client groups in the Details pane. Data for each individual client group includes the data quality icon, Name of client, number of Items, number of Active Items, number of items with Errors, Update Interval, and group State.

Note Only Client Groups and Device Groups display system items.

Client Groups icons are marked as active/inactive corresponding to their OPC group state. The Normal/Warning/Error color of the icons is set as follows:

Icon State	Client Group
Normal	The OPC quality is good for all items in this group.
Warning	The OPC quality is uncertain or bad for at least one item in this group and the OPC quality is good for at least one item.
Error	The OPC quality is uncertain or bad for all items.

Data for an individual client group includes data quality icon, Name of item, Client Value, Time, Client Quality, Subscription Message (Subscr. Msg), State, Location, and Device Group. Double-click on any item name in the Details pane, and a Diagnostic Info dialog box similar to the one shown in Figure 6 is displayed.

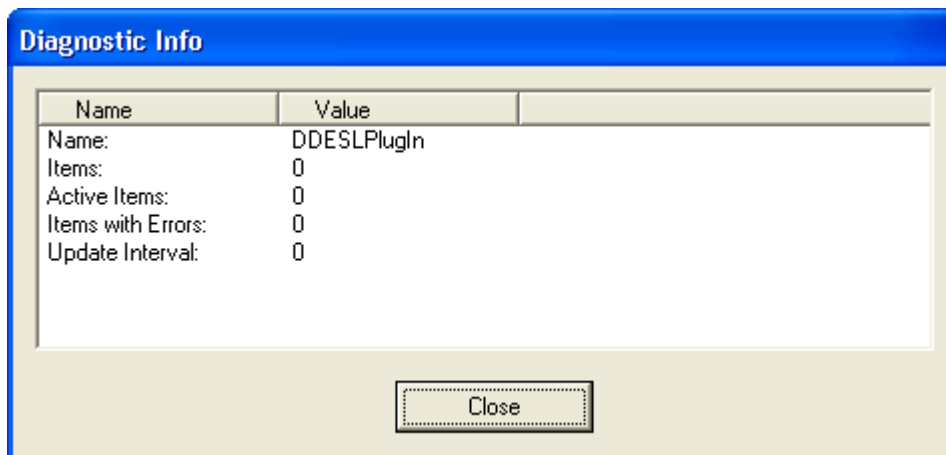


Figure 6. Diagnostic Info Dialog Box

The Diagnostic Info dialog box provides more detailed information about the client group's diagnostics. This information varies between client groups and the type of data described. For instance, the Diagnostic Info dialog box shows Quality for transactions except for write transactions, for which it shows Write Status.

Select an individual client group from the Tree pane hierarchy, and the following Normal/Warning/Error icon colors apply:

Icon State	Individual Client Group
Normal	The OPC quality is good.
Warning	The OPC quality is uncertain.
Error	The OPC quality is bad.

Structure Diagnostic Root

The DAServer namespace may include many levels of hierarchy, some which have not been added (and therefore, are not visible) in the Tree pane. In the Structure diagnostic root, you can view data about as many levels of hierarchy as possible based on the structure of the DAServer. Data for each structural hierarchy includes the data quality icon, Name of item, number of Items, number of items with Errors, R/W Status, Value, Time, Quality, number of Messages, and Device Groups. The R/W Status column always displays R/W, which means that the structure supports both read/refresh/property transactions and write transactions. (See R/W Items in Diagnostics for further details.)

Structure icons are marked as active/inactive. Hierarchical elements (structural branches) are always marked as active, and the Normal/Warning/Error color of the icons is set as follows:

Icon State	Hierarchical Element
Normal	The status error code is greater than or equal to zero (not negative) and the OPC quality is good for all items on this level.
Warning	The status error code is greater than or equal to zero (not negative) and the OPC quality is uncertain or bad for at least one item on this level.
Error	The status error code is less than zero (negative).

Hierarchical items (leaves) are marked as active if at least one group item referencing it is active. It is marked as inactive if all group items referencing it are inactive. The Normal/Warning/Error color of the icons is set as follows:

Icon State	Item
Normal	The OPC quality is good.
Warning	The OPC quality is uncertain.
Error	The OPC quality is bad.

Important! Error indications in the Diagnostics-Structure root do not necessarily mean that an error condition exists at the hierarchical level in focus. It means that an error condition exists at some point down the hierarchical tree.

Transactions Diagnostic Root

The Transaction diagnostic root contains all individual transactions. Data for the Transaction root includes the data quality icon, Type of transaction, item ID, number of Items, Status, Start time, and End time. The Status column displays whether the transaction is COMPLETE, ERROR, or INCOMPLETE. The Normal/Warning/Error color of the icons for the Transactions root is set as follows:

Icon State	Transaction
Initializing	Transaction is in process.
Normal	Transaction has completed successfully, and the OPC quality is good for all items or write completed with success.
Warning	Transaction has completed successfully, and the OPC quality is uncertain or bad for at least one item or write completed with error in at least one item.
Error	Transaction has completed with error, the OPC quality is uncertain or bad for all items or write completed with error.

Note Items below the root level in this hierarchy are subject to customization by the code and configuration of individual DAServers.

Individual transactions that are pending are marked with a white icon (the state is undefined/pending). A transaction item element is always marked as active (viewing completed transactions is viewing a snapshot). Data for an individual transaction item include data quality icon, Name of item, R/W Status, Value, Time, Quality/Result, message ID (MsgID), and Location. The Quality/Result column displays the write complete code for Demand Write transactions and data quality for all other transactions. The R/W Status column displays R for read/refresh/property transactions or W for write transactions. (See R/W Items in Diagnostics for further details.) Location is the path of the hierarchical item name.

Important! For a Demand Write transaction, the data shown in the Quality/Results column indicates the success or failure of the item in the transaction. All zeroes (00000000) means the item was successful. A positive number means the item was successful but indicates a condition that should be noted. Double-click the item to open the Diagnostic Info dialog box, and note the Write Status data for additional information about the item. A negative number in the Quality/Results column of the Details pane of the Transactions root means the item in the transaction was not successful.

The Normal/Warning/Error color of the icons is set as follows:

Icon State	Transaction Item
Normal	The OPC quality is good, write completed with success.
Warning	The OPC quality is uncertain.
Error	The OPC quality is bad, write completed with error.

Statistics Diagnostic root

The Statistics diagnostic root has no sub-nodes since it displays general DAServer data. The types of statistics available includes Server State, DAS Engine Version, Start Time, Current Time, Client Groups, Client Group Items, Client Group Errors, Device Items, Device Errors, and Messages. For each type of statistics, data displayed includes the data quality icon, type of Statistic, Value, and Unit/Info.

The Normal/Warning/Error color of the icons for the Statistics items is set as follows:

Icon State	Statistic
Normal	The value is 0.
Warning	The value is not zero and not equal to the corresponding total number of items.
Error	The number of items with errors is equal to the corresponding total number of items.

Messages Diagnostic Root

The Messages diagnostic root displays data for the root as well as individual messages. Data displayed for the root includes data quality icon, MsgID, number of Items, number of items with Errors, and Status.

The Normal/Warning/Error color of the icons for the Statistics items is set as follows:

Icon State	Message
Normal	The OPC quality is good for all items in this message.
Warning	The OPC quality is uncertain or bad for at least one item in this message, and the OPC quality is good for at least one item.
Error	The OPC quality is uncertain or bad for all items in this message.

Note Items below the root level in this hierarchy are subject to customization by the code and configuration of individual DAServers.

Both messages and message items are always marked as active. Data for an individual message item include data quality icon, Name of item, R/W Status, Value, Time, Quality, message ID (MsgID), and Location. The R/W Status column displays R for read/refresh/property messages, W for write messages, or R/W for both read/refresh/property and write messages. (See R/W Items in Diagnostics for further details.) Location is the path of the hierarchical item name. The Normal/Warning/Error color of the icons for message items is set as follows:

Icon State	Message Item
Normal	The OPC quality is good.
Warning	The OPC quality is uncertain.
Error	The OPC quality is bad.

Device Groups Diagnostic Root

The Device Groups diagnostic root displays data for the root as well as individual device groups. Data displayed for the root includes data quality icon, Device Group, Update Interval, number of Items, number of Active Items, number of items with Errors, and Location.

Note Only Client Groups and Device Groups display system items.

The Normal/Warning/Error color of the icons for the Device Groups items is set as follows:

Icon State	Device Group
Normal	The OPC quality is good for all items in this device group.
Warning	The OPC quality is uncertain or bad for at least one item in this device group, and the OPC quality is good for at least one item.
Error	The OPC quality is uncertain or bad for all items in this device group.

Device group items are marked as active if at least one active group item (from any active group) is referencing it. They are marked as inactive if no active item in any active group is referencing it. Referencing means having the same fully qualified ItemID/hierarchical name and the same OPC access path/device group.

Note Items below the root level in this hierarchy are subject to customization by the code and configuration of individual DAServers.

Data for an individual device group item include data quality icon, Name of item, R/W Status, Value, Time, Quality, message ID (MsgID), and Location. The R/W Status column displays R for read/refresh/property device group items, W for write device group items, or R/W for both read/refresh/property and write device group items. (See R/W Items in Diagnostics for further details.) Location is the path of the hierarchical item name.

The Normal/Warning/Error color of the icons for device group items is set as follows:

Icon State	Device Group Item
Normal	The OPC quality is good.
Warning	The OPC quality is uncertain.
Error	The OPC quality is bad.

R/W Items in Diagnostics

The R/W Status column in the Structure, Transactions, Messages, and Device Groups dialogs has the following meaning:

- Any item that has been updated with VTQ (good or bad) is marked R. Before being updated with VTQ, it is marked with a hyphen (-) for read-uninitialized.
- Any item that has no pending writes (either has completed all write activities or was never poked) is marked W. If writes are pending on an item, it is marked with a hyphen W (-W).

The normal state of an item is R/W. All other cases reflect temporary or special states such as item in initialization state, item is processing a write, or error accessing item data.

Some variations in R/W Status meaning exist between the four diagnostic dialogs that contain it. The following describes these variations:

1. In the Structure dialog, an R means:

- The item was updated from any subscription or transaction with a corresponding fully qualified itemID at least once.
- A VTQ for any client group item pointing to this item is available if reading from cache and if the item is active.

The R should be missing only for a short period of time during initialization of an active item. Reasons for a missing R state include:

- Item was not active long enough to acquire data.
- Item cannot access data.
- The system item \$\$SYSPollNow was poked and the device item has not been updated yet.

In the Structure dialog, a W means:

- No pokes are pending on this item.
- All pokes have been completed.
- No write transaction items are connected to this item.

2. In the Transaction dialog, demand reading or demand writing creates a new transaction item. Each transaction item represents a unique demand operation on this item. Transaction items display R in the R/W Status column during read transactions and W during write transactions. So R means that the item's VTQ was acquired in this transaction for this item and W means the item poke is completed. R also can represent a refresh or property read. Refresh is typically a device group-wide read (either from the field device or from cache) triggered by the client. A property read is a read of any property of an item (usually a property other than VTQ) by the client.

3. In the Message dialog, an R means item VTQ was acquired for this item and a W means item poke is completed.
4. In the Device Groups dialog, an R means item VTQ was acquired for this item. W is always set because there are no transaction items and poke is always complete.

Time Zone Format

All diagnostic data has a date/time component. The DAServer engine sends diagnostic time information embedded in diagnostic strings or info. This allows the client to display the time in the selected format. You can view the current time zone component of the date/time stamp or set it by selecting one of three available formats from the Time Zone menu (located on the menu bar):

- UTC (Coordinated Universal Time): The date/time displayed is in the UTC time of the DAServer.
- Client Time Zone: The date/time displayed is in the client's time zone (that is, DAServer UTC + client time zone).
- Server Time Zone: The date/time displayed is in the DAServer's time zone (that is, DAServer UTC + DAServer time zone).

The Time Zone menu is displayed when you select **DAServer Manager** or any branch below it in the hierarchy.

Another characteristic of time data you may see associated with diagnostic data is related to how long-lived the data is. This characteristic is determined by the DAServer engine and is manifested in three formats as well:

- Short-lived data: Used for timestamping of data points of end devices (for example, PLCs, RTUs, and control processors). This format shows hours, minutes, and seconds.
- Medium-lived data: Used for transaction start and end times, this format shows month, day, year, hours, minutes, and seconds.
- Long-lived data: Used in the Statistics diagnostic root for DAServer start time and current time, this format shows the day of the week, month, day, year, hours, minutes, and seconds.

Note The context menu commands for DAServer diagnostic items in the DAServer Manager are all standard for Windows or the Microsoft Management Console (MMC). See MMC help (MMC.CHM) for more information.

OPC Quality Flags

OPC clients display a variety of possible quality flags for an item's data value. Those clients typically show quality flags in one of two forms: textual description or hexadecimal value.

If your OPC client displays quality flags in textual form, refer to the Description Table below for descriptions of those flags. If your OPC client displays quality flags in hexadecimal form, refer first to the Hexadecimal Quality Code Cross-Reference Table below.

For descriptions of hexadecimal quality flags, first look up the hex value in the Hexadecimal Quality Code Cross-Reference Table. Then use the three numbers in associated Description Cross-Reference column to find the Textual Quality Words and Description in the Description Table below.

Together, the three descriptions provide a complete explanation for the quality code displayed in your OPC client. For example, hex quality code 0x001B (1, 10, 20 cross-reference numbers) is described as follows:

- **1** Bad quality: Value is not useful
- **10** Comm failure: Communication has failed. There is no last known value available.
- **20** Constant: The value is a constant and cannot move.

Hexadecimal Quality Code Cross-Reference Table

Hexadecimal Quality Flag	Description Cross-Reference
0x0000	1, 4, 17
0x0001	1, 4, 18
0x0002	1, 4, 19
0x0003	1, 4, 20
0x0004	1, 5, 17
0x0005	1, 5, 18
0x0006	1, 5, 19
0x0007	1, 5, 20
0x0008	1, 6, 17
0x0009	1, 6, 18
0x000A	1, 6, 19
0x000B	1, 6, 20
0x000C	1, 7, 17
0x000D	1, 7, 18
0x000E	1, 7, 19
0x000F	1, 7, 20
0x0010	1, 8, 17
0x0011	1, 8, 18
0x0012	1, 8, 19
0x0013	1, 8, 20
0x0014	1, 9, 17
0x0015	1, 9, 18

Hexadecimal Quality Flag	Description Cross-Reference
0x0016	1, 9, 19
0x0017	1, 9, 20
0x0018	1, 10, 17
0x0019	1, 10, 18
0x001A	1, 10, 19
0x001B	1, 10, 20
0x001C	1, 11, 17
0x001D	1, 11, 18
0x001E	1, 11, 19
0x001F	1, 11, 20
0x0040	2, 4, 17
0x0041	2, 4, 18
0x0042	2, 4, 19
0x0043	2, 4, 20
0x0044	2, 12, 17
0x0045	2, 12, 18
0x0046	2, 12, 19
0x0047	2, 12, 20
0x0050	2, 13, 17
0x0051	2, 13, 18
0x0052	2, 13, 19
0x0053	2, 13, 20
0x0054	2, 14, 17
0x0055	2, 14, 18
0x0056	2, 14, 19
0x0057	2, 14, 20
0x0058	2, 15, 17
0x0059	2, 15, 18
0x005A	2, 15, 19
0x005B	2, 15, 20
0x00C0	3, 4, 17
0x00C1	3, 4, 18
0x00C2	3, 4, 19
0x00C3	3, 4, 20
0x00D8	3, 16, 17
0x00D9	3, 16, 18
0x00DA	3, 16, 19
0x00DB	3, 16, 20

Description Table

Description Cross-Reference Number	Textual Quality Words	Description
1	Bad	Value is not useful.
2	Uncertain	The quality of the value is uncertain.
3	Good	The quality of the value is good.
4	Non-specific	There is no specified reason for the quality state.
5	Configuration error	There is some server-specific problem with the configuration. For example, the item in question has been deleted from the configuration.
6	Not connected	The input is required to be logically connected to something but it is not. This quality may reflect that no value is available at this time; for instance, the value may not have been provided by the data source.
7	Device failure	A device failure has been detected.
8	Sensor failure	A sensor failure has been detected (numbers 17 through 20 below may provide additional diagnostic information in some situations).
9	Last known value	Communication has failed. However, the last known value is available. Note that the "age" of the value may be determined from the timestamp in the OPCITEMSTATE.
10	Comm failure	Communication has failed. There is no last known value available.
11	Out of service	The block is offscan or otherwise locked. This quality is also used when the active state of the item or the group containing the item is inactive.

Description Cross- Reference Number	Textual Quality Words	Description
12	Last usable value	Whatever device was writing this value has stopped doing so. The returned value should be regarded as "stale." Note that this differs from Bad quality (No. 1 above) with Last Known Value (No. 9). That status is associated specifically with a detectable communications error on a "fetched" value. This status is associated with the failure of some external source to "put" something into the value within an acceptable period of time. Note that the "age" of the value can be determined from the TIMESTAMP in OPCITEMSTATE.
13	Sensor not accurate	Either the value has "pegged" at one of the sensor limits (related to No. 18 or 19 below) or the sensor is otherwise known to be out of calibration via some form of internal diagnostics (related to No. 17 below).
14	Engineering units exceeded	The returned value is outside the limits defined for this parameter. Note that in this case (per the Fieldbus Specification) the Limits descriptions (No. 17 through 20 below) indicate which limit has been exceeded but they do not necessarily imply that the value cannot move farther out of range.
15	Sub-normal	The value is derived from multiple sources and has less than the required number of good sources.
16	Local override	The value has been overridden. Typically, this means the input has been disconnected and a manually entered value has been "forced."
17	Not limited	The value is free to move up or down.
18	Low limited	The value has "pegged" at some lower limit.
19	High limited	The value has "pegged" at some high limit.
20	Constant	The value is a constant and cannot move.

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