Wonderware®

S7SIMATIC DAServer User’s Guide

Version 1.1.100

Last Revision: 8/11/04

Wonderware

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Contents

Before You Begin

About This Book

This guide describes how to configure and use the Wonderware® S7SIMATIC® DAServer™ after it is installed. The remainder of this book is organized in the following fashion:

- **Contents**
- **Introduction**: contains overview information about this S7SIMATIC DAServer, its features, and the environment in which it works.
- **Configuration**: contains a detailed description of the user-interface elements of this DAServer as well as its functionality.
- **Item Names**: describes the item-naming conventions for targeted devices.
- **Troubleshooting**: provides information about error messages displayed by this DAServer, monitoring connectivity status with the device or the status of DAS conversations, and debugging communications between the DAServer and the targeted device.
- **Reference**: describes the DAServer architecture in general.
- **Index**

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CHAPTER 1

Introduction

This chapter provides an overview of the Wonderware® S7SIMATIC® DAServer, including application- and bus-level communications protocols, item naming conventions, and server features.

Contents

- Overview
- Communications Protocols
- Accessing Items via the DAServer
- Features
- Demo Mode

Overview

The S7SIMATIC DAServer is a Microsoft® Windows® application program that acts as a communications protocol server. It provides other Windows application programs with access to data within the Siemens S7 200/300/400 family of PLCs. The S7SIMATIC DAServer provides access to a Siemens PLC through the MPI programming port, or a Siemens processor directly connected to the SIMATIC S7 200/300/400 backplane. It supports numerous communications processor cards.

While the S7SIMATIC DAServer is primarily intended for use with the Wonderware InTouch® (Version 7.11 Patch 02 and later), it may be used by any Microsoft Windows program capable of acting as a DDE, FastDDE, or SuiteLink™ client.

The S7SIMATIC DAServer supports the following adapter cards and required software components in SIMATIC NET. It is capable of supporting up to four (4) hardnet cards in a system plus multiple network interface cards.

Computer Adapter Card	Software Component
CP5611, CP5511, MPI Board	PROFIBUS Softnet S7
CP5613, CP5614	PROFIBUS S7-5613

Computer Adapter Card	Software Component
CP1613	Industrial Ethernet S7-1613
CP1612, CP1512, 3COM Network Adapter	Industrial Ethernet Softnet-S7

Note Please refer to instructions included with the Siemens-supplied driver software and card-configuration tools for detailed installation instructions for Siemens products. Siemens driver configuration is required at both ends of the PLC communications link. Both the computer and the target PLC have CP cards that must be configured to work together, before operating the DAServer.

Communications Protocols

The S7SIMATIC DAServer (Data Access Server) communicates with clients and PLCs using different communications protocols. The DAServer uses application protocols such as OPC, DDE, and SuiteLink to communicate with the clients, and PROFIBUS, Industrial Ethernet, and TCP/IP bus protocols to communicate with the PLCs.

Note This DAServer is compliant with the OPC Data Access (DA) 2.05 specifications.

For more information about the DAServer architecture, please see the "Reference" section.

Application Communications Protocols

This section describes a variety of application communications protocols that can be used to communicate with the clients:

- OPC
- SuiteLink
- FastDDE
- DDE

Note SuiteLink, DDE, and OPC clients will coexist with FactorySuite AA.

OPC

OPC (OLE for Process Control) is a non-proprietary set of standard interfaces based upon Microsoft’s OLE/COM technology. This standard enables interoperability between automation/control applications, field systems/devices and business/office applications. Avoiding the traditional requirement of software/application developers to write custom drivers to exchange data with field devices, OPC defines a common, high-performance interface that permits this work to be done once, and then easily reused by HMI, SCADA, control and custom applications. Over the network, OPC uses DCOM (Distributed COM) for remote communications.

SuiteLink

SuiteLink uses a TCP/IP-based protocol and is designed specifically to meet industrial needs such as data integrity, high throughput, and easier diagnostics. This TCP/IP standard is supported on Windows NT and Windows NT-technology-based operating systems (for example, Windows NT, Windows 2000 Professional, Windows 2000 Server, Windows 2000 Advanced Server, and Windows XP Professional).

SuiteLink is not a replacement for DDE, FastDDE, or NetDDE. The protocol used between a client and a server depends on your network connections and configurations. SuiteLink provides the following features:

- Value Time Quality (VTQ) places a time stamp and quality indicator on all data values delivered to VTQ-aware clients.
- Extensive diagnostics of the data throughput, server loading, computer resource consumption, and network transport are made accessible through the operating system’s performance monitor. This feature is critical for the operation and maintenance of distributed industrial networks.
- Consistent high data volumes can be maintained between applications regardless if the applications are on a single node or distributed over a large node count.
- The network transport protocol is TCP/IP using Microsoft’s standard WinSock interface.

FastDDE

FastDDE provides a means of packing many proprietary Wonderware Dynamic Data Exchange messages into a single Microsoft DDE message. This packing improves efficiency and performance by reducing the total number of DDE transactions required between a client and a server. Although Wonderware's FastDDE has extended the usefulness of DDE for our industry, this extension is being pushed to its performance constraints in distributed environments.

DDE

DDE is a communications protocol developed by Microsoft to allow applications in the Windows environment to send/receive data and instructions to/from each other. It implements a Client/Server relationship between two concurrently running applications. The server application provides the data and accepts requests from any other application interested in its data. Requesting applications are called clients. Some applications such as InTouch or Microsoft Excel can simultaneously be both a client and a server.

Bus Communications Protocols

The following bus-level protocols are supported in the S7SIMATIC DAServer:

- TCP/IP with RFC1006
- H1 Industrial Ethernet
- PROFIBUS
- MPI

Note SIMATIC NET 6.2 from CD 11/2003 must be installed on your computer and configured for the PLC with which you wish to communicate.

Accessing Items via the DAServer

The method for accessing items through the DAServer depends on the communications protocol being used.

In the case of OPC communications, the protocol addresses an element of data in a conversation with six characteristics: node name, program name, group name, device group, link name, and item name. The node name (required for remote access) and device group are optional. A fully qualified OPC Item name (ItemID) is composed of the link name and item name. All other characteristics are specified through separate DAServer means.

To access an OPC item, the OPC client needs to connect to the DAServer (either in-process or out-of-process) and create an OPC group defining the data-acquisition properties for the collection of items to be added. OPC groups can be either public or private. Public OPC groups are shared across multiple clients, whereas private OPC groups are local to a single client. Optionally a device group, which indicates the access path to the items for Read/Write, can be specified from the DAServer.

Note DAServers only support private OPC groups.

The following briefly describes each characteristic of the OPC protocol:

- **node name**: Computer (host) name identifying a specific node on the network (for Remote Access ONLY).
- **program name**: The registered OPC server name uniquely identifying a specific server (ProgID).
    - For this DAServer, the program name is **ArchestrA.DASS7.1**.

- **group name**: The OPC group created from the client for organizing a collection of items logically with the same data-acquisition properties between the client and the server, such as update rate.
- **device group**: Meaningful names configured in the DAServer under a specific controller for the common custom attributes between the DAServer and the device, such as update interval.
  - If not specified from the client, the default device group using the global-configuration attribute values from the DAServer is assumed.
  - Functionally, a device group is equivalent to an access path (optional).
- **link name**: The set of hierarchy node names, representing the specific devices on a communications path link from the hierarchy root to a specific controller as configured for this DAServer under the DAServer Manager, separated by delimiters.
- **item name**: A specific data element, the leaf of the hierarchy tree of this DAServer, within the specified group. For example, when using this DAServer, an item can be a relay, timer, counter, register, and so on, in the controller.

In the case of DDE/SuiteLink communications, the protocol addresses an element of data in a conversation that uses a four-part naming convention that includes the node name, application name, topic name, and item name. The fully qualified DDE/SuiteLink naming convention includes all four parts, although the node-name part (required for remote access only) is optional. The following briefly describes each portion of this naming convention:

- **node name**: Computer (host) name identifying a specific node on the network (for Remote Access ONLY).
- **application name**: The name of the Windows program (this DAServer) that will be accessing the data element. In the case of data coming from or going to Siemens devices via the DDE/SuiteLink PlugIn of this DAServer, the application name portion of the address is **DASS7**.
- **topic name**: Meaningful names are configured in the DAServer to identify specific devices. These names are then used as the topic names in all conversations with that device. For example, **S7PLC**. Topic name maps to a device group defined in the DAServer.

  Note You can define multiple device group (topic) names for the same device (PLC) to poll different points at different rates.

- **item name**: A specific data element within the specified topic. For example, when using this DAServer, an item can be a relay, timer, counter, register, and so on, in the PLC.

  Note The term "point" is used interchangeably with the term "item" in this user's guide.

  For more information on item/point names, see the "Item Names" section.

Features

The S7SIMATIC DAServer provides the following features:

- The ability to communicate over multiple application-level protocols at the same time.
- The ability to add new application-level protocols on the fly.
- The ability to be configured remotely.
- New, robust diagnostic abilities.
- Additional server-specific diagnostics.
- XML storage.
  For example, the storage of the .aacfg file that has the details of all the device groups and device items that can be stored in XML.
- Full existing item-name space.
- Log of errors, warnings, traces, and SAPI messages, individually adjustable for reading and writing.
- OPC browsing.

For more in-depth information on the DAServer architecture, see the "Reference" section.

Demo Mode

You can install a fully functioning version of this S7SIMATIC DAServer for demonstration purposes without a license. Demo mode allows you to test the functionality of the server for 120 minutes. After that time, you must install a license to continue using the DAServer.

When you first start this S7SIMATIC DAServer, it checks for a license. If the DAServer cannot find a valid license installed on the local computer, it logs a warning message indicating a valid license cannot be retrieved, and enters Demo mode. Thereafter, the S7SIMATIC DAServer repeats its request for the license every 30 seconds. If no licenses are found, the DAServer again logs a warning message on the issue. This process is repeated for 120 minutes, after which the DAServer stops updating read/write on all device items (read from cache is allowed, but all non-system data would receive Bad quality status).

The S7SIMATIC DAServer continues to request for a license. Clients continue to function normally (for instance, you can still add or remove an item, but its quality is set to Bad until a license is obtained).

Note Use the $SYS$Licensed system item, a read-only Boolean item, to check the status of your license: True for Licensed and False for Not Licensed.

If you subsequently add a license to the License Manager, the DAServer logs a message acknowledging the license, switches out of Demo mode, and runs normally.

Note Once a DAServer obtains a valid license, it no longer checks for a license. Thus, if your license expires, your DAServer would cease to function, but this condition would not be logged until the next restart of the DAServer.

CHAPTER 2

Configuration

Once the Wonderware S7SIMATIC DAServer has been installed, a small amount of configuration is required. This configuration is performed using the DAServer Manager hosted in the **System Management Console** after it is started through the **Programs** menu of the Windows **Start** button

Before the DAServer is activated, the device hierarchy, simulating the physical hardware layout, must first be built to establish communications to each of the controllers. Once the S7 SIMATIC NET hierarchy has been built, the respective devices for communications can be configured. Finally, the desired Device Groups for each controller may be created by clicking on the **Device Groups** tab.

Contents

Getting Started Quickly with the S7SIMATIC DAServer

This section briefly describes the procedures required to prepare the S7SIMATIC DAServer for use. Detailed descriptions of each step can be found in later sections of this documentation. This section is intended for people who are familiar with DAServers.

Note If you are not familiar with DAServer functionality, please proceed to the more-detailed procedures following this section.

To prepare the S7SIMATIC DAServer

Note Prior to installing the DAServer, the SIMATIC NET software needs to be installed on your computer. Please follow the instructions provided by the manufacturer.

1. Install the Wonderware S7SIMATIC DAServer from Windows by running the **Setup.exe** program.

Note The DAServer installation instructions are included in a separate Help file (.chm extension).

- Accept all the default settings during installation.

Important! Since there are no default values for security settings, you must take note of the User Name and password selected during the install.

2. Start the Wonderware DAServer Manager by selecting the **Programs** menu from the **Start** button on the taskbar.
3. Navigate to the **Wonderware** folder that contains the System Management Console, then click **System Management Console**.
4. From the **ArchestrA System Management Console**, find the S7SIMATIC DAServer in the **DAServer Manager** tree, the location in which it is installed.
   - Under the local node the DAServer name is **ArchestrA.DASS7.1**.
   - See the DAServer Manager Online Help for general information about working in this snap-in environment.
5. The new S7SIMATIC DAServer must now be configured.
   - Before proceeding, determine the hierarchical structure of the network/PLC environment to which you plan to connect.
6. Select and right-click the **Configuration** branch of the hierarchy, and on the shortcut menu, select **Add CP Object**.
   - The S7SIMATIC DAServer allows up to 10,000 instances of CP object in the hierarchy.
   - In this step, in addition to steps 7 and 8, the hierarchy entry is added in "edit mode," providing a convenient place for you to appropriately describe components of your specific hardware environment.
   - If you do not rename the object at this time, a numeric sequencing system is applied.
   - Any hierarchy entry can be renamed at a later time.
7. Select the **New_CP_000** object you created in the tree, then right-click on it and select **Add VFD Object**.
   - The S7SIMATIC DAServer allows up to 10,000 instances of VFD object in the hierarchy.
8. Select the **New_VFD_000** object, then right-click on it and select **Add CON Object**.
   - The S7SIMATIC DAServer allows up to 10,000 instances of CON object in the hierarchy.
9. Optionally, create the desired device groups in the **Device Groups** dialog box of each logical end-point object.

Note When any configuration view is in an open state and you open the same server the second time, the DAServer locks the second instance of this same-server access for any update or configuration activities. Access to this second opening instance will resume after the first one has been closed.

Your S7SIMATIC DAServer is now ready for use. In order to use the DAServer, you must activate it.

- If you are using an OPC client, the S7SIMATIC DAServer will auto-start.
- If you are using DDE/SuiteLink, you must start the S7SIMATIC DAServer either as a manual or automatic service.
- To activate the DAServer, right-click on **ArchestrA.DASS7.1** and select **Activate Server** from the shortcut menu.

Note To run the S7SIMATIC DAServer as a sevice, use the shortcut menu on the **S7SIMATIC DAServer name** and select **Configure As Service**. You can configure it as an auto service or manual service. For more information about configuring your S7SIMATIC DAServer as a service, see the Activation/ Deactivation/Service Component of the DAServer Manager documentation.

Configuring the S7SIMATIC DAServer

Note This DAServer is hosted by the DAServer Manager, a Microsoft Management Console (MMC) snap-in. Many high-level functions and user-interface elements of the DAServer Manager are universal to all DAServers, and **only** the documentation for the DAServer Manager contains descriptions of those universal functions/UI elements. Therefore, reading the documentation for both the MMC and the DAServer Manager is critical to understanding this documentation. To read the documentation about the MMC and DAServer Manager, click the Help topics on the MMC **Help** menu. Both the MMC and DAServer Manager Help is displayed. An Adobe Acrobat version of the DAServer Manager documentation (DAServerManager.pdf) is provided.

Note The shortcut menu items described in this document typically represent only a subset of any actual shortcut menu. Most items in each shortcut menu are standard Windows commands. See the **Help** menu of the MMC for more information about those commands.

Before the S7SIMATIC DAServer can be configured, the following steps need to be performed.

1. Install the SIMATIC NET software on your computer, following the instructions provided by the manufacturer.
2. Install the Wonderware S7SIMATIC DAServer by running the **Setup.exe** program.

Note The DAServer installation instructions are included in a separate Help file (.chm extension).

- Accept all the default settings during installation.

Important! Since there are no default values for security settings, you must take note of the User Name and password selected during the install.

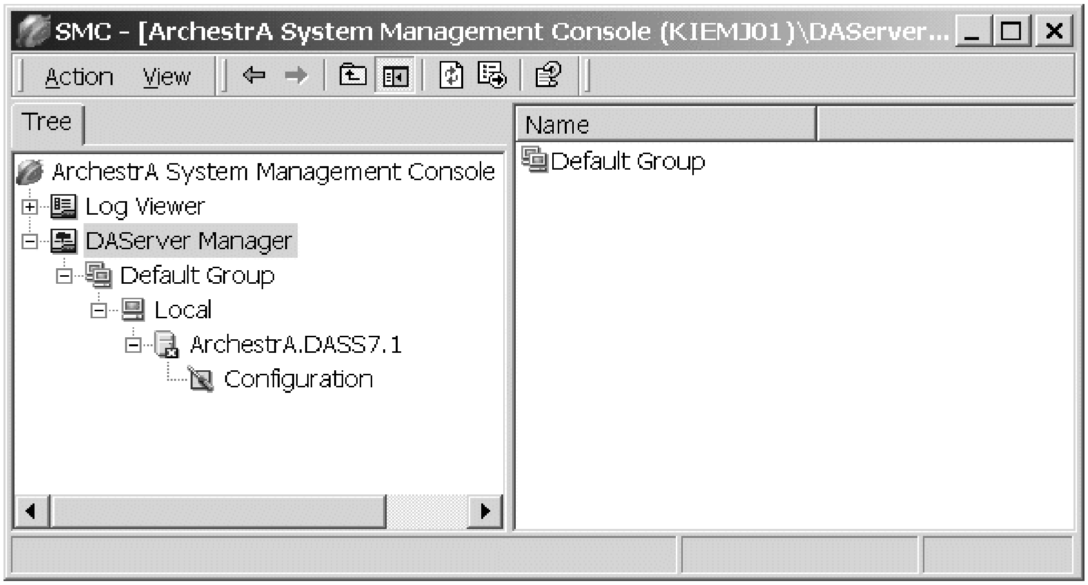
3. Have the DAServer Manager run on at least one computer.

Once the S7SIMATIC DAServer has been installed, a small amount of configuration is required.

To prepare the S7SIMATIC DAServer

1. Start the System Manager Console by clicking the **Start** button on the Windows taskbar and pointing to **Programs**.
2. Point to the **Wonderware** folder that contains the System Management Console, then click **System Management Console**.
3. From the **ArchestrA System Management Console** tree, click on **DAServerManager**.
4. Click on **Default Group**, then click on **Local**.
   - Under the Local node, the name of the DAServer is **ArchestrA.DASS7.1**.

Note See the DAServer Manager documentation for general information about working in this snap-in environment.



5. Before the DAServer is started, the device hierarchy must be built to establish communications to each of the controllers.

Note For step-by-step procedures on how to build the device hierarchy, please see the following section, "S7SIMATIC Hierarchy in the DAServer Manager."

Note Selecting the **Configuration** object of the hierarchy tree displays the **Global Parameters** configuration view for this S7SIMATIC DAServer. Configure all other global parameters as required for this S7SIMATIC DAServer. For more information about the **Global Parameters** dialog box, including descriptions of the different Poke Modes, see the DAServer Manager documentation. You can access the documentation by rigth-clicking the **DAServer Manager** icon, selecting the appropriate Help topic on the **Help** menu, and then navigating through the **DASever Manager** book.

Important! Any Global Parameters that appear dimmed are not supported.

6. Once you have built the S7SIMATIC hierarchy, you can start configuring the respective devices for communications.
7. Finally, you may create the desired Device Groups for each controller by:
   - Navigating to the object of interest in the **DAServer Manager** tree view.
   - Clicking on the **Device Groups** tab.

   For step-by-step procedures on configuring Device Groups, please see the section, "Configuring Device-Group and Device-Item Definitions."

Note When any configuration view is in an open state and you open the same server the second time, the DAServer locks the second instance of this same-server access for any update or configuration activities. Access to this second opening instance will resume after the first one has been closed.

The DAServer will be ready to use after it is activated.

- If you are using an OPC client, the DAServer will auto-start.
- If you are using DDE/SuiteLink, you must start the DAServer either as a manual or automatic service.
- The DAServer can be activated by right-clicking on **ArchestrA.DASS7.1** and selecting **Activate Server** from the shortcut menu.

Note To run the S7SIMATIC DAServer as a sevice, use the shortcut menu on the **S7SIMATIC DAServer nam**e and select **Configure As Service**. You can configure it as an auto service or manual service. For more information about configuring your S7SIMATIC DAServer as a service, see the Activation/ Deactivation/Service Component of the DAServer Manager documentation.

S7SIMATIC Hierarchy in the DAServer Manager

Note Before attempting to configure your S7SIMATIC DAServer, you should determine the hierarchical structure of your network/PLC environment.

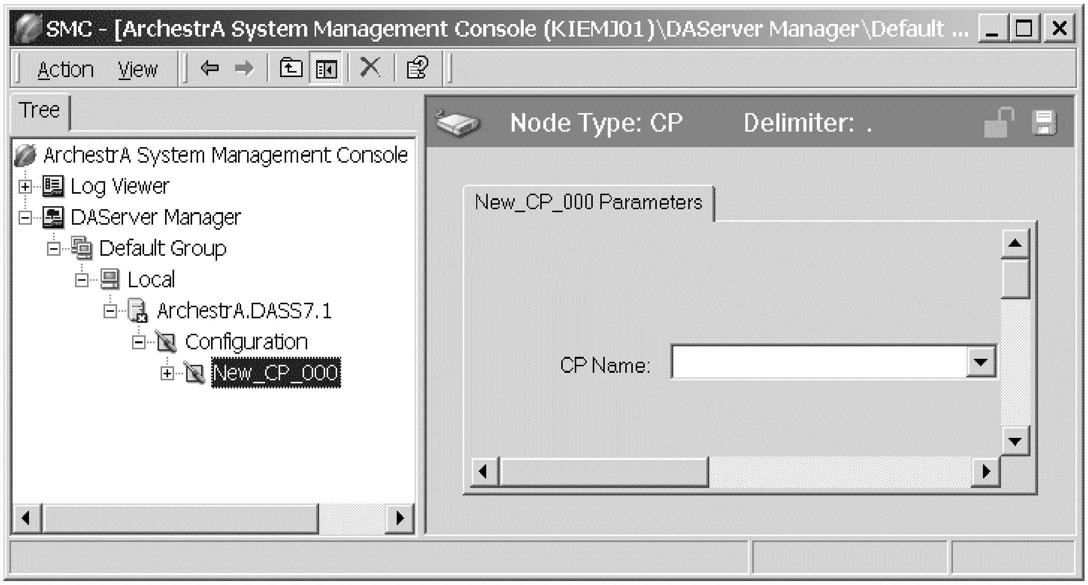
CP Object

The server-specific configuration portion of the S7SIMATIC DAServer hierarchy tree under the DAServer Manager starts at the CP (Communications Processor) object. It is a logical representation of the PROFIBUS/HI Industrial Ethernet port for CP communications in a computer.

- Up to 128 of these CP objects can be created from the global **Configuration** branch.
- Rename this object as appropriate.

Important! If you subsequently clear your configuration hierarchy, you must create this CP port object by right-clicking on the **Configuration** object and selecting **Add CP Object**. An object called New_CP_000 Parameters is created. Rename as appropriate. From this point, all of the following instructions apply.

The following figure illustrates the New_CP_000 Parameters configuration view (right pane).



The New_CP_000 Parameters configuration view has one element to configure:

- **CP Name**: Select the name of the Communications Processor of the PLC from the drop-down menu.

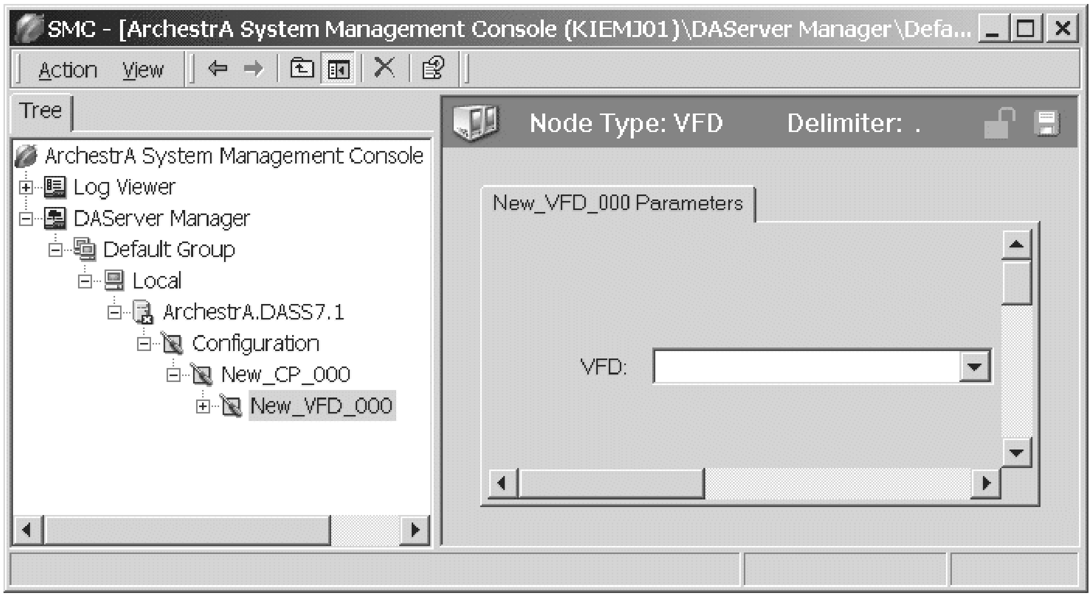
VFD Object

From the New_CP_000 branch of the DAServer hierarchy, the Virtual Field Device object, generically named New_VFD_000, can be created.

To add Virtual Field Device object to your S7SIMATIC hierarchy

1. Select your **New_CP_000** object and right-click on it.
2. Select **Add VFD Object** from the shortcut menu.

3. Rename as appropriate.
   - The New_VFD_000 Parameters configuration view is displayed.



There is one element in the New_VFD_000 Parameters configuration view to configure:

- **VFD**: Select the name of the Virtual Field Device of the PLC from the drop-down menu.

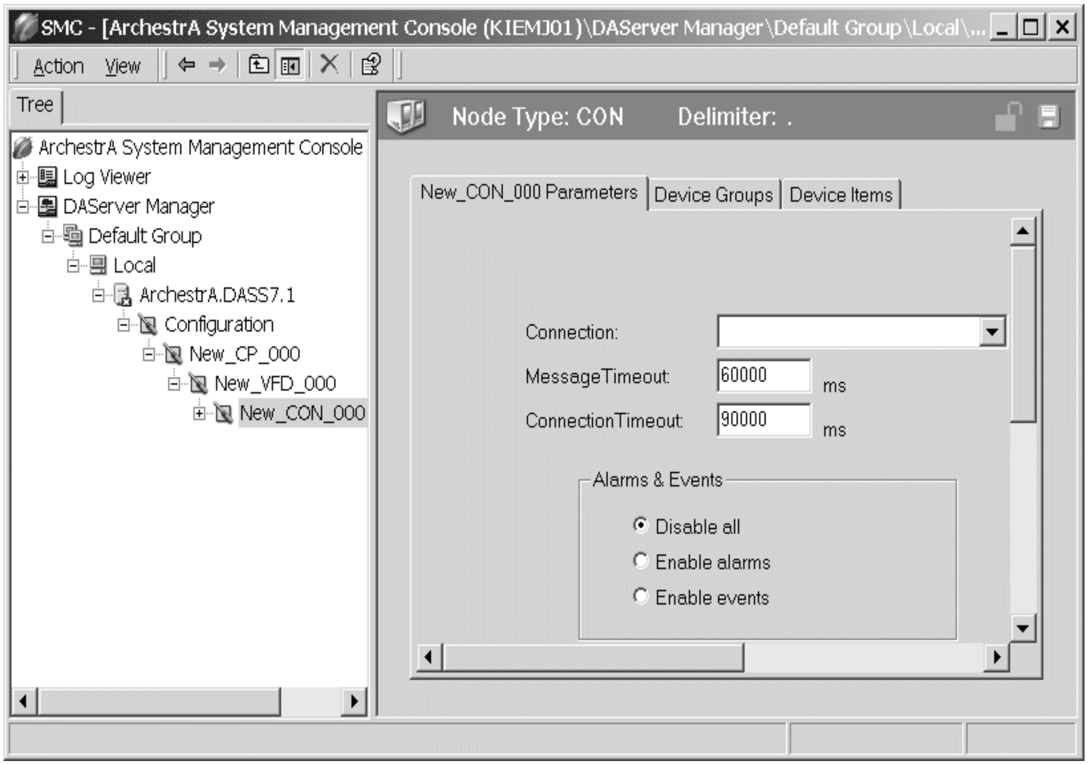
Note If you happen to see that the drop-down VFD box is blank, make sure that you have selected the correct CP Name in the **CP Name** box of the **CP Object Parameters** configuration view.

CON Object

From the New_VFD_000 branch of the S7SIMATIC DAServer hierarchy, the Connection object, generically named New_CON_000, can be created.

To add Connection object to your S7SIMATIC hierarchy

1. Select your **New_VFD_000** object and right-click on it.
2. Select **Add CON Object** from the shortcut menu.
3. Rename as appropriate.
   - The New_CON_000 Parameters configuration view is displayed.



Connection:

MessageTimeout: 60000 ms

ConnectionTimeout: 90000 ms

● Disable all
○ Enable alarms
○ Enable events

This configuration view has four configurable elements:

- **Connection**: From the drop-down menu, select the name of the Connection on the PLC.
- **Message Timeout**: Enter a value in milliseconds beyond which messages will time out.
  - The default value is 60,000 ms.
  - Allowable range is 0 to 100,000 ms.
    - If you decrease this value, the S7SIMATIC DAServer reacts faster to a communications failure.
- **Connection Timeout**: Enter a value in milliseconds beyond which a pending request to initiate a connection will time out.
  - The default value is 90,000 ms.
  - Allowable range is 0 to 100,000 ms.
- **Alarms and Events**: Enable Alarms or Events, or disable both for this connection by clicking on its option button.
  - Disable All
  - Enable Alarms
  - Enable Events

Note On one SIMATIC NET connection, either Alarms, or Events, or none can be configured.

Note If you need to access both Alarms and Events, two different connections (CONs) have to be created.

The logical endpoint for each branch of the S7SIMATIC hierarchy tree is a hardware device (PLC).

Note The default name created from adding a hierarchy object is in the format of **New_ObjectName_###**, where ObjectName is the name of the object type and ### is a numeric value starting from "000" enumerated sequentially per hierarchy object. The link name for the OPC items is constructed by assembling the respective object names of the nodes along the hierarchy tree in the logical order, starting from the CP root of this DAServer down to the leaf. Therefore, the link name is always unique for the DAServer.

Note In order to use the DAServer, you must activate it. See the DAServer Manager documentation for information about how to activate and deactivate the DAServer.

Configuring Device-Group and Device-Item Definitions

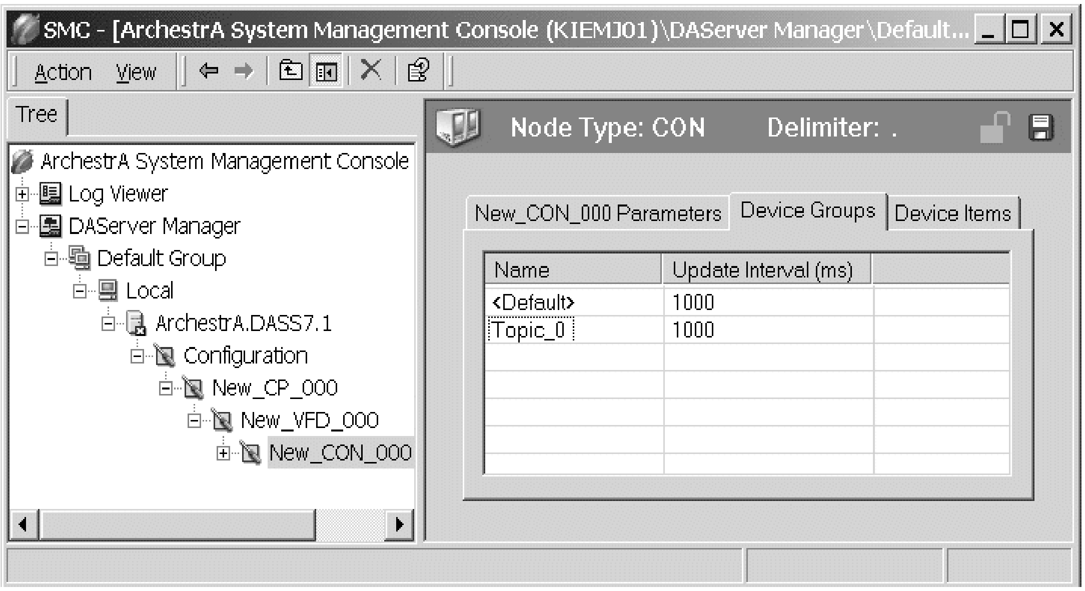
Use the **Device Groups** tab or **Device Items** tab in the DAServer Manager user interface to create new, modify, or delete device-group and device-item definitions for an object, respectively.

- For DDE/SuiteLink communications, one or more device-group definitions must exist for each PLC that the S7SIMATIC DAServer will communicate with.
- Each device-group (topic) definition should contain a unique name for the PLC associated with it.

Device-Group Definitions

The **Device Groups** dialog box, invoked by clicking the **Device Groups** tab in the **New_CON_000 Parameters** configuration view, is the place where device groups are created or added, deleted, and defined. Configuring default update intervals for the objects and editing update intervals are also performed in this dialog box.

Note When you add a new device group, enter a unique name (up to 32 characters long). When you select another part of the DAServer tree hierarchy, you are prompted to save the modifications to the configuration set.



Name	Update Interval (ms)	
<Default>	1000	
Topic_0	1000	

To create or add device groups

1. Right-click in the **Device Groups** box.
2. Select the **Add** command from the shortcut menu.
   - When you add a new device group, enter a unique name (up to 32 characters long).

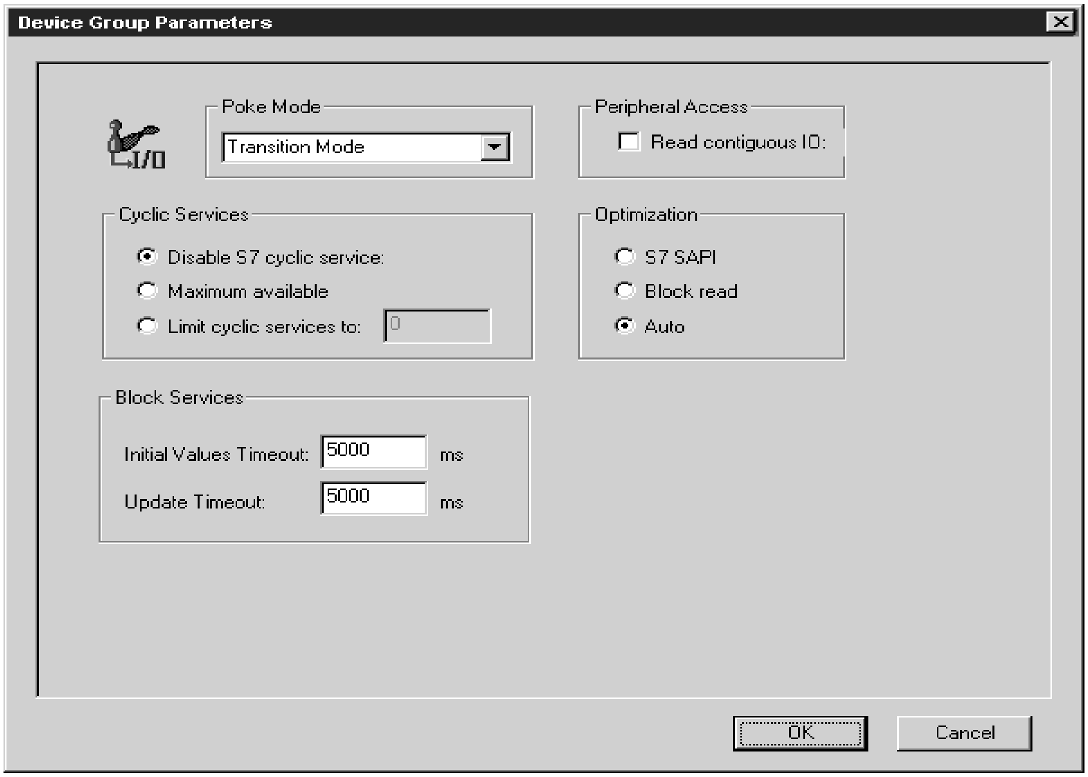
To delete device groups

1. Right-click on the **device group to be deleted** from the list.
2. Select the **Delete** command from the shortcut menu.

Note When you select another part of the S7SIMATIC DAServer tree hierarchy, you are prompted to save the modifications to the configuration set.

To make edits on device groups

1. Make edits on a device group by right-clicking on the **device group to be edited**.
2. Select **Edit** from the shortcut menu to open the **Device Group Parameters** dialog box.



Device Group Parameters

Poke Mode: Transition Mode

Peripheral Access: □ Read contiguous IO:

Cyclic Services:
● Disable S7 cyclic service:
○ Maximum available
○ Limit cyclic services to: 0

Optimization:
○ S7 SAPI
○ Block read
● Auto

Block Services:
Initial Values Timeout: 5000 ms
Update Timeout: 5000 ms

3. Make the necessary edits.

This Edit dialog box contains the following five configurable elements:

- **Poke Mode**: Choose one of three settings to tune the poking behavior to the PLC.
  - Control mode
  - Transition mode
  - Full optimization

Note The default Poke Mode settings for the S7SIMATIC DAServer is Transition mode.

- **Cyclic Services**: If Cyclic Services is utilized (the **Disable S7 cyclic services:** option button is **not** selected), two additional settings must be configured:
    - Maximum available
    - Limit cyclic services to
  - If you know how many services the remote PLC can handle, you can limit the use of cyclic services in this device group and distribute the available cyclic services among the device groups associated with this connection. Otherwise, you can use the maximum available services.
    - Allowable range for Limit cyclic services to is 0 to 150.
    - The default is 0.

- Click on **Disable S7 cyclic services:** to disable the S7 SAPI cyclic services for the device group.
    - Cyclic services have a reliable update frequency and need less bus access.
    - They are a limited resource in the PLC and/or Communications Processor.
- If the **Disable S7 cyclic services:** option button is selected, the S7SIMATIC DAServer polls all topics in this device group.
  If this option button is not selected, the S7SIMATIC DAServer tries to register as many topics in the cyclic services as possible.
- If there are insufficient credits for cyclic services left, the S7SIMATIC DAServer creates poll messages instead of cyclic messages for the remaining topics.
- Reasons for disabling Cyclic Services include the following:
    - A device group with a long update interval. (It should not occupy the cyclic services resource.)
    - When you need to force the S7SIMATIC DAServer to attempt to collect data faster than 100 milliseconds.

- **Block Services**: If the Block Services function is required, in the **Block Services** box there are two settings that must be configured:
        - Initial Values Timeout
        - Update Timeout
    - Time-outs are needed for Block Services to supervise the reading of initial values and updating the block items to this connection. A time-out value of 0 disables the time supervision of block messages.
    - Block services are unconfirmed services. If the remote station does not send data within this time range, the Block Services is reinitialized and an error message is logged.
- **Peripheral Access**: Select the **Read Contiguous IO** check box to force the S7SIMATIC DAServer to read input and output blocks (also peripherals), only if their address spaces are contiguous.
  Select this check box if you have some holes in your PLC's input-address or output-address space.
- **Optimization**: To configure the optimization mode the S7SIMATIC DAServer should use to acquire data from the PLC, select one of these settings:
    - S7 SAPI
    - Block read
    - Auto

To configure default update intervals

1. To configure a default update interval for the object, right-click in the **Device Groups** box.
2. Select **Config Default Update Interval** from the shortcut menu.

To edit update intervals

- To edit the update interval for an object, double-click its **value** in the **Update Interval** column and make the edits.
    - Update Interval is the frequency (in milliseconds) that the S7SIMATIC DAServer acquires data from the topics associated with that device group.
    - Different topics can be polled at different rates in a PLC by defining multiple device-group names for the same PLC and setting a different Update Interval for each device group.

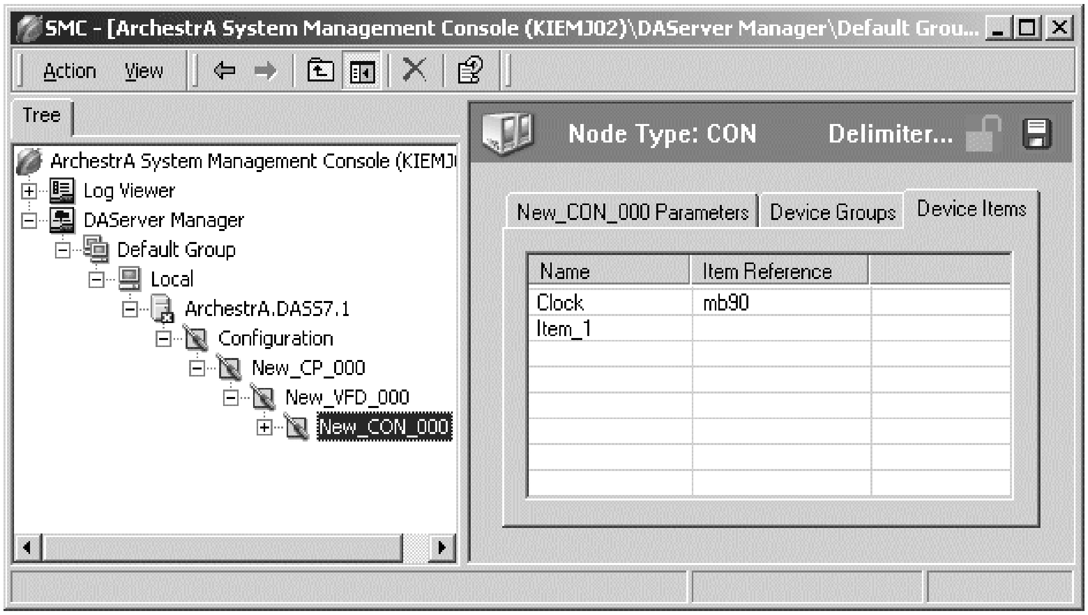
Note When you select another part of the S7SIMATIC DAServer tree hierarchy, you are prompted to save the modifications to the configuration set.

Device-Item Definitions

The predefined item syntax/name for the S7 PLC cannot be changed. However, to make it easier to remember item names, the DAServer enables you to create aliases for these item names. For example, it may be easier for you to remember the item syntax "mb80" as "Temperature."

The **Device Items** tab in the DAServer Manager user interface is used to create new, modify, delete, export, or import device-item definitions for an object. The configuration is performed in the **Device Items** dialog box, invoked by clicking the **Device Items** tab in the **New_S7Cp_000 Parameters** configuration view.

Once the Device Items feature is utilized to configure item names, it provides the DAServer with the capability to perform OPC Item browsing. When the DAServer is running and an OPC Client requests item information, the configured items will show up under the CON Object hierarchy node.



Name	Item Reference
Clock	mb90
Item_1	

To create or add device items

1. Right-click in the **Device Items** box.
2. Select the **Add** command from the shortcut menu.
3. Type in the item name of your choice in the **Name** column.
   - For example, "Clock."
   - When you add a new device item, enter a unique name (up to 32 characters long).
4. Double-click the line on the **Item Reference** column and enter the correlated item reference for the name you have just selected.
   - For example, "mb90."

Note If the name and the item reference is the same, it is only necessary to enter a name. The DAServer will assume that the item reference is the same. This may be necessary if you want to add some items for browsing via OPC, even if they do not have a symbolic name.

To rename device items

1. Rename a device item by right-clicking on the **device item to be renamed**.
2. Select **Rename** from the shortcut menu, then make the changes.

To delete device items

1. Right-click on the **device item to be deleted** from the list.
2. Select the **Delete** command from the shortcut menu.

To clear all device items

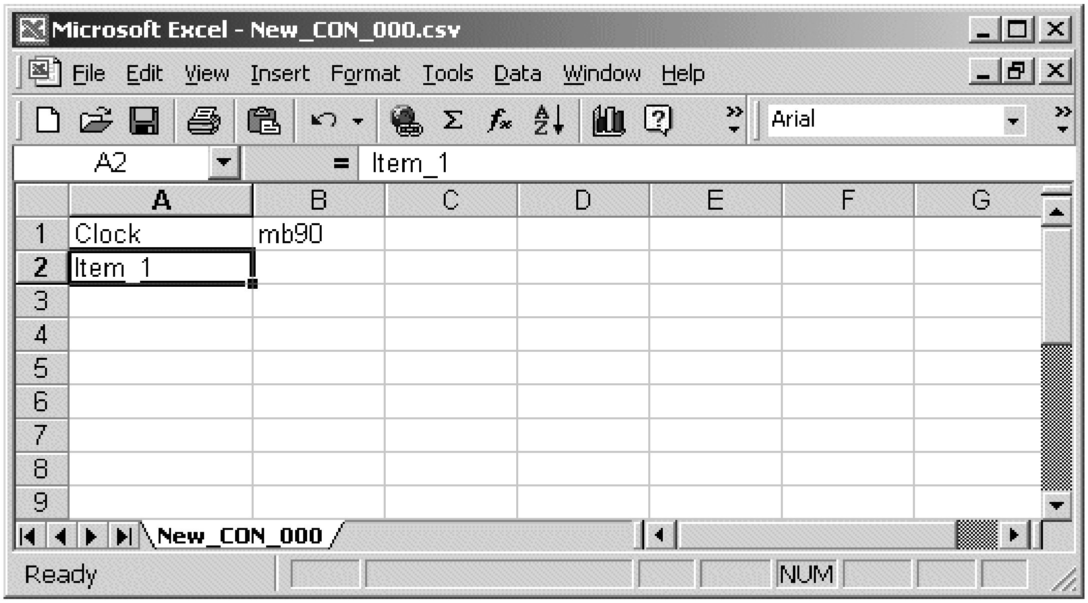
1. Right-click in the **Device Items** box.
2. Select the **Clear All** command from the shortcut menu.
   - All the device items listed will be cleared after you confirm their deletion.

The Export and Import commands on the shortcut menu enable you to export and import the DAServer item data to and from a CSV file, after the configuration of the Device Items has been completed. These commands will allow you to perform an off-line, large-scale edit on the item data configured for a PLC, and import what has been edited back into the PLC configuration.

To export DAServer item data to a CSV file

1. Right-click in the **Device Items** box.
2. Select the **Export** command from the shortcut menu.
   - The standard **Save As** dialog box appears.
   - The file name has defaulted into "PLC Hierarchyname.csv," within the current-system-configured default directory.

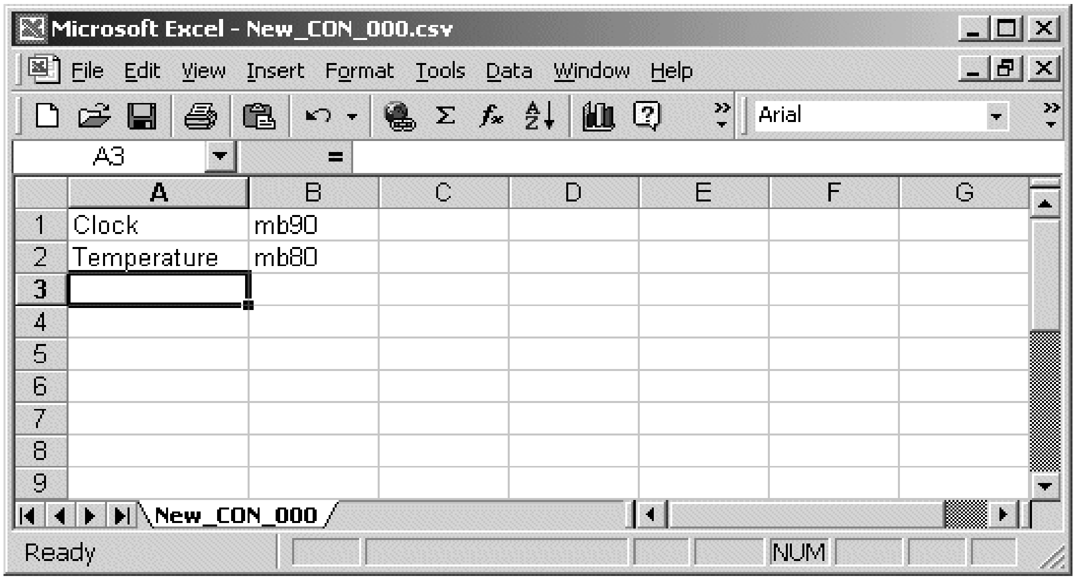
3. Accept the defaults to save the file.
   - The file is saved as New_CON_000.csv.
   - It is editable in Microsoft Excel.


Microsoft Excel - New_CON_000.csv
File Edit View Insert Format Tools Data Window Help
Arial
New_CON_000
Ready
NUM

A2 = Item_1

	A	B	C	D	E	F	G
1	Clock	mb90					
2	Item_1						
3							
4							
5							
6							
7							
8							
9							

The file can now be edited off-line. It contains one row for each item configured with two columns, Name and Item Reference, respectively.


Microsoft Excel - New_CON_000.csv
File Edit View Insert Format Tools Data Window Help
Arial
New_CON_000
Ready
NUM

A3 =

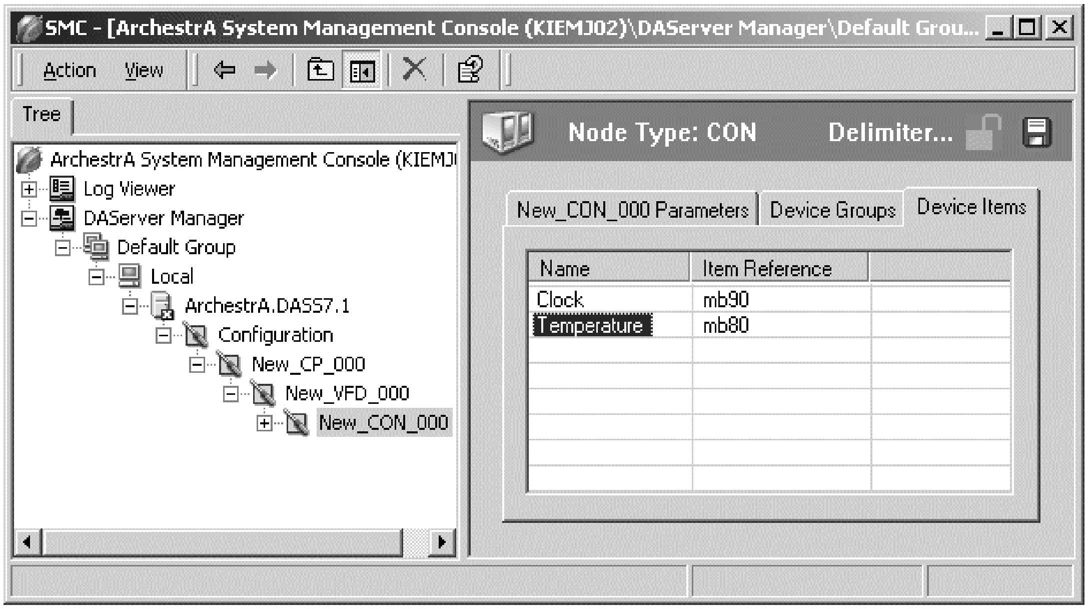
	A	B	C	D	E	F	G
1	Clock	mb90					
2	Temperature	mb80					
3							
4							
5							
6							
7							
8							
9							

To import DAServer item data from a CSV file

1. Right-click in the **Device Items** box.
2. Clear all the item data you wish to replace with the edited .csv file by selecting the **Clear All** command.

- The data will be cleared after you click on **Yes** to confirm the deletion.

3. Select the **Import** command from the shortcut menu.
   - The standard **Open** dialog box appears.
   - It defaults to the .csv file extension within the current-system-configured default directory.
4. Browse for the .csv file you want to import, select it, then press the **OK** button for confirmation.
   - The DAServer manager will import the file and deposit it in the Device Items box.



Name	Item Reference
Clock	mb90
Temperature	mb80

- During the imported file processing:
  - New item references will be added based on unique names.
  - If there are duplicate names, you will be provided with the ability to replace the existing entry with the new entry, or ignore the new entry.

When the DAServer is running and an OPC client requests item information, the imported configured items will show up under the Con Object hierarchy node.

Note When you select another part of the S7SIMATIC DAServer tree hierarchy, you are prompted to save the modifications to the configuration set.

Each configuration view associated with objects in the S7SIMATIC DAServer hierarchy tree has a common feature, the **Save** button located on the upper right corner of the configuration view.

1. When you modify any **Parameters**, or **Device Groups** dialog box, click **Save** to implement the new modifications.

- If you do not click **Save**, the configuration is reset to its original condition (since the last save).

2. After all modifications, you must save when prompted for the new data to be saved to the configuration set.

Scan-Based Message Handling

Wonderware S7SIMATIC DAServers are based on the concept of polling a hardware device for information. This polling is driven by a need which is expressed in the form of requests from one or more clients. Once a particular piece of information has been requested by a client, the S7SIMATIC DAServer formulates its own request and sends that request to the hardware device. The S7SIMATIC DAServer then waits for a response to its request. Once the information has been received, the S7SIMATIC DAServer passes that information back to the client, and repeats the process until all clients have ceased requesting information.

The rate at which the S7SIMATIC DAServer will poll a particular device for a specific piece of information is defined in the device group (topic definition) inside the S7SIMATIC DAServer, using a parameter called the Update Interval. When setting this parameter, there is always a trade-off between the update speed of the device group and the resulting decrease in system responsiveness.

Since you more than likely want very fast response, the temptation is to set the Update Interval to a value close to 0 (zero) seconds. However, if every point is polled at this rate, the entire system will suffer due to slow response time. Therefore, you should compromise, and set the Update Interval to a more reasonable value. You could also create multiple device groups for each device, setting the Update Interval to different values, then assigning different items to different device groups, depending on how quickly the values change and how quickly you want to see an update of those changes.

Unsolicited Message Handling

The S7SIMATIC DAServer will process the following three types of unsolicited messages sent by the S7 PLCs:

- Alarms
- Events
- Block Services

Alarms and Events

In the world of PLCs and DAServers, it is obvious that a PLC will know when a critical event has occurred before the DAServer will have a chance to poll for that data. Therefore, it would seem natural that if a critical event occurs, the PLC should have the capability to inform the DAServer immediately, without having to wait for the DAServer to poll it.

This is the role of an unsolicited message. Once a PLC has determined that a critical condition exists, it can generate a message immediately sent to the DAServer without a prior request from the DAServer. The unsolicited message implementation requires both the messaging instructions properly programmed in the PLC logic and the device group appropriately configured in the DAServer.

Block Services

In addition to unsolicited messages based on critical conditions or events, S7 PLCs are also capable of handling another type of unsolicited messages: "Block Services."

Block Services can be used to send blocks of data up to 64Kbps within one send job. This can be triggered by a timer, an event, an I/O activity, or initiated via a program code.

Archiving Configuration Sets

After you have configured your DAServer, you can archive that specific configuration. You can archive more than one configuration set, and subsequently choose different configurations for different purposes.

To archive configuration sets

1. In the DAServer Manager, right-click on the **Configuration** node in the hierarchy below your DAServer.
2. Select **Archive Configuration Set** from the shortcut menu.
3. In the **Archive Configuration Set** dialog box, provide a Configuration Set Name.
4. Click **Archive**.
   - All current configuration values are saved to the archived set.

Once you have archived at least one configuration set, you can select it for use.

To use different configuration sets from the current one

1. In the DAServer Manager, right-click the **Configuration** node in the hierarchy below your DAServer.
2. Select **Use Another Configuration Set** from the shortcut menu and click on a configuration set in the sub-menu.
   - All parameters in the DAServer configuration hierarchy change to the chosen configuration set.

Hot Configuration

If a parameter value change takes effect right away while the DAServer is running, the parameter is a hot-configurable parameter. Certain parameters in the S7SIMATIC DAServer are hot-configurable. Incorporated in the DAServer are the following hot-configuration functionalities:

- Modifying Global Configuration parameters.
- Adding, deleting, or modifying device nodes (without affecting any other device nodes, excluding the children of the modified device nodes).
- Adding, deleting, or modifying device groups, the Update Interval column in the Device Groups tab, and device items.

All other parameters are not hot-configurable. To have those changes take effect, you have to restart the DAServer.

Note If changes are made to server-specific parameters while the server is active, the DAServer will issue a warning message to the logger.

CHAPTER 3

Item Names

The Wonderware S7SIMATIC DAServer uses an item-naming convention based on the two-letter data-type identifiers used by SIMATIC NET. This convention differs slightly from the convention used for programming Siemens PLCs. The following tables describe the item naming for the Siemens S7 200/300/400 family of PLCs.

Contents

Address Space

Items are defined within the S7SIMATIC DAServer address space. The items of the S7SIMATIC DAServer consist of the Communications Processor, the Virtual Field Device, the Connection, and specific items separated by a delimiter. See the following examples.

OPC Example:

OPC Access Path/Device Group Name in the client: S7400_sn_100

Item in the client: board1.vfd1.connection1.DB100,W0

In the above example:

The name of the access path (device group) is S7400_sn_100.
The name of the Communications Processor is board1.
The name of the Virtual Field Device is vfd1.
The name of the Connection is connection1.
The name of the item is DB100,W0. It is a word with address 0 of the data block 100.

All properties are delimited by a "." (period).

Note It is not necessary to use an OPC access path. Without an OPC access path, the default OPC device group is being used.

DDE/SuiteLink Example:

Topic in the client: S7400_sn_100

Item in the client: DB100,W0

In the above example:

The name of the topic (device group) is S7400_sn_100.

For DDE/SuiteLink communications, there must be no path information in the item name.
The path is determined by the device group, if all device groups have unique names. (See Configuring Device-Group and Device-Item Definitions.)

The name of the item is DB100,W0. It is a word with address 0 of the data block 100.

Data Blocks and Instance Blocks

The following table summarizes the data format, item or point, suffix, data type, and range for Data Blocks and Instance Block.

Data Format	Item/Point	Suffix	Data Type	Range
Bit	D<B,I>d,Xx.y		VT_BOOL	0 or 1
String	D<B,I>d,Sx,v D<B,I>d,STRINGx,v		VT_BSTR VT_BSTR	String String
S7String	D<B,I>d,S7Sx,w D<B,I>d,S7STRINGx,w		VT_BSTR VT_BSTR	String String
Byte	D<B,I>d,Bx D<B,I>d,BYTEx	 DT	VT_UI1 VT_UI1 VT_BSTR	0 to 255 0 to 255 1990-1-1-0:00:00.000 to 2089-12-31-23:59:59.999
Byte Array	D<B,I>d,Bx,v D<B,I>d,BYTEx,v		VT_ARRAY: VT_UI1 VT_ARRAY: VT_UI1	0 to 255 for each element* 0 to 255 for each element*
Char	D<B,I>d,CHARx	 DT	VT_I1 VT_BSTR	-128 to 127 1990-1-1-0:00:00.000 to 2089-12-31-23:59:59.999

Data Format	Item/Point	Suffix	Data Type	Range
Char Array	D<B,I>d,CHARx,v		VT_ARRAY: VT_I1	-128 to 127 for each element*
Word	D<B,I>d,Wn		VT_UI2	0 to 65535
	D<B,I>d,WORDn		VT_UI2	0 to 65535
		BCD	VT_UI2	0 to 9999
		KT	VT_BSTR	0.0 to 999.3
		S5T	VT_BSTR	0ms to 2h46m30s
		TR	VT_R4	0.0 to 9990.0 (s)
		D	VT_BSTR	1990-1-1 to 2168-12-31
Word Array	D<B,I>d,Wn,v D<B,I>d,WORDn,v		VT_ARRAY: VT_UI2 VT_ARRAY: VT_UI2	0 to 65535 for each element* 0 to 65535 for each element*
Integer	D<B,I>d,INTn		VT_I2	-32768 to 32767
		BCD	VT_I2	-999 to 999
		D	VT_BSTR	1990-1-1 to 2168-12-31
Integer Array	D<B,I>d,INTn,v		VT_ARRAY: VT_I2	-32768 to 32767 for each element*
Double Word	D<B,I>d,Dm		VT_UI4	0 to 4294967295**
	D<B,I>d,DWORDm		VT_UI4	0 to 4294967295**
		BCD	VT_UI4	0 to 99999999
		TOD	VT_BSTR	0:00:00.000 to 23:59:59.999
		T	VT_BSTR	-24D_20H_31M_ 23S_648MS to 24D_20H_31M_23S_647MS
Double Word Array	D<B,I>d,Dm,v D<B,I>d,DWORDm,v		VT_ARRAY: VT_UI4 VT_ARRAY: VT_UI4	0 to 4294967295 for each element* 0 to 4294967295 for each element*
Double Integer	D<B,I>d,DINTm		VT_I4	-2147483648 to 2147483647
		BCD	VT_I4	-9999999 to 9999999
		TOD	VT_BSTR	0:00:00.000 to 23:59:59.999
		T	VT_BSTR	-24D_20H_31M_ 23S_648MS to 24D_20H_31M_23S_647MS
Double Integer Array	D<B,I>d,DINTm,v		VT_ARRAY: VT_I4	-2147483648 to 2147483647 for each element*
Real	D<B,I>d,REALm		VT_R4	-3.4e38 to 3.4e38
Real Array	D<B,I>d,REALm,v		VT_ARRAY: VT_R4	-3.4e38 to 3.4e38 for each element*

Note *: For DDE/SuiteLink, the item value is the HexASCII representation of the complete array. The result is one string containing all the elements of the array in the HexASCII representation of the binary data. In this case, the datatype is Message (VT_BSTR).
**: For DDE/SuiteLink, this value is restricted to the range 0 to 2147483647. Values higher than that will be clamped to the maximum value of 2147483647 in a SuiteLink or DDE client. In this case, the quality of the item shows "Clamp High."

Where:

d	is the data block number, with a range from 1 to 65535.
x	is the start address, with a range from 0 to 65535.

Where:

y is the bit position, with a range from 0 to 7.

- 0 is the least significant bit.
- 7 is the most significant bit.

v denotes the length of data in bytes, with a range from 1 to (net PDU data size/type size - header information).

w denotes the length of the net S7 string-data in characters, with a range from 1 to (net PDU data size/type size - header information - 1).
The size in S7 message is w+1.
The size of string representation in S7 PLC is w+2.

n is the start address of 2-byte data/2-byte data arrays, with a range from 0 to 65534.

m is the start address of 4-byte data/4-byte data arrays, with a range from 0 to 65532.

Note All data blocks are Read/Write. The longest string or array that can be read in a cyclic service has the length of the PDU size minus 32 bytes. The longest string InTouch can process is 131 bytes. The longest string that can be poked is 256 bytes or the PDU size minus 28 bytes, whichever is less. The S7SIMATIC DAServer processes a write (POKE) to a Data Block.

Flag Bytes

Data format, item or point, suffix, data type, and range are summarized in the following table for Flag Bytes.

Data Format	Item/Point	Suffix	Data Type	Range
Bit	FXx.y MXx.y		VT_BOOL VT_BOOL	0 or 1 0 or 1
String	FSx,v MSx,v FSTRINGx,v MSTRINGx,v		VT_BSTR VT_BSTR VT_BSTR VT_BSTR	String String String String
Byte	FBx MBx FBYTEx MBYTEx		VT_UI1 VT_UI1 VT_UI1 VT_UI1	0 to 255 0 to 255 0 to 255 0 to 255
		DT	VT_BSTR	1990-1-1-0:00:00.000 to 2089-12-31-23:59:59.999
Byte Array	FBx,v MBx,v FBYTEx,v MBYTEx,v		VT_ARRAY: VT_UI1 VT_ARRAY: VT_UI1 VT_ARRAY: VT_UI1 VT_ARRAY: VT_UI1	0 to 255 for each element* 0 to 255 for each element* 0 to 255 for each element* 0 to 255 for each element*

Data Format	Item/Point	Suffix	Data Type	Range
Char	FCHARx		VT_I1	-128 to 127
	MCHARx		VT_I1	-128 to 127
		DT	VT_BSTR	1990-1-1-0:00:00.000 to 2089-12-31-23:59:59.999
Char Array	FCHARx,v		VT_ARRAY: VT_I1	-128 to 127 for each element*
	MCHARx,v		VT_ARRAY: VT_I1	-128 to 127 for each element*
Word	FWn		VT_UI2	0 to 65535
	MWn		VT_UI2	0 to 65535
	FWORDn		VT_UI2	0 to 65535
	MWORDn		VT_UI2	0 to 65535
		BCD	VT_UI2	0 to 9999
		KT	VT_BSTR	0.0 to 999.3
		S5T	VT_BSTR	0ms to 2h46m30s
		TR	VT_R4	0.0 to 9990.0 (s)
		D	VT_BSTR	1990-1-1 to 2168-12-31
Word Array	FWn,v		VT_ARRAY: VT_UI2	0 to 65535 for each element*
	MWn,v		VT_ARRAY: VT_UI2	0 to 65535 for each element*
	FWORDn,v		VT_ARRAY: VT_UI2	0 to 65535 for each element*
	MWORDn,v		VT_ARRAY: VT_UI2	0 to 65535 for each element*
Integer	FINTn		VT_I2	-32768 to 32767
	MINTn		VT_I2	-32768 to 32767
			VT_I2	-999 to 999
			VT_BSTR	1990-1-1 to 2168-12-31
Integer Array	FINTn,v		VT_ARRAY: VT_I2	-32768 to 32767 for each element*
	MINTn,v		VT_ARRAY: VT_I2	-32768 to 32767 for each element*
Double Word	FDm		VT_UI4	0 to 4294967295**
	MDm		VT_UI4	0 to 4294967295**
	FDWORDm		VT_UI4	0 to 4294967295**
	MDWORDm		VT_UI4	0 to 4294967295**
		BCD	VT_UI4	0 to 9999999
		TOD	VT_BSTR	0:00:00.000 to 23:59:59.999
		T	VT_BSTR	-24D_20H_31M_ 23S_648MS to 24D_20H_31M_23S_647MS
Double Word Array	FDm,v		VT_ARRAY: VT_UI4	0 to 4294967295 for each element*
	MDm,v		VT_ARRAY: VT_UI4	0 to 4294967295 for each element*
	FDWORDm,v		VT_ARRAY: VT_UI4	0 to 4294967295 for each element*
	MDWORDm,v		VT_ARRAY: VT_UI4	0 to 4294967295 for each element*
Double Integer	FDINTm		VT_14	-2147483648 to 2147483647
	MDINTm		VT_14	-2147483648 to 2147483647
		BCD	VT_14	-9999999 to 9999999
		TOD	VT_BSTR	0:00:00.000 to 23:59:59.999
		T	VT_BSTR	-24D_20H_31M_ 23S_648MS to 24D_20H_31M_23S_647MS
Double Integer Array	FDINTm,v		VT_ARRAY: VT_I4	-2147483648 to 2147483647 for each element*
	MDINTm,v		VT_ARRAY: VT_I4	-2147483648 to 2147483647 for each element*
Real	FREALm		VT_R4	-3.4e38 to 3.4e38
	MREALm		VT_R4	-3.4e38 to 3.4e38
Real Array	FREALm,v		VT_ARRAY: VT_R4	-3.4e38 to 3.4e38 for each element*
	MREALm,v		VT_ARRAY: VT_R4	-3.4e38 to 3.4e38 for each element*

Note *: For DDE/SuiteLink, the item value is the HexASCII representation of the complete array. The result is one string containing all the elements of the array in the HexASCII representation of the binary data in big-endian format. In this case, the datatype is Message (VT_BSTR).
**: For DDE/SuiteLink, this value is restricted to the range 0 to 2147483647. Values higher than that will be clamped to the maximum value of 2147483647 in a SuiteLink or DDE client. In this case, the quality of the item shows "Clamp High."

Where:

x is the start address, with a range from 0 to 65535.

y is the bit position, with a range from 0 to 7.

- 0 is the least significant bit.
- 7 is the most significant bit.

v denotes the length of data in bytes, with a range from 1 to (net PDU data size/type size - header information).

n is the start address of 2-byte data/2-byte data arrays, with a range from 0 to 65534.

m is the start address of 4-byte data/4-byte data arrays, with a range from 0 to 65532.

Note All flags are Read/Write. The longest string or array that can be read in a cyclic service has the length of the PDU size minus 32 bytes. The longest string InTouch can process is 131 bytes. The longest string that can be poked is 256 bytes or the PDU size minus 28 bytes, whichever is less. The S7SIMATIC DAServer processes a write (POKE) to a Flag Byte.

Input Bytes

The following table summarizes the data format, item or point, suffix, data type, and range for Input Bytes.

Data Format	Item/Point	Suffix	Data Type	Range
Bit	Ix.y Ex.y IXx.y EXx.y		VT_BOOL VT_BOOL VT_BOOL VT_BOOL	0 or 1 0 or 1 0 or 1 0 or 1
String	ISx,v ESx,v ISTRINGx,v ESTRINGx,v		VT_BSTR VT_BSTR VT_BSTR VT_BSTR	String String String String

Data Format	Item/Point	Suffix	Data Type	Range
Byte	IBx		VT_UI1	0 to 255
	EBx		VT_UI1	0 to 255
	IBYTEx		VT_UI1	0 to 255
	EBYTEx		VT_UI1	0 to 255
		DT	VT_BSTR	1990-1-1-0:00:00.000 to 2089-12-31-23:59:59.999
Byte Array	IBx,v		VT_ARRAY: VT_UI1	0 to 255 for each element*
	EBx,v		VT_ARRAY: VT_UI1	0 to 255 for each element*
	IBYTEx,v		VT_ARRAY: VT_UI1	0 to 255 for each element*
	EBYTEx,v		VT_ARRAY: VT_UI1	0 to 255 for each element*
Char	ICHARx		VT_I1	-128 to 127
	ECHARx		VT_I1	-128 to 127
		DT	VT_BSTR	1990-1-1-0:00:00.000 to 2089-12-31-23:59:59.999
Char Array	ICHARx,v		VT_ARRAY: VT_I1	-128 to 127 for each element*
	ECHARx,v		VT_ARRAY: VT_I1	-128 to 127 for each element*
Word	IWn		VT_UI2	0 to 65535
	EWn		VT_UI2	0 to 65535
	IWORDn		VT_UI2	0 to 65535
	EWORDn		VT_UI2	0 to 65535
		BCD	VT_UI2	0 to 9999
		KT	VT_BSTR	0.0 to 999.3
		S5T	VT_BSTR	0ms to 2h46m30s
		TR	VT_R4	0.0 to 9990.0 (s)
		D	VT_BSTR	1990-1-1 to 2168-12-31
Word Array	IWn,v		VT_ARRAY: VT_UI2	0 to 65535 for each element*
	EWn,v		VT_ARRAY: VT_UI2	0 to 65535 for each element*
	IWORDn,v		VT_ARRAY: VT_UI2	0 to 65535 for each element*
	EWORDn,v		VT_ARRAY: VT_UI2	0 to 65535 for each element*
Integer	IINTn		VT_I2	-32768 to 32767
	EINTn		VT_I2	-32768 to 32767
		BCD	VT_I2	-999 to 999
		D	VT_BSTR	1990-1-1 to 2168-12-31
Integer Array	IINTn,v		VT_ARRAY: VT_I2	-32768 to 32767 for each element*
	EINTn,v		VT_ARRAY: VT_I2	-32768 to 32767 for each element*
Double Word	IDmEDm		VT_UI4	0 to 4294967295**
	IDWORDm		VT_UI4	0 to 4294967295**
	EDWORDm		VT_UI4	0 to 4294967295**
			VT_UI4	0 to 4294967295**
		BCD	VT_UI4	0 to 99999999
		TOD	VT_BSTR	0:00:00.000 to 23:59:59.999
		T	VT_BSTR	-24D_20H_31M_23S_648MS to 24D_20H_31M_23S_647MS
Double Word Array	IDm,v		VT_ARRAY: VT_UI4	0 to 4294967295 for each element*
	EDm,v		VT_ARRAY: VT_UI4	0 to 4294967295 for each element*
	IDWORDm,v		VT_ARRAY: VT_UI4	0 to 4294967295 for each element*
	EDWORDm,v		VT_ARRAY: VT_UI4	0 to 4294967295 for each element*

Data Format	Item/Point	Suffix	Data Type	Range
Double Integer	IDINTm EDINTm 	 BCD TOD T	VT_UI4 VT_UI4 VT_UI4 VT_BSTR VT_BSTR	-2147483648 to 2147483647 -2147483648 to 2147483647 -9999999 to 9999999 0:00:00.000 to 23:59:59.999 -24D_20H_31M_23S_ 648MS to 24D_20H_ 31M_23S_647MS
Double Integer Array	IDINTm,v EDINTm,v		VT_ARRAY: VT_I4 VT_ARRAY: VT_I4	-2147483648 to 2147483647 for each element* -2147483648 to 2147483647 for each element*
Real	IREALm EREALm		VT_R4 VT_R4	-3.4e38 to 3.4e38 -3.4e38 to 3.4e38
Real Array	IREALm,v EREALm,v		VT_ARRAY: VT_R4 VT_ARRAY: VT_R4	-3.4e38 to 3.4e38 for each element* -3.4e38 to 3.4e38 for each element*

Note *: For DDE/SuiteLink, the item value is the HexASCII representation of the complete array. The result is one string containing all the elements of the array in the HexASCII representation of the binary data in big-endian format. In this case, the datatype is Message (VT_BSTR).
**: For DDE/SuiteLink, this value is restricted to the range 0 to 2147483647. Values higher than that will be clamped to the maximum value of 2147483647 in a SuiteLink or DDE client. In this case, the quality of the item shows "Clamp High."

Where:

x is the start address, with a range from 0 to 65535.

y is the bit position, with a range from 0 to 7.

- 0 is the least significant bit.
- 7 is the most significant bit.

v denotes the length of data in bytes, with a range from 1 to (net PDU data size/type size - header information).

n is the start address of 2-byte data/2-byte data arrays, with a range from 0 to 65534.

m is the start address of 4-byte data/4-byte data arrays, with a range from 0 to 65532.

Note All inputs are Read-only. The longest string or array that can be read in a cyclic service has the length of the PDU size minus 32 bytes. The longest string InTouch can process is 131 bytes. The S7SIMATIC DAServer does not process a write (POKE) to an Input Byte.

Output Bytes

Data format, item or point, suffix, data type, and range are summarized in the following table for Output Bytes.

Data Format	Item/Point	Suffix	Data Type	Range
Bit	Ox.y		VT_BOOL	0 or 1
	Ax.y		VT_BOOL	0 or 1
	OXx.y		VT_BOOL	0 or 1
	AXx.y		VT_BOOL	0 or 1
String	OSx,v		VT_BSTR	String
	ASx,v		VT_BSTR	String
	OSTRINGx,v		VT_BSTR	String
	ASTRINGx,v		VT_BSTR	String
Byte	OBx		VT_UI1	0 to 255
	ABx		VT_UI1	0 to 255
	OBYTEx		VT_UI1	0 to 255
	ABYTEx		VT_UI1	0 to 255
		DT	VT_BSTR	1990-1-1-0:00:00.000 to 2089-12-31-23:59:59.999
Byte Array	OBx,v		VT_ARRAY: VT_UI1	0 to 255 for each element*
	ABx,v		VT_ARRAY: VT_UI1	0 to 255 for each element*
	OBYTEx,v		VT_ARRAY: VT_UI1	0 to 255 for each element*
	ABYTEx,v		VT_ARRAY: VT_UI1	0 to 255 for each element*
Char	OCHARx		VT_I1	-128 to 127
	ACHARx		VT_I1	-128 to 127
		DT	VT_BSTR	1990-1-1-0:00:00.000 to 2089-12-31-23:59:59.999
Char Array	OCHARx,v		VT_ARRAY: VT_I1	-128 to 127 for each element*
	ACHARx,v		VT_ARRAY: VT_I1	-128 to 127 for each element*
Word	OWn		VT_UI2	0 to 65535
	AWn		VT_UI2	0 to 65535
	OWORDn		VT_UI2	0 to 65535
	AWORDn		VT_UI2	0 to 65535
		BCD	VT_UI2	0 to 9999
		KT	VT_BSTR	0.0 to 999.3
		S5T	VT_BSTR	0ms to 2h46m30s
		TR	VT_R4	0.0 to 9990.0 (s)
		D	VT_BSTR	1990-1-1 to 2168-12-31
Word Array	OWn,v		VT_ARRAY: VT_UI2	0 to 65535 for each element*
	AWn,v		VT_ARRAY: VT_UI2	0 to 65535 for each element*
	OWORDn,v		VT_ARRAY: VT_UI2	0 to 65535 for each element*
	AWORDn,v		VT_ARRAY: VT_UI2	0 to 65535 for each element*
Integer	OINTn		VT_I2	-32768 to 32767
	AINTn		VT_I2	-32768 to 32768
		BCD	VT_I2	-999 to 999
		D	VT_BSTR	1990-1-1 to 2168-12-31
Integer Array	OINTn,v		VT_ARRAY: VT_I2	-32768 to 32767 for each element*
	AINTn,v		VT_ARRAY: VT_I2	-32768 to 32768 for each element*

Data Format	Item/Point	Suffix	Data Type	Range
Double Word	ODm ADm ODWORDm ADWORDm	 BCD TOD T	VT_UI4 VT_UI4 VT_UI4 VT_UI4 VT_UI4 VT_BSTR VT_BSTR	0 to 4294967295** 0 to 4294967295** 0 to 4294967295** 0 to 4294967295** 0 to 99999999 0:00:00.000 to 23:59:59.999 -24D_20H_31M_23S_648MS to 24D_20H_31M_23S_647MS
Double Word Array	ODm,v ADm,v ODWORDm,v ADWORDm,v		VT_ARRAY: VT_UI4 VT_ARRAY: VT_UI4 VT_ARRAY: VT_UI4 VT_ARRAY: VT_UI4	0 to 4294967295 for each element* 0 to 4294967295 for each element* 0 to 4294967295 for each element* 0 to 4294967295 for each element*
Double Integer	ODINTm ADINTm	 BCD TOD T	VT_I4 VT_I4 VT_I4 VT_BSTR VT_BSTR	-2147483648 to 2147483647 -2147483648 to 2147483647 -9999999 to 9999999 0:00:00.000 to 23:59:59.999 -24D_20H_31M_23S_ 648MS to 24D_20H_31M_23S_ 647MS
Double Integer Array	ODINTm,v ADINTm,v		VT_ARRAY: VT_I4 VT_ARRAY: VT_I4	-2147483648 to 2147483647 for each element* -2147483648 to 2147483647 for each element*
Real	OREALm AREALm		VT_R4 VT_R4	-3.4e38 to 3.4e38 -3.4e38 to 3.4e38
Real Array	OREALm,v AREALm,v		VT_ARRAY: VT_R4 VT_ARRAY: VT_R4	-3.4e38 to 3.4e38 for each element* -3.4e38 to 3.4e38 for each element*

Note *: For DDE/SuiteLink, the item value is the HexASCII representation of the complete array. The result is one string containing all the elements of the array in the HexASCII representation of the binary data in big-endian format. In this case, the datatype is Message (VT_BSTR).
**: For DDE/SuiteLink, this value is restricted to the range 0 to 2147483647. Values higher than that will be clamped to the maximum value of 2147483647 in a SuiteLink or DDE client. In this case, the quality of the item shows "Clamp High."

Where:

x is the start address, with a range from 0 to 65535.

y is the bit position, with a range from 0 to 7.

- 0 is the least significant bit.
- 7 is the most significant bit.

v denotes the length of data in bytes, with a range from 1 to (net PDU data size/type size - header information).

n is the start address of 2-byte data/2-byte data arrays, with a range from 0 to 65534.

m is the start address of 4-byte data/4-byte data arrays, with a range from 0 to 65532.

Note All outputs are Read/Write. The longest string or array that can be read in a cyclic service has the length of the PDU size minus 32 bytes. The longest string InTouch can process is 131 bytes. The longest string that can be poked is 256 bytes or the PDU size minus 28 bytes, whichever is less. The S7SIMATIC DAServer processes a write (POKE) to an Output Byte.

Peripheral Input Bytes

The following table summarizes the data format, item or point, suffix, data type, and range for Peripheral Input Bytes.

Data Format	Item/Point	Suffix	Data Type	Range
Bit	PIx.y PEx.y PIXx.y PEXx.y		VT_BOOL VT_BOOL VT_BOOL VT_BOOL	0 or 1 0 or 1 0 or 1 0 or 1
String	PISx,v PESx,v PISTRINGx,v PESTRINGx,v		VT_BSTR VT_BSTR VT_BSTR VT_BSTR	String String String String
Byte	PIBx PEBx PIBYTEx PEBYTEx	 DT	VT_UI1 VT_UI1 VT_UI1 VT_UI1 VT_BSTR	0 to 255 0 to 255 0 to 255 0 to 255 1990-1-1-0:00:00.000 to 2089-12-31-23:59:59.999
Byte Array	PIBx,v PEBx,v PIBYTEx,v PEBYTEx,v		VT_ARRAY: VT_UI1 VT_ARRAY: VT_UI1 VT_ARRAY: VT_UI1 VT_ARRAY: VT_UI1	0 to 255 for each element* 0 to 255 for each element* 0 to 255 for each element* 0 to 255 for each element*
Char	PICHARx PECHARx	 DT	VT_I1 VT_I1 VT_BSTR	-128 to 127 -128 to 127 1990-1-1-0:00:00.000 to 2089-12-31-23:59:59.999
Char Array	PICHARx,v PECHARx,v		VT_ARRAY: VT_I1 VT_ARRAY: VT_I1	-128 to 127 for each element* -128 to 127 for each element*
Word	PIWn PEWn PIWORDn PEWORDn	 BCD KT S5T TR D	VT_UI2 VT_UI2 VT_UI2 VT_UI2 VT_UI2 VT_BSTR VT_BSTR VT_R4 VT_BSTR	0 to 65535 0 to 65535 0 to 65535 0 to 65535 0 to 9999 0.0 to 999.3 0ms to 2h46m30s 0.0 to 9990.0 (s) 1990-1-1 to 2168-12-31

Data Format	Item/Point	Suffix	Data Type	Range
Word Array	PIWn,v		VT_ARRAY: VT_UI2	0 to 65535 for each element*
	PEWn,v		VT_ARRAY: VT_UI2	0 to 65535 for each element*
	PIWORDn,v		VT_ARRAY: VT_UI2	0 to 65535 for each element*
	PEWORDn,v		VT_ARRAY: VT_UI2	0 to 65535 for each element*
Integer	PIINTn		VT_I2	-32768 to 32767
	PEINTn		VT_I2	-32768 to 32767
		BCD	VT_I2	-999 to 999
		D	VT_BSTR	1990-1-1 to 2168-12-31
Integer Array	PIINTn,v		VT_ARRAY: VT_I2	-32768 to 32767 for each element*
	PEINTn,v		VT_ARRAY: VT_I2	-32768 to 32767 for each element*
Double Word	PIDm		VT_UI4	0 to 4294967295**
	PEDm		VT_UI4	0 to 4294967295**
	PIDWORDm		VT_UI4	0 to 4294967295**
	PEDWORDm		VT_UI4	0 to 4294967295**
		BCD	VT_UI4	0 to 99999999
		TOD	VT_BSTR	0:00:00.000 to 23:59:59.999
		T	VT_BSTR	-24D_20H_31M_23S_648MS to 24D_20H_31M_23S_647MS
Double Word Array	PIDm,v		VT_ARRAY: VT_UI4	0 to 4294967295 for each element*
	PEDm,v		VT_ARRAY: VT_UI4	0 to 4294967295 for each element*
	PIDWORDm,v		VT_ARRAY: VT_UI4	0 to 4294967295 for each element*
	PEDWORDm,v		VT_ARRAY: VT_UI4	0 to 4294967295 for each element*
Double Integer	PIDINTm		VT_I4	-2147483648 to 2147483647
	PEDINTm		VT_I4	-2147483648 to 2147483647
		BCD	VT_I4	-9999999 to 9999999
		TOD	VT_BSTR	0:00:00.000 to 23:59:59.999
		T	VT_BSTR	-24D_20H_31M_23S_ 648MS to 24D_20H_31M_23S_647MS
Double Integer Array	PIDINTm,v		VT_ARRAY: VT_I4	-2147483648 to 2147483647 for each element*
	PEDINTm,v		VT_ARRAY: VT_I4	-2147483648 to 2147483647 for each element*
Real	PIREALm		VT_R4	-3.4e38 to 3.4e38
	PEREALm		VT_R4	-3.4e38 to 3.4e38
Real Array	PIREALm,v		VT_ARRAY: VT_R4	-3.4e38 to 3.4e38 for each element*
	PEREALm,v		VT_ARRAY: VT_R4	-3.4e38 to 3.4e38 for each element*

Note *: For DDE/SuiteLink, the item value is the HexASCII representation of the complete array. The result is one string containing all the elements of the array in the HexASCII representation of the binary data in big-endian format. In this case, the datatype is Message (VT_BSTR).
**: For DDE/SuiteLink, this value is restricted to the range 0 to 2147483647. Values higher than that will be clamped to the maximum value of 2147483647 in a SuiteLink or DDE client. In this case, the quality of the item shows "Clamp High."

Where:

x is the start address, with a range from 0 to 65535.

y is the bit position, with a range from 0 to 7.

- 0 is the least significant bit.
- 7 is the most significant bit.

v denotes the length of data in bytes, with a range from 1 to (net PDU data size/type size - header information).

n is the start address of 2-byte data/2-byte data arrays, with a range from 0 to 65534.

m is the start address of 4-byte data/4-byte data arrays, with a range from 0 to 65532.

Note All peripheral inputs are Read-only. The longest string or array that can be read in a cyclic service has the length of the PDU size minus 32 bytes. The longest string InTouch can process is 131 bytes. The S7SIMATIC DAServer does not process a write (POKE) to a Peripheral Input Byte. Some input modules are not readable.

Peripheral Output Bytes

The following table summarizes the data format, item or point, suffix, data type, and range for Peripheral Output Bytes.

Data Format	Item/Point	Suffix	Data Type	Range
Bit	POx.y PAx.y POXx.y PAXx.y		VT_BOOL VT_BOOL VT_BOOL VT_BOOL	0 or 1 0 or 1 0 or 1 0 or 1
String	POSx,v PASx,v POSTRINGx,v PASTRINGx,v		VT_BSTR VT_BSTR VT_BSTR VT_BSTR	String String String String

Data Format	Item/Point	Suffix	Data Type	Range
Byte	POBx		VT_UI1	0 to 255
	PABx		VT_UI1	0 to 255
	POBYTEx		VT_UI1	0 to 255
	PABYTEx		VT_UI1	0 to 255
		DT	VT_BSTR	1990-1-1-0:00:00.000 to 2089-12-31-23:59:59.999
Byte Array	POBx,v		VT_ARRAY: VT_UI1	0 to 255 for each element*
	PABx,v		VT_ARRAY: VT_UI1	0 to 255 for each element*
	POBYTEx,v		VT_ARRAY: VT_UI1	0 to 255 for each element*
	PABYTEx,v		VT_ARRAY: VT_UI1	0 to 255 for each element*
Char	PACHARx		VT_I1	-128 to 127
	POCHARx		VT_I1	-128 to 127
		DT	VT_BSTR	1990-1-1-0:00:00.000 to 2089-12-31-23:59:59.999
Char Array	POCHARx,v		VT_ARRAY: VT_I1	-128 to 127 for each element*
	PACHARx,v		VT_ARRAY: VT_I1	-128 to 127 for each element*
Word	POWn		VT_UI2	0 to 65535
	PAWn		VT_UI2	0 to 65535
	POWORDn		VT_UI2	0 to 65535
	PAWORDn		VT_UI2	0 to 65535
		BCD	VT_UI2	0 to 9999
		KT	VT_BSTR	0.0 to 999.3
		S5T	VT_BSTR	0ms to 2h46m30s
		TR	VT_R4	0.0 to 9990.0 (s)
		D	VT_BSTR	1990-1-1 to 2168-12-31
Word Array	POWn,v		VT_ARRAY: VT_UI2	0 to 65535 for each element*
	PAWn,v		VT_ARRAY: VT_UI2	0 to 65535 for each element*
	POWORDn,v		VT_ARRAY: VT_UI2	0 to 65535 for each element*
	PAWORDn,v		VT_ARRAY: VT_UI2	0 to 65535 for each element*
Integer	POINTn		VT_I2	-32768 to 32767
	PAINTn		VT_I2	-32768 to 32767
		BCD	VT_I2	-999 to 999
		D	VT_BSTR	1990-1-1 to 2168-12-31
Integer Array	POINTn,v		VT_ARRAY: VT_I2	-32768 to 32767 for each element*
	PAINTn,v		VT_ARRAY: VT_I2	-32768 to 32767 for each element*
Double Word	PODm		VT_UI4	0 to 4294967295**
	PADm		VT_UI4	0 to 4294967295**
	PODWORDm		VT_UI4	0 to 4294967295**
	PADWORDm		VT_UI4	0 to 4294967295**
		BCD	VT_UI4	0 to 99999999
		TOD	VT_BSTR	0:00:00.000 to 23:59:59.999
		T	VT_BSTR	-24D_20H_31M_23S_ 648MS to 24D_20H_31M_23S_ 647MS
Double Word Array	PODm,v		VT_ARRAY: VT_UI4	0 to 4294967295 for each element*
	PADm,v		VT_ARRAY: VT_UI4	0 to 4294967295 for each element*

Data Format	Item/Point	Suffix	Data Type	Range
Double Integer	PODINTm PADINTm	 BCD TOD T	VT_I4 VT_I4 VT_I4 VT_BSTR VT_BSTR	-2147483648 to 2147483647 -2147483648 to 2147483647 -9999999 to 9999999 0:00:00.000 to 23:59:59.999 -24D_20H_31M_23S_ 648MS to 24D_20H_31M_23S_ 647MS
Double Integer Array	PODINTm,v PADINTm,v		VT_ARRAY: VT_I4	-2147483648 to 2147483647 for each element*
Real	POREALm PAREALm		VT_R4 VT_R4	-3.4e38 to 3.4e38 -3.4e38 to 3.4e38
Real Array	POREALm,v PAREALm,v		VT_ARRAY: VT_R4 VT_ARRAY: VT_R4	-3.4e38 to 3.4e38 for each element* -3.4e38 to 3.4e38 for each element*

Note *: For DDE/SuiteLink, the item value is the HexASCII representation of the complete array. The result is one string containing all the elements of the array in the HexASCII representation of the binary data in big-endian format. In this case, the datatype is Message (VT_BSTR).
**: For DDE/SuiteLink, this value is restricted to the range 0 to 2147483647. Values higher than that will be clamped to the maximum value of 2147483647 in a SuiteLink or DDE client. In this case, the quality of the item shows "Clamp High."

Where:

x is the start address, with a range from 0 to 65535.

y is the bit position, with a range from 0 to 7.

- 0 is the least significant bit.
- 7 is the most significant bit.

v denotes the length of data in bytes, with a range from 1 to (net PDU data size/type size - header information).

n is the start address of 2-byte data/2-byte data arrays, with a range from 0 to 65534.

m is the start address of 4-byte data/4-byte data arrays, with a range from 0 to 65532.

Note All peripheral outputs are Write Only. The longest string or array that can be read in a cyclic service has the length of the PDU size minus 32 bytes. The longest string InTouch can process is 131 bytes. The longest string that can be poked is 256 bytes or the PDU size minus 28 bytes, whichever is less. The S7SIMATIC DAServer processes a write (POKE) to a Peripheral Output Byte. All output modules are not readable but only POKES are allowed.

Counters

Data format, item or point, suffix, data type, and range are summarized in the following table for Counters.

Data Format	Item/Point	Suffix	Data Type	Range
Word	Cx	None	VT_UI2	0…65535
	Zx	None	VT_UI2	0 to 65535
		BCD	VT_UI2	0 to 9999
		KT	VT_BSTR	0.0 to 999.3
		S5T	VT_BSTR	0ms to 2h46m30s

Where:

x is the start address, with a range from 0 to 65535.

Note All counters are Read/Write. The S7SIMATIC DAServer processes a write (POKE) to a Counter. Although the S7SIMATIC DAServer allows poking any word value into counters, the S7 PLC can only process values in the range of 0…2457 or 0…999 (BCD).

Timers

Data format, item or point, suffix, data type, and range are summarized in the following table for Timers.

Data Format	Item/Point	Suffix	Data Type	Range
Word	Tx	None	VT_UI2	0 to 14745
		BCD	VT_UI2	0 to 9999
		KT	VT_BSTR	0.0 to 999.3
		S5T	VT_BSTR	0ms to 2h46m30s
	TREALx	None	VT_R4	0.0 to 9990.00

Where:

x is the start address, with a range from 0 to 65535.

Note All timers are Read/Write. The S7SIMATIC DAServer processes a write (POKE) to a Timer. Although the S7SIMATIC DAServer allows poking any word value into timers, the S7 PLC can only process values that represent a valid time format.

Block Items

The following table summarizes the data format, item or point, suffix, data type, and range for Block Items.

Data Format	Item/Point	Suffix	Data Type	Range
Bit	BLd,Xx.y		VT_BOOL	0 or 1
String	BLd,Sx,v		VT_BSTR	String
	BLd,STRINGx,v		VT_BSTR	String
Byte	BLd,Bx		VT_UI1	0 to 255
	BLd,BYTEx		VT_UI1	0 to 255
		DT	VT_BSTR	1990-1-1-0:00:00.000 to 2089-12-31-23:59:59.999
Byte Array	BLd,Bx,v		VT_ARRAY: VT_UI1	0 to 255 for each element*
	BLd,BYTEx,v		VT_ARRAY: VT_UI1	0 to 255 for each element*
Char	BLd,CHARx		VT_I1	-128 to 127
		DT	VT_BSTR	1990-1-1-0:00:00.000 to 2089-12-31-23:59:59.999
Char Array	BLd,CHARx,v		VT_ARRAY: VT_I1	-128 to 127 for each element*
Word	BLd,Wn		VT_UI2	0 to 65535
	BLd,WORDn		VT_UI2	0 to 65535
		BCD	VT_UI2	0 to 9999
		KT	VT_BSTR	0.0 to 999.3
		S5T	VT_BSTR	0ms to 2h46m30s
		TR	VT_R4	0.0 to 9990.0 (s)
		D	VT_BSTR	1990-1-1 to 2168-12-31
Word Array	BLd,Wn,v		VT_ARRAY: VT_UI2	0 to 65535 for each element*
	BLd,WORDn,v		VT_ARRAY: VT_UI2	0 to 65535 for each element*
Integer	BLd,INTn		VT_I2	-32768 to 32767
		BCD	VT_I2	-999 to 999
		D	VT_BSTR	1990-1-1 to 2168-12-31
Integer Array	BLd,INTn,v		VT_ARRAY: VT_I2	-32768 to 32767 for each element*
Double Word	BLd,Dm		VT_UI4	0 to 4294967295**
	BLd,DWORDm		VT_UI4	0 to 4294967295**
		BCD	VT_UI4	0 to 99999999
		TOD	VT_BSTR	0:00:00.000 to 23:59:59.999
		T	VT_BSTR	-24D_20H_31M_23S_ 648MS to 24D_20H_31M_23S_ 647MS
Double Word Array	BLd,Dm,v		VT_ARRAY: VT_UI4	0 to 4294967295 for each element**
	BLd,DWORDm,v		VT_ARRAY: VT_UI4	0 to 4294967295 for each element**
Double Integer	BLd,DINTm		VT_I4	-2147483648 to 2147483647
		BCD	VT_I4	-9999999 to 9999999
		TOD	VT_BSTR	0:00:00.000 to 23:59:59.999
		T	VT_BSTR	-24D_20H_31M_23S_ 648MS to 24D_20H_31M_23S_ 647MS
Double Integer Array	BLd,DINTm,v		VT_ARRAY: VT_I4	-2147483648 to 2147483647 for each element*

Data Format	Item/Point	Suffix	Data Type	Range
Real	BLd,REALm		VT_R4	-3.4e38 to 3.4e38
Real Array	BLd,REALm,v		VT_ARRAY: VT_R4	-3.4e38 to 3.4e38 for each element*

Note *: For DDE/SuiteLink, the item value is the HexASCII representation of the complete array. The result is one string containing all the elements of the array in the HexASCII representation of the binary data in big-endian format. In this case, the datatype is Message (VT_BSTR).
**: For DDE/SuiteLink, this value is restricted to the range 0 to 2147483647. Values higher than that will be clamped to the maximum value of 2147483647 in a SuiteLink or DDE client. In this case, the quality of the item shows "Clamp High."

Where:

d is the r_id configured in the SFB 12 call in the remote PLC, with a range from 0 to 4294967296.

x is the start address, with a range from 0 to 65533.

y is the bit position, with a range from 0 to 7.

- 0 is the lest significant bit.
- 7 is the most significant bit.

v denotes the length of data in bytes, with a range from 0 to 65534.

n is the start address of 2-byte data/2-byte data arrays, with a range from 0 to 65532.

m is the start address of 4-byte data/4-byte data arrays, with a range from 0 to 65530.

Note All block items are Read-only. The longest string or array that can be read in a cyclic service has the length of 65534 bytes. The longest string InTouch can process is 131 bytes. The S7SIMATIC DAServer does not process a write (POKE) to a Block Item.

Alarms and Events

The item syntax for Alarms and Events is as follows:

ALARM<EV_ID>.<Extension 1>[,<Extension 2>[<Suffix>]]

EVENT<EV_ID>.<Extension 1>[,<Extension 2>[<Suffix>]]

For valid values for Extension 1, Extension 2, and Suffix, and for valid combinations, refer to the following table.

Item	Extension 1	Extension 2	Suffix	Data Type	Range
ALARM<EV_ID>	EVENT_STATE			VT_UI2	0 to 65535
	STATE			VT_UI2	0 to 65535
	ACK_STATE			VT_UI2	0 to 65535
	TIME_STAMP			VT_BSTR	String
	NO_ADD_VALUES			VT_UI2	0 to 10
	ADD_VALUEw	DATA_TYPE		VT_BSTR	String
		LENGTH		VT_UI2	0 to 65535
		Xx.y		VT_BOOL	0 or 1
		Sx,v		VT_BSTR	String
		STRINGx,v		VT_BSTR	String
		Bx		VT_UI1	0 to 255
		BYTEx		VT_UI1	0 to 255
			DT	VT_BSTR	String
		Bx,v		VT_ARRAY: VT_UI1	0 to 255 for each element*
		BYTEx,v		VT_ARRAY: VT_UI1	0 to 255 for each element*
		CHARx		VT_I1	-128 to 127
			DT	VT_BSTR	String
		CHARx,v		VT_ARRAY: VT_I1	-128 to 127 for each element*
		Wn		VT_UI2	0 to 65535
		WORDn		VT_UI2	0 to 65535
			BCD	VT_UI2	0 to 9999
			KT	VT_BSTR	0.0 to 999.3
			S5T	VT_BSTR	0ms to 2h46m30s
			D	VT_BSTR	String
		Wn,v		VT_ARRAY: VT_UI2	0 to 65535 for each element*
		WORDn,v		VT_ARRAY: VT_UI2	0 to 65535 for each element*
		INTn		VT_I2	-32768 to 32767
			BCD	VT_I2	0 to 9999
			D	VT_BSTR	String
		INTn,v		VT_ARRAY: VT_I2	-32768 to 32767 for each element*
		Dm		VT_UI4	0 to 4294967295**
		DWORDm		VT_UI4	0 to 4294967295**
			BCD	VT_UI4	0 to 99999999
			T	VT_BSTR	String
			TOD	VT_BSTR	String
		Dm,v		VT_ARRAY: VT_UI4	0 to 4294967295 for each element*
		DWORDm,v		VT_ARRAY: VT_UI4	0 to 4294967295 for each element*
		DINTm		VT_I4	-2147483648 to 2147483647
			BCD	VT_I4	0 to 99999999
			T	VT_BSTR	String
			TOD	VT_BSTR	String
		DINTm,v		VT_ARRAY: VT_I4	-2147483648 to 2147483647 for each element*
		REALm		VT_R4	-3.4e38 to 3.4e38
		REALm,v		VT_ARRAY: VT_R4	-3.4e38 to 3.4e38 for each element*

Item	Extension 1	Extension 2	Suffix	Data Type	Range
EVENT<EV_ID>	EVENT_STATE			VT_UI2	0 to 65535
	STATE			VT_UI2	0 to 65535
	ACK_STATE			VT_UI2	0 to 65535
	TIME_STAMP			VT_BSTR	String
	NO_ADD_VALUES			VT_UI2	0 to 10
	ADD_VALUEw	DATA_TYPE		VT_BSTR	String
		LENGTH		VT_UI2	0 to 65535
		Xx.y		VT_BOOL	0 or 1
		S,v		VT_BSTR	String
		STRINGx,v		VT_BSTR	String
		Bx		VT_UI1	0 to 255
		BYTEx		VT_UI1	0 to 255
			DT	VT_BSTR	String
		Bx,v		VT_ARRAY: VT_UI1	0 to 255 for each element*
		BYTEx,v		VT_ARRAY: VT_UI1	0 to 255 for each element*
		CHARx		VT_I1	-128 to 127
			DT	VT_BSTR	String
		CHARx,v		VT_ARRAY: VT_I1	-128 to 127 for each element*
		Wn		VT_UI2	0 to 65535
		WORDn		VT_UI2	0 to 65535
			BCD	VT_UI2	0 to 9999
			KT	VT_BSTR	0.0 to 999.3
			S5T	VT_BSTR	0ms to 2h46m30s
			D	VT_BSTR	String
		Wn,v		VT_ARRAY: VT_UI2	0 to 65535 for each element*
		WORDn,v		VT_ARRAY: VT_UI2	0 to 65535 for each element*
		INTn		VT_I2	-32768 to 32767
			BCD	VT_I2	0 to 9999
			D	VT_BSTR	String
		INTn,v		VT_ARRAY: VT_I2	-32768 to 32767 for each element*
		Dm		VT_UI4	0 to 4294967295**
		DWORDm		VT_UI4	0 to 4294967295**
			BCD	VT_UI4	0 to 99999999
			T	VT_BSTR	String
			TOD	VT_BSTR	String
		Dm,v		VT_ARRAY: VT_UI4	0 to 4294967295 for each element**
		DWORDm,v		VT_ARRAY: VT_UI4	0 to 4294967295 for each element**
		DINTm		VT_I4	-2147483648 to 2147483647
			BCD	VT_I4	0 to 99999999
			T	VT_BSTR	String
			TOD	VT_BSTR	String
		DINTm,v		VT_ARRAY: VT_I4	-2147483648 to 2147483647 for each element*
		REALm		VT_R4	-3.4e38 to 3.4e38
		REALm,v		VT_ARRAY: VT_R4	-3.4e38 to 3.4e38 for each element*

Note *: For DDE/SuiteLink, the item value is the HexASCII representation of the complete array. The result is one string containing all the elements of the array in the HexASCII representation of the binary data in big-endian format. In this case, the datatype is Message (VT_BSTR).
**: For DDE/SuiteLink, this value is restricted to the range 0 to 2147483647. Values higher than that will be clamped to the maximum value of 2147483647 in a SuiteLink or DDE client. In this case, the quality of the item shows "Clamp High."

Where:

w denotes the length of the net S7 string-data in characters, with a range from 1 to 10.

x is the start address, with a range from 0 to 65535.

y is the bit position, with a range from 0 to 7.

- 0 is the least significant bit.
- 7 is the most significant bit.

v denotes the length of data in bytes, with a range from 1 to (net PDU data size/type size - header information).

n is the start address of 2-byte data/2-byte data arrays, with a range from 0 to 65534.

m is the start address of 4-byte data/4-byte data arrays, with a range from 0 to 65532.

Note All alarms and events are Read-only. (<EV_ID> is the ID defined by Step7, in integer format, filled with leading zeros up to 6 characters.). The longest string or array that can be read in a cyclic service has the length of the PDU size minus 32 bytes. The longest string InTouch can process is 131 bytes. The S7SIMATIC DAServer does not process writes (POKES) to Alarms and Events.

Note This version of the S7SIMATIC DAServer does not allow acknowledgement of Alarms and Events.

Examples:

ALARM000010.TIME_STAMP

EVENT001234.ADD_VALUE2,LENGTH

ALARM000555.ADD_VALUE10,REAL0

EVENT000001.ADD_VALUE3,D0TOD

Alarms and Events Terms

The terms available in Alarms and Events Terms and their descriptions are collated in the following table.

Term	Description
EVENT_STATE:	State of the Alarm/Event itself. If the Alarm/Event is TRUE, then EVENT_STATE is TRUE and vice versa.
STATE:	The state in general whether the Alarm/Event is available (maybe a data block was deleted where a bit should be monitored).
ACK_STATE:	The state of the acknowledgement of coming or going Alarms/Events.
TIME_STAMP:	Time stamp of the Alarm/Event, provided by the PLC.
NO_ADD_VALUES:	Number of additional values that are sent with this Alarm/Event message.
ADD_VALUEw,DATA_TYPE:	Data type of a specific additional value of an Alarm/Event.
ADD_VALUEw,LENGTH:	Length of a specific additional value of an Alarm/Event.
<EV_ID>:	The event ID is created automatically by the Step7 programming software. In case of Alarms (FB33 to FB36), this is the EV_ID-parameter of the function block. The value of the parameter must be converted from hexadecimal to decimal, and then filled up with leading zeros to the length of 6 characters (for example: EV_ID: DW#16#4E25 => <EV_ID>: 020005). In case of Events (generated by the symbol editor) this is the "Message Number." This number is in decimal format and must be filled with leading zeros up to 6 characters (for example: "Message number": 20000 => <EV_ID>: 020000).

Conversions and Suffixes of Items

This section describes what data-format items and suffixes are converted and what they are converted into.

Endian Conversion

In endian conversion, all items with the following data formats are copied in a reverse-byte order to convert the data from the big endian of the protocol to the little endian of the computer:

- Word
- Integer
- Double Word

- Double Integer
- Real

Suffix BCD

All items with the following data formats and suffix BCD are converted from the BCD format into the integer and back:

- Word
- Integer
- Double Word
- Double Integer

Suffix DT

All items with the following data formats and suffix DT (Date and Time) are converted from DT into a message and back to store a value in the range of 1990-1-1-0:00:00.000 to 2089-12-31-23:59:59.999"

- Byte
- Char

This is an 8-byte value (although declared as "byte") that contains both the date and time. In the client, you see a string such as: 1999-12-13-07:06:05.888. The construction is a BCD interpretation. This means that the value in the memory of the PLC (seen as a hex value) represents directly the single "parts" of the string above.

The example above would look like the following:

0x9912130706058880 in the memory.

The last character ("0" in this example) is not used in this string, but represents the day of the week. If a DT item is poked, the server will write the correct day of the week to the PLC.

Suffix KT

All items with the following data format and suffix KT are converted from KT to a message and back to store a value in the range of 0.0 to 999.3.

- Word

The item contains a time value in the same format as in the old Step-5 PLCs. In the client, you see a string such as: 999.3. The construction is like a BCD interpretation, but the digits are twisted.

The example above would look like the following:

0x3999 in the memory of the PLC.

Another example: 0x2345 in the memory of the PLC would be 345.2 as the item value.

Suffix S5T

All items with the following data format and suffix S5T are converted from S5T to a message and back to store a value in the range 0ms to 2h46m30s.

- Word

The memory in the PLC is exactly the same as for the KT items, but the presentation is different although it means the same time. This means a memory content of 0x3999 (as in the first example for KT) would result in the string 2h46m30s0ms.

999.3 (KT) means:

999 - the first three characters are the time value in BCD.
3 - the last digit is the multiplier (possible values are: 0: 0.01s, 1: 0.1s, 2: 1s, and 3: 10s.

This means:

A value of 123.0 represents: 123*0.01s=1.23s (equals 1s230ms).
A value of 543.2 represents: 543*1s=543s (equals 9m3s0ms).
A value of 999.3 represents: 999*10s=9990s (equals 2h46m30s0ms).

Suffix TR

All items with the following data format and with suffix TR (Time as real value) are converted from TR into a real value or back to store a value in the range of 0.0 to 9990.0 (s).

- Word

The memory in the PLC is exactly the same as for the KT items, but the presentation is different, although it means the same time. The memory content of 0x3999 (as in the example for KT) would result in the real value 9990.0. The construction is the result of the multiplication as described in the examples for S5T, given to the client as a real value.

Suffix D

All items with the following data formats and with suffix D (Date) are converted from D into a message or back to store a value in the range 1990-1-1 to 2168-12-31.

- Word
- Integer

The item contains the date. The construction is the number of days since 1/1/1990. The integer value 4010, for example, represents 2000-12-24.

Suffix T

All items with the following data formats and with suffix T (Time) are converted from T into a message or back to store a value in the range –24D_20H_31M_23S_648MS to 24D_20H_31M_23S_647MS.

- Double Word

- Double Integer

The item contains a time in the IEC format. The client shows a value such as: 3D_7H_32M_11S_153MS. This is the time in milliseconds, represented to the user as a more readable string.
The range from 0 to 2147483647 (0x0 to 0x7FFFFFFF) is interpreted as a positive time value, and the range from -2147483648 to -1 (0x80000000 to 0xFFFFFFFF) is interpreted as a negative time value.

Suffix TOD

All items with the following data formats and with suffix TOD (Time Of Day) are converted from TOD into a message or back to store a value in the range of 0:00:00.000 to 23:59:59.999.

- Double Word
- Double Integer

The item contains the time of a day. The client shows a value such as: 4:58:15.654. This is the time in milliseconds (as for T), represented to the user as a more readable string, but the highest value is 23:59:59.999 and there are no negative values. Thus all values greater than 86399999 (0x05265BFF) are shown with quality 0x0056 (Clamp Hi).

Note For the English-speaking users, the string is always represented in a 24-hour format, regardless of the time representation of the operating system used. This means you see the time 1:13:5 P.M. as 13:13:5:0.

DAServer Standard System Items

System items supply DAServer users with easy access to DAServer status and diagnostics information. They are treated just like ordinary items with respect to the client. However, in most cases these items are not directly acquired via the communications layer. System item values are usually generated through internal calculations, measurements, and tracking of the DAS Engine.

No DAServer-specific system items are provided in this S7SIMATIC DAServer.

System items, like ordinary items, are defined by name within the following context:

- **Group** (client group/OPC group): arbitrary collection of items, not correlated.
- **Hierarchical location** (link name/OPC path: hierarchical node section of the fully qualified OPC item ID): the device the item is attached to.
- **Device group** (OPC access path/topic, or a Scan Group on a hierarchical branch): collection of items on the same physical location with the same protocol update rate.

To check the status of an external device, the reference might be:

```
<CP name>.<VFD name>.<CONNECTION name>.$SYS$Status
```

Example:

```
CP1.VFD1.S7PLC1.$SYS$Status
```

Note In this example the scope of the item is not limited to a specific access path/device group. As long as the data requested is from the same external device, specified by the same hierarchical location, the value will always be the same.

Note For DDE/SuiteLink clients, $SYS$Status always comes from the level of the DAServer hierarchy branch, which is defined by the unique device group. For OPC clients, $SYS$Status can be accessed at all hierarchy levels. $SYS$Status at the root level of the whole hierarchy tree is always good, as it represents the quality status of the local computer itself. Hence, for practical application, OPC clients should reference $SYS$Status at hierarchy levels other than the root.

In the ArchestrA context, the device group plays the most important role of identifying the scope of any item (the device group defines the hierarchical location implicitly when using globally unique device-group names, which is required for DDE/SuiteLink compatibility).

All system items follow the same naming convention:

- All system items start with $SYS$.
- The DAS Engine scans and parses the name for system items.
  - Parsing of the name is case-insensitive.

All system items can be accessed through subscriptions to a device group. However, while some system items return data for that device group, others are server-wide.

DAServer Global System Item

The following system item refers to specific information regarding a global condition of the DAServer.

System Item Name	Type/ Access Rights	Description	Values
$SYS$Licensed	Boolean/ Read	The Binary status indication of the existence of a valid license for the DAServer. If FALSE, this item causes the DAServer to stop updating existing tags, to refuse activation of new tags, and to reject write requests as well as setting quality for all items to BAD. If TRUE, the DAServer functions as configured. All instances have the same value.	RANGE: 0, 1 1: Valid license exists. 0: No valid license exists.

DAServer Device-Specific System Items

The following system items refer to specific information regarding the device(s) the DAServer is connected to.

System Item Name (Type)	Type/ Access Rights	Description	Values
$SYS$Status	Boolean/ Read	The Binary status indication of the connection state to the device (hierarchy level) the item is attached to. The device group (OPC access path/topic) does not affect the value. The status can be good even if individual items have errors. For DDE/SuiteLink clients, $SYS$Status always comes from the leaf level of a DAServer hierarchy branch, which is the destination PLC node. For OPC clients, $SYS$Status can be accessed at all hierarchy levels. $SYS$Status at the root level of the whole hierarchy tree is always good, as it represents the quality status of the local computer itself. Hence, for practical application, OPC clients should reference $SYS$Status at any hierarchy levels other than the root.	RANGE: 0, 1 1: DAServer connection to the device is intact. 0: Error communicating with the device.
$SYS$ErrorCode	Longint/ Read	Detailed error code of the communications state to the device. The device group (OPC access path/topic) does not affect the value.	>= 0: Good status (0 is the default state – connected. >0: is some device state such as, connecting, initializing, and so on. <0: Error status (value indicates the error).
$SYS$ErrorText	String/ Read	Detailed error string of the communications state of the device. The device group (OPC access path/topic) does not affect the value.	Descriptive text for the communications state corresponding to the error code.

System Item Name (Type)	Type/ Access Rights	Description	Values
$SYS$StoreSettings	Integer/ Read/Write	Used to make the temporary update interval changes via the $SYS$UpdateInterval item permanent. If the client pokes a value of 1 into this system item, the currently set update interval is written to the servers configuration file. The value of this system item clears to 0 after being set, if the configuration file write is successful. If the write fails, then the value is set to -1. If the update interval has been changed via the $SYS$UpdateInterval item and this item is not poked to 1, the DAServer uses the original update interval for that topic the next time it is started. Reading the item always provides 0. Read/Write values are persisted only if the user sets this system item. The values other than this persist only for the life of the DAServer.	RANGE: -1, 0, 1 -1: Error occurred during saving the configuration file. 0: Read value always if status is OK. 1: Persist settings (cleared immediately).

DAServer Device-Group-Specific System Items

The following system items refer to specific information regarding device groups that have been configured in the DAServer.

System Item Name (Type)	Type/ Access Rights	Description	Values
$SYS$UpdateInterval	Dword/ Read/Write	Used to access the currently set update interval. It is the current update interval of the device group in milliseconds. A client can poke new values into this item. The value of zero indicates that no non-system items on that topic are updated (data for these items are not acquired from the device).	RANGE: 1…2147483647 0: Topic inactive, no items are updated. Data acquisition is stopped. >0: Expected updated interval for the set of all items in the device group.
$SYS$MaxInterval	Dword/ Read	Used to access the currently measured maximum update interval, in milliseconds, of all items of the corresponding device group. This item is read-only. The value of the slowest item is displayed.	RANGE: 0…2147483647 0: If update interval is 0 or if the status is false. >0: Measured update interval.

System Item Name (Type)	Type/ Access Rights	Description	Values
$SYS$WriteComplete	Integer/ Read/Write	Used to access the state of pending write activities on the corresponding device group. On device group creation (adding items to an OPC group) the value of this system item is initially 1, indicating all write activities are complete – no pokes are pending. If values are poked into any items of the device group, the value of this item changes to 0, indicating write activity is currently in progress. If the server has completed all write activities, the value of this item changes to 1 if all pokes were successful, or to -1 if at least one poke has failed. If the value of this item is not zero, the client can poke 1 or -1 to it (poke a 1 to clear errors, or a -1 to test a client reaction on write errors). If the value of this item is zero, it cannot be poked.	RANGE: -1, 0, 1 1: Write complete (no writes are pending – initial state). 0: Writes are pending. -1: Writes completed with errors.
$SYS$ReadComplete	Integer/ Read/Write	Used to access the state of reads on all items in the corresponding device group. The value is unequal 0 if all active items in a device group have been read. If at least one item in the device group is activated, this item changes to 0. It changes to 1 if all newly activated items have been read successfully or to -1 if at least one item has a non-good quality. Poking a 0 to this item resets the internal-read states of all items in this device group. This resets this item to 0. If all items are read again after this poke, this item changes back to 1 or -1.	RANGE: -1, 0, 1 1: Read complete (all values have been read). 0: Not all values have been read. -1: All values have been read but some have a non-good quality.
$SYS$ItemCount	Dword/ Read	Used to access the number of items in the corresponding device group. This item is read-only.	RANGE: 0…2147483647 >=0: Number of active items.
$SYS$ActiveItemCount	Dword/ Read	Used to access the number of active items in the corresponding device group. This item is read-only.	RANGE: 0…2147483647 >=0: Number of active items.

System Item Name (Type)	Type/ Access Rights	Description	Values
$SYS$ErrorCount	Dword/ Read	Used to access the number of all items (active and inactive) that have errors (non-good OPC quality) in the corresponding topic. If the communications status of a device group is bad, all items have errors. This item is read-only.	RANGE: 0…2147483647 >=0: Number of all items (active and inactive) with errors.
$SYS$PollNow	Boolean/ Read/Write	Poking a 1 to this item forces all items in the corresponding device group to be read immediately (all messages in this device group become due). This is useful if you want to force to get the newest values from the device, regardless of its update interval. This also works on device groups with a zero update interval (manual protocol triggering).	RANGE: 0, 1

Generic OPC Syntax

A DAServer serves as a container for OPC Groups, which provide the mechanism for containing and logically organizing OPC items. Within each OPC Group, an OPC-compliant client can register OPC items, which represent connections to data sources in the field device. In other words, all access to OPC items is maintained through the OPC Group.

The fully qualified name for an OPC item is called the Item ID (equivalent to Item Name). The syntax for specifying a unique Item ID is DAServer-dependent. In OPC data acquisition DAServers, the syntax can be as follows:

```
AREA10.VESSEL1.TIC1.PLC.DB1,B20
```

Where:

Each component (delimited by a period) represents a branch or leaf of the field device’s hierarchy.

In this example:

PLC is the name of the target PLC.
DB1,B20 is the specific data point (Item) desired.

An item is typically a single value such as an analog, digital, or string value.

Where Item ID describes the syntax for defining the desired data point. OPC provides another parameter, called Access Path, that defines optional specifications for obtaining that data. In DAServers, Access Paths are equivalent to Device Groups. In DAServers, it is this parameter that is used to define the update interval between the DAServer and the field device for accessing the values of data points in the PLC.

CHAPTER 4

Troubleshooting

This chapter describes the troubleshooting tools that can be used to deal with S7SIMATIC DAServer problems you may encounter.

The DAServer Manager provides access to diagnostics and other statistical data, and the Log Viewer provides access to event messages logged during the operation of a S7SIMATIC DAServer. Also, your client (for example, InTouch) can monitor connectivity with the PLC through the $SYS$Status item. Use these tools, together with the information in this section, to troubleshoot your S7SIMATIC DAServer.

Note In order to determine the version of your DAServer, perform either one of the following ways.
Click on the DAServer in the hierarchy-tree view. In the right pane you will see the version numbers of several installed products, including one of the DAServer's.
Search for **DASSIDirect.dll**. Right-click on the file name and select **Properties** on the shortcut menu. Select the **Version** tab on the **Properties** dialog box. The version of your DAServer is listed under **File Version**.

Contents

Monitoring Connectivity Status with the PLC

The built-in discrete item, $SYS$Status, can be used to monitor the status of communications with the PLC. This item is set to:

0 (zero) when communications with the PLC fails.
1(one) when communications is successful.

Note For DDE/SuiteLink clients, $SYS$Status always comes from the leaf level of a DAServer hierarchy branch, which is the destination PLC node. For OPC clients, $SYS$Status can be accessed at all hierarchy levels. $SYS$Status at the root level of the whole hierarchy tree is always good, as it represents the quality status of the local computer itself. Hence, for practical application, OPC clients should reference $SYS$Status at any hierarchy levels other than the root.

Enter the following DDE reference formula in the appropriate place in your client:

=DASS7|S7PLC!$SYS$Status

where:

DASS7	is the name of the DAServer application.
S7PLC	is the exact device group defined in the DAServer for the PLC.
$SYS$Status	is the discrete item used to monitor the status of connectivity with the PLC.

Enter the following OPC item reference syntax when adding the item in your OPC client:

YourOPCAccessPath.$SYS$Status

where:

YourOPCAccessPath	is the assembly of hierarchy node names leading to a specific (controller) device.
$SYS$Status	is the discrete item used to monitor the status of connectivity with the (controller) device.

Monitoring the Status of a DAS Conversation

The **InTouch WindowViewer** supports built-in topic names, called **DDEStatus** and **IOStatus**, that can be used to monitor the status of specific DAS conversations. For example, let us assume that **WindowViewer** (**VIEW**) is communicating with the S7SIMATIC DAServer to a PLC that has been defined in the DAServer with the topic name **S7PLC**.

The discrete items, **DDEStatus** and **IOStatus**, are set to 0 when this DAS conversation failed, and to 1 when this DAS conversation is successful.

Using DDEStatus and IOStatus in Excel

The status of communications between the PLC and InTouch can be read into Excel by entering the following DDE reference formula in a cell on a spreadsheet:

=view|DDEStatus!S7PLC

or

=view|IOStatus!S7PLC

where:

view	is the name of the InTouch application.
[DDE][IO] Status	is the built-in topic name used to monitor the status of communications between the DAServer and InTouch.
S7PLC	is the exact topic name defined in the server for the PLC.

Reading Values from the DAServer into Excel

Values may be read directly into Excel spreadsheets from the DAServer by entering a DDE formula into a cell using the following format:

=applicationname|<devicegroup>!itemname

Example formula:

=DASS7|S7PLC!'<tagname>'

where:

DASS7	is the name of the DAServer application.
S7PLC	is the exact device group name defined in the DAServer for the PLC.
<tagname>	is the actual location in the PLC that contains the data value. This is the item name.

In this example, each time the value of **<tagname>** changes in the PLC, the DAServer will automatically send the new value to the cell containing the formula in Excel.

Note Refer to the Microsoft Excel manual for complete details on entering Remote Reference formulas for cells.

Writing Values to the DAServer from Excel

Values may be written to the DAServer from Microsoft Excel by creating an Excel macro that uses the **POKE** command. The proper command is entered in Excel as follows:

channel=INITIATE("applicationname","topicname")

=POKE(channel,"itemname", Data_Reference)

=TERMINATE (channel)

=RETURN()

The following describes each of the above **POKE** macro statements:

channel=INITIATE("applicationname","topicname")

- Opens a channel to a specific topic name (defined in the DAServer) in a particular application name (the executable name less the .exe), and assigns the number of that opened channel to **channel.**

Note By using the **channel=INITIATE** statement, the word **channel** must be used in the **=POKE** statement instead of the actual cell reference. The **"application name"** and **"topic name"** portions of the formula must be enclosed in quotation marks.

=POKE(channel,"itemname", Data_Reference)

- **POKEs** the value contained in the **Data_Reference** to the specified item name (actual location in the PLC), via the **channel** number returned by the previously executed **INITIATE** function.
- **Data_Reference** is the row/column ID of the cell containing the data value.

=TERMINATE(channel)

- Closes the channel at the end of the macro.
- Some applications have a limited number of channels; therefore, they should be closed when finished.
- **Channel** is the channel number returned by the previously executed **INITIATE** function.

=RETURN()

- Marks the end of the macro.

Note Refer to the **.xlm** sample Excel poke macro provided on the DAServer CD. Also refer to the Microsoft Excel manual for complete details on entering Remote Reference formulas for cells.

Debugging Communications Between S7SIMATIC DAServer and the PLC

The DAServer Manager allows on-line diagnostics of the S7SIMATIC DAServer components at run-time, locally and remotely.

To perform on-line diagnostics

- Select any active S7SIMATIC DAServer on any node in the DAServer Manager.
  - The Diagnostics branch is visible only if the DAServer is active (indicated by the green icon on the server branch).
  - The Diagnostics branch contains the following sub-branches:
    - Client Groups
    - Structure
    - Transactions

    - Statistics
    - Messages
    - Device Groups
- Each of these sub-branches contains live information from the DAServer as configured by the Global configuration view pane.
- They allow detailed diagnostics of objects within the S7SIMATIC DAServer.

Note If you have pokes that will be folded, the diagnostics will show ALL items in the transaction. However, since they are folded, only items that have actually been sent have both the message ID and value. All other items that have not been sent, because of the folding, are listed in this transaction with the same time stamp, but without the message and value.

Client Groups

The information provided in the Client Groups diagnostic root is organized identical of all DAServers. Please refer to the DAServer Manager User's Guide for detailed explanation of the generic diagnostic information of DAServers.

In the Diagnostics Client Groups branch, the OPC client groups are displayed as created by the OPC clients. The DDE/SL plug-in will always create only one client group called DDESLPlugIn.

The list view displays the following information:

Name	The name of the client group.
Items	The number of created items in the client group.
Active Items	The number of active items in the client group.
Errors	The number of items with errors (OPC quality is not good) in the client group.
Update Interval	The client group update interval.
State	The state of the client group (Active/Inactive).

Clicking on an item in the list view displays the full diagnostic information of this item.

For example:

Name:	DDESLPlugIn
Items:	10234
Active Items:	10234
Items with Errors:	0
Update Interval:	100

Selecting a client group in the tree view displays all items in this client group. The item information is grouped into the following columns:

Name The OPC leaf item name (without the fully qualified OPC item ID path).

Client Value The last updated value to the client.

Client Time The time stamp the client was updated last.

Client Quality The item quality of last update.

Subscr Msg The DAS identifier for the subscription message of the item.

Location The path item name (OPC path part of the fully qualified item ID).

Device Group The name of the device group the item is in (OPC access path).

Clicking on an item in the list view displays the full diagnostic information of this item.

For example:

Name:	MB9
Client Value:	129
Client Time:	Monday, July 29, 2002
Quality:	GOOD: Nonspecific: …
Location:	New_CP_000 New_ …
Subscription Message:	1002809
Device Group:	PLC1

Structure

The structure view displays the physical hierarchical organization of the DAServer. In the Diagnostics Structure branch, the structure view displays generic DAServer information as well as S7SIMATIC-DAServer-specific information. Please refer to the DAServer Manager User’s Guide for detailed explanation of the generic diagnostic information of DAServers.

The list view displays either the branches, or items, or both, populating different columns. The branches populate the following columns:

Name The branch name.

Items The number of active items.

Errors The number of items wih errors.

R/W Status The Read/Write status of the corresponding branch.
R: Read complete (all items’ values have been acquired).
W: Write complete (all write operations are completed).

Messages The number of messages and messages on this branch.

Device Groups The number of device groups on this branch.

The S7SIMATIC DAServer provides the following additional S7-specific columns for branches:

S7 Error: The S7 error code.

A&E: The Alarms and Events setting (OFF/ALARMS ON/EVENTS ON)

The items populate the following columns:

Name The item leaf name.

R/W Status R: Item was updated.
W: No writes are pending on the item.

Value The last protocol value.

Time The last protocol time.

Quality The last protocol quality.

No S7-specific columns are populated for items.

Transactions

The transactions view displays currently pending transactions and completed transactions, depending on the backlog setting; it also displays generic DAServer information as well as S7SIMATIC-DAServer-specific information. Please refer to the DAServer Manager User's Guide for detailed explanation of the generic diagnostic information pertaining to the DAServers.

In the Diagnostics Transactions branch, the transactions populate the following columns:

Type The Demand Read, Demand Write …
Icons indicate the state of the transaction.

ID The unique identifier for the transaction.

Items The number of items.

Status The status of the transaction.

Start The time the transaction starts.

End The time the transaction ends (empty if not completed yet).

Expanding a transaction lists all items with the same columns as in Structure.

Statistics

The statistics view displays current statistics of a DAServer. This generic information is not specific to the S7SIMATIC DAServer. Please refer to the DAServer Manger User's Guide for detailed explanation of the generic diagnostic information pertaining to DAServers.

Messages

The message view displays generic and S7-specific information of the S7SIMATIC DAServer. Please refer to the DAServer Manager User’s Guide for detailed explanation of the generic diagnostic information of DAServers.

In the Diagnostics Messages branch, the message view displays all messages in the DAS engine.

MsgID The message unique identifier.

Items The number of items.

Errors The number of items with non-good quality.

Status The status of the message.

The following is the S7SIMATIC-DAServer-specific diagnostic information:

S7 Msg ID The S7 message ID consisting of a letter:
P: poll message
C: cyclic service
B: block message
W: write message
S: scan message
A: alarm message
and a number.

PDU size <data resp>/<req msg>
data resp: the size of the data in the response message.
req. msg.: the size of the request message.

Message error The S7-SAPI-message communications error code.

Clicking on a message in the list view displays the full diagnostic information of this message.

For example:

Name:	0100280A
Active Items:	462
Error Items:	0
Status:	IDLE
S7 Msg ID:	P0
PDU Size (cur./max.):	480/24
Msg Error:	OK

Expanding a message lists all items with the same columns as in Structure.

Name The item leaf name.

R/W Status R means the item was updated/W means no writes are pending on the item.

Value The last updated value from the protocol.

Time The last updated time from the protocol.

Quality The last updated quality from the protocol.

Msg ID The DAServer internal message identifier.

Location The OPC path of fully qualified item ID.

The following is the S7SIMATIC-DAServer-specific diagnostic information:

S7 Msg ID The S7 message ID consisting of a letter:
P: poll message
C: cyclic service
B: block message
W: write message
S: scan message
A: alarm message
and a number.

Item error The S7-SAPI-item communications error code (255 = OK). (Please refer to the SIMATIC NET S7 SAPI documentation on error codes.)

Clicking on an item in the list view displays the full diagnostic information of this item.

For example:

Name:	New_CP_000.New_...
Read status:	complete
Write status:	complete
Value:	127
Type:	VT_Ul1 - unsigned c...
Time:	Monday, July 29, 2002...
Quality:	GOOD: Nonspecific:...
S7 Msg ID:	P2
Item Error:	OK

Device Groups

The device groups view displays all device groups in the DAS Engine.

Device Group The device group name.

Update Interval The protocol update interval in ms.

Items The number of items.

Active Items The number of active items.

Errors The number of items with errors.

Location The OPC path of the fully qualified Item IDs of items in this device group.

Poll Msgs	The number of poll messages.
Cyclic Srvs	The number of cyclic services.

Clicking on a device group in the list view displays the full diagnostic information of this device group.

For example:

Name:	PLC1
Updated Interval:	1000
Number of Items:	10234
Located at:	New_CP_000.New_...
Poll Messages:	23
Cyclic Services:	0

Expanding a device group in the tree view displays all items in this group. The diagnostic information on items in a device group is identical to the items in Messages.

Error Messages and Codes

In addition to the S7SIMATIC DAServer-specific error messages, DAServer error messages are supported. Use the Log Flag data to customize the type of messages logged to the Log Viewer. See the Log Viewer online documentation for more information about using log flags.

To troubleshoot S7SIMATIC DAServer problems, use the following error messages together with the DAServer Manager Diagnostic root data.

DAServer Error Messages

The following list contains error messages produced by the DAServer, grouped by category, that are logged to the Log Viewer.

Error Message	Explanation	Probable Cause	Solution
DACmnProtFail (Protocol Errors)			
Can not load S732.DLL	The SIMATIC NET communications library cannot be loaded.	The SIMATIC NET is not installed on this system.	Install the SIMATIC NET software package.
Internal Error: CIoVariant::Update()	The internal type conversion encountered an invalid or unknown type.	It is an SAPI-version conflict; this is an internal program error.	Report the error to Siemens/SIMATIC NET.

Error Message	Explanation	Probable Cause	Solution
Item <name> doesn’t fit in a single message and won’t be advised	The data size of the item is too large for the PDU size of the protocol.	The PLC does not support the required PDU size.	Split up the array or string item into smaller items, or use a PLC supporting the required PDU size.
(<err code>):Invalid item name: <item name> (<topic name>)	The item name does not correspond to the DAS S7 item naming convention.	There is a spelling error, an incorrect syntax used, or an un-supported conversion suffix is used.	Use the correct naming convention for the DAS S7 items.
(<err code>):Invalid item name suffix: <item name> (<topic name>)	The item name is combined with an invalid suffix.	There is a spelling error, an incorrect syntax used, or an un-supported conversion suffix is used.	Use the correct naming convention for the DAS S7 items.
Can’t send request for msg=<msg ptr> (no orderid available)	The server ran out of order IDs for the SIMATIC NET software.	There is a data-volume overload.	Check the configuration; advise less items.
Send; (MSG_FAIL): message (<msg type> msg=<msp ptr>) [msg_state=<msg state>,con_state=<connection state>]	The message send method failed.	It is a communications/ configuration error.	Check the connection to the device and configuration.
(<ret>): s7_brcv_init (cpd=<cpdescr>,cref=<con ref>,r_id=<block id>) [(<err code>) <errtext>]	There is an error in s7_brcv_init (Block services). The detailed error description is found in the SAPI error text.	It is a communications/ configuration error.	Refer to the SAPI error description in the SIMATIC NET documentation.
(<ret>): s7_brcv_stop (cpd=<cpdescr>,cref=<con ref>,r_id=<block id>) [(<err code>) <errtext>]	There is an error in s7_brcv_stop (Block services). The detailed error description is found in the SAPI error text.	This is a communications error.	Refer to the SAPI error description in the SIMATIC.
Timeout for initial values of block with r_id=<block id>	A time-out occurred when reading the initial block-service values from the PLC.	It is a communications error/PLC configuration error.	Check the connection and the PLC configuration/program.
Timeout updating values of block with r_id=%d	A time-out occurred between updates of block-service values from the PLC.	It is a communications error/PLC configuration error.	Check the connection and the PLC configuration/program.
Timeout updating values of block with r_id=%d	A time-out occurred between updates of block-service values from the PLC.	It is a communications error/PLC configuration error.	Check the connection and the PLC configuration/program.
(<ret>): s7_get_cref(cpd=<cpdescr>,conn=<con name>): [(<errcode>) <errtext>]	There is an error retrieving connection reference.	It is a configuration error; the connection name does not exist in the SIMATIC NET configuration.	Correct the connection configuration and connection name in the SIMATIC NET software.

Error Message	Explanation	Probable Cause	Solution
(<ret>): s7_initiate_req (cpd=<cpdescr>,conn=<conref>): [(<errcode>) <errtext>]	There is an error in initiating a request (establishing a connection).	It is a communications error/PLC configuration error.	Check the connection and the PLC configuration/program.
Can't connect (cpd=<cpdescr>,cref=<conref>)	There is an error establishing a connection.	It is a communications error/PLC configuration error.	Check the connection and the PLC configuration/program.
(<ret>): s7_abort (cpd=<cpdescr>,conn=<con name>): [(<errcode>) <errtext>]	An error occurred when aborting a connection.	This is a communications error; the connection has already been aborted.	Check the connection to the PLC.
Can't create poke message for item <item name>, data size is too large	The data size of the item is too large for the poke messages. DAS S7 currently supports data up to a size of 240 bytes.	The item definition specifies a data buffer which is too large for poke messages.	Define an item (string of array with a smaller data size).
Can't create poke message for item <item name>, not able to generate data	The poke data for creating a poke message cannot be generated.	The poke data value cannot be converted to the SIMATIC NET datatype.	Check the value being poked and create the correct format.
(<ret>): s7_msg_initiate_req (cpd=<cpdescr>,cref=<conref>, orderid=<order id>) for <name> [(<errcode>) <errtext>]	There is an error in the message initiate request (initiating alarms and events).	It is a communications error/PLC configuration error.	Check the connection and the PLC configuration/program.
(<ret>): s7_receive (cpd=<cpdescr>,cref=<conref>, orderid=<order id>) [(<errcode>) <errtext>]	There is an error receiving S7 message.	It is a communications error/PLC configuration error.	Check the connection and the PLC configuration/program.
unknown IND or CNF (<ind id>) (cpd=<cpdescr>,cref=<conref>, orderid=<order id>)	An unknown message type is received.	An unknown and unrequested message type was received from the SIMATIC NET layer.	Check the SIMATIC NET and the PLC configuration and version.
(<ret>): s7_get_initiate_cnf (cpd=<cpdescr>,cref=<conref>, name=<con name>) [(<errcode>) <errtext>]	Initiate confirmation returned an error.	It is a communications error/PLC configuration error.	Check the connection and the PLC configuration/program.
s7_get_abort_ind=OK (cpd=<cpdescr>,cref=<conref>, name=<con name>)	Abort indication was received from the PLC or SIMATIC NET layer.	It is a communications error/PLC configuration error.	Check the connection and the PLC configuration/program.
(<ret>): s7_get_abort_ind (cpd=<cpdescr>,cref=<conref>, name=<con name>) [(<errcode>) <errtext>]	An error occurred when receiving an abort indication from the PLC or SIMATIC NET layer.	It is a communications error/PLC configuration error.	Check the connection and the PLC configuration/program.
(<ret>): s7_get_vfd_state_cnf (cpd=<cpdescr>,cref=<conref> [(<errcode>) <errtext>]	An error occurred when receiving an vfd state message.	It is a communications error/PLC configuration error.	Check the connection and the PLC configuration/program.

Error Message	Explanation	Probable Cause	Solution
(<ret>): s7_get_multiple_read_cnf (cpd=<cpdescr>,cref=<conref>, orderid=<order id>) [(<errcode>) <errtext>]	There is an error receiving S7 multiple read confirmation. The detailed error description is found in the SAPI error text.	It is a communications error/PLC configuration error.	Refer to the SAPI error description in the SIMATIC.
(<ret>): s7_get_multiple_write_cnf (cpd=<cpdescr>,cref=<conref>, orderid=<order id>) [(<errcode>) <errtext>]	There is an error receiving S7 multiple write confirmation. The detailed error description is found in the SAPI error text.	It is a communications error/PLC configuration error.	Refer to the SAPI error description in the SIMATIC.
(<ret>): s7_get_cycl_read_init_cnf (cpd=<cpdescr>,cref=<conref>, orderid=<order id>) [(<errcode>) <errtext>]	An error occurred when receiving S7 cyclic read init confirmation. The detailed error description is found in the SAPI error text.	It is a communications error/PLC configuration error; there is a PLC firmware version error (in this case it is a too-long-data error).	Refer to the SAPI error description in the SIMATIC.
(<ret>): s7_get_cycl_read_start_cnf (cpd=<cpdescr>,cref=<conref>, orderid=<order id>) [(<errcode>) <errtext>]	An error occurred when receiving S7 cyclic read start confirmation. The detailed error description is found in the SAPI error text.	It is a communications error/PLC configuration error.	Refer to the SAPI error description in the SIMATIC.
(<ret>): s7_get_cycl_read_ind (cpd=<cpdescr>,cref=<conref>, orderid=<order id>) [(<errcode>) <errtext>]	An error occurred when receiving S7 cyclic read indication. The detailed error description is found in the SAPI error text.	It is a communications error/PLC configuration error.	Refer to the SAPI error description in the SIMATIC.
(<ret>): s7_get_cycl_read_delete_cnf (cpd=<cpdescr>,cref=<conref>, orderid=<order id>) [(<errcode>) <errtext>]	An error occurred when receiving S7 cyclic read delete confirmation. The detailed error description is found in the SAPI error text.	It is a communications error/PLC configuration error.	Refer to the SAPI error description in the SIMATIC.
(<ret>): s7_get_cycl_read_abort_ind (cpd=<cpdescr>,cref=<conref>, orderid=<order id>) [(<errcode>) <errtext>]	An error occurred when receiving S7 cyclic read abort indication. The detailed error description is found in the SAPI error text.	It is a communications error/PLC configuration error.	Refer to the SAPI error description in the SIMATIC.
(<ret>): s7_get_brcv_ind (cpd=<cpdescr>,cref=<conref>, orderid=<order id>) [(<errcode>) <errtext>]	An error occurred when receiving S7 block services indication. The detailed error description is found in the SAPI error text.	It is a communications error/PLC configuration error.	Refer to the SAPI error description in the SIMATIC.
(<ret>): s7_get_msg_initiate_cnf (cpd=<cpdescr>,cref=<conref>, orderid=<order id>) [(<errcode>) <errtext>]	An error occurred when receiving S7 message initiate confirmation (alarms and events). The detailed error description is found in the SAPI error text.	It is a communications error/PLC configuration error.	Refer to the SAPI error description in the SIMATIC.

Error Message	Explanation	Probable Cause	Solution
(<ret>): s7_get_scan_ind (cpd=<cpdescr>,cref=<conref>, orderid=<order id>) [(<errcode>) <errtext>]	An error occurred when receiving S7 scan indication (alarms and events). The detailed error description is found in the SAPI error text.	It is a communications error/PLC configuration error.	Refer to the SAPI error description in the SIMATIC.
(<ret>): s7_get_alarm_ind (cpd=<cpdescr>,cref=<conref>, orderid=<order id>) [(<errcode>) <errtext>]	An error occurred when receiving S7 alarm indication (alarms and events). The detailed error description is found in the SAPI error text.	It is a communications error/PLC configuration error.	Refer to the SAPI error description in the SIMATIC.
(<ret>): s7_get_msg_abort_cnf (cpd=<cpdescr>,cref=<conref>, orderid=<order id>) [(<errcode>) <errtext>]	An error occurred when receiving S7 message abort confirmation (alarms and events). The detailed error description is found in the SAPI error text.	It is a communications error/PLC configuration error.	Refer to the SAPI error description in the SIMATIC.
TIMEOUT for pending initiate request (cpd=<cpdescr>,cref=<conref>	A time-out occurred while waiting for an initiate confirmation.	It is a communications error/PLC configuration error.	Check the communications/ configuration.
TIMEOUT for connection (while<command>) (con=<con name>,cpd=<cpdescr>,cref=<conref>)	A time-out occurred while waiting for a response messageto <command>.	It is a communications error/PLC configuration error.	Check the communications/ configuration.
TIMEOUT for message (<type> msg=<msg ptr> (while<command>) (con=<con name>,cpd=<cpdescr>,cref=<conref>)	A time-out occurred while waiting for a response message.	It is a communications error/PLC configuration error.	Check the communications/ configuration.
(<ret>): s7_cycl_read (cpd=<cpdescr>,cref=<conref>, orderid=<order id>) [(<errcode>) <errtext>]	An error occurred when sending S7 cyclic read message.	It is a communications error/PLC configuration error.	Refer to the SAPI error description in the SIMATIC.
(<ret>): s7_cycl_read (cpd=<cpdescr>,cref=<conref>, orderid=<order id>) [(<errcode>) <errtext>]	An error occurred when sending S7 cyclic read initiate request.	It is a communications error/PLC configuration error.	Refer to the SAPI error description in the SIMATIC.
(<ret>): s7_cycl_read_start_req (cpd=<cpdescr>,cref=<conref>, orderid=<order id>) [(<errcode>) <errtext>]	An error occurred when sending S7 cyclic read start request.	It is a communications error/PLC configuration error.	Refer to the SAPI error description in the SIMATIC.
(<ret>): s7_cycl_read_delete_req (cpd=<cpdescr>,cref=<conref>, orderid=<order id>) [(<errcode>) <errtext>]	An error occurred when sending S7 cyclic read delete request.	It is a communications error/PLC configuration error.	Refer to the SAPI error description in the SIMATIC.
(<ret>): s7_shut (cpd=<cpdescr>,VFD=<vfd name>) [(<errcode>) <errtext>]	An error occurred when calling S7 shut.	It is a communications error/SIMATIC NET configuration error.	Refer to the SAPI error description in the SIMATIC.

Error Message	Explanation	Probable Cause	Solution
Can’t read property string for <attr name> attribute (VFD=<vfdname>)	This is a DAS S7 configuration error.	There is invalid data in the DAS S7 configuration.	Reconfigure DAS S7.
(<ret>): s7_set_window_handle_msg (cpd=<cpdescr>,VFD=<vfd name>) [(<errcode>) <errtext>]	An error occurred when calling S7 set window handle function.	There is a version conflict with the SIMATIC NET version. It corrupts the SIMATIC NET version.	Reinstall the SIMATIC NET software.
DACmnProtWarn (Protocol Warnings)			
Clamping S5T poke data for <item name> on <device group> (client poke <poke value>ms clamped to 9990000)	S5T poke value was clamped to 9990000.	Poke value exceeded the valid range.	Limit poke values to the valid range.
Losing precision on converting S5T poke data for <item name> on <device group> (client poke <poke value>ums converted to 0ms)	Non-zero S5T poke value was converted to 0.	Poke value was below the S7 S5T type resolution.	Datatype limitation.
Losing precision on converting S5T poke data for <item name> on <device group> (client poke <poke value>ums converted to <new value>ums)",	Precision is lost on value.	The resolution of S7 datatype does not match the poked value.	Datatype limitation.
invalid poke value, clamp at high limit for item: <item name> on <device group>	Poke data is clamped into valid range.	Poke value exceeded the S7 datatype range.	Datatype limitation.
invalid poke value, clamp at low limit for item: <item name> on <device group>	Poke data is clamped into valid range.	Poke value exceeded the S7 datatype range.	Datatype limitation.
invalid poke value, cannot convert value for item: <item name> on <device group>	Poke data set to constant.	Poke value exceeded the S7 datatype range.	Datatype limitation.
LogError (Log Flag) Severe Error Stopping Normal Operation			
cannot alloc memory for ReadReqParaArray	Low memory conditions: It was not possible to allocate memory for creating SIMATIC NET objects required by DAS S7.	There is not enough RAM in the computer for normal operation	Provide more memory.
cannot alloc memory for WriteReqParaArray		An active application is continuously allocating memory.	Identify the memory-consuming application and replace it with a correctly working version.
cannot alloc memory for WriteReqQualityArray			
cannot alloc memory for ScanObjects			
cannot alloc memory for AlarmObjects			

Error Message	Explanation	Probable Cause	Solution
response values out of range: offset <offset> size <sizea.	Size of response values are longer than 942 bytes.	SIMATIC NET compatibity.	Install the corresponding SIMATIC NET version.
Internal Program Warnings			
LogWarning (Log Flag) Severe Error Stopping Normal Operation			
Can't get parent of connection <connection name>	The internal tree references are corrupt.	There is an error in the internal data management.	Restart the system.
Can't get parent of vfd <vfd name>	The internal tree references are corrupt.	There is an error in the internal data management.	Restart the system.
Send: unhandled state for message (<msgtype> msg=<msg ptr>) [msg_state=<msg state>,con_state=<connection state>]	Unknown message state. A message due for sending had an incorrect message state.	There is an error in the computer's internal state.	Restart the system.
s7_get_multiple_read_cnf (cpd=<cp>,cref=<cref>,orderid =<order id>): message cref (<msg cref>) doesn't match	SAPI returned an incorrect connection reference.	This is an SAPI error.	Report the error to Siemens/SIMATIC NET.
s7_get_multiple_read_cnf (cpd=<cp>,cref=<cref>,orderid =<order id>): wrong message state (<state>)	SAPI returned a message while in a different state.	This is an SAPI error.	Report the error to Siemens/SIMATIC NET.
s7_get_multiple_write_cnf (cpd=<cp>,cref=<cref>,orderid =<order id>): message cref (<msg cref>) doesn't match	SAPI returned an incorrect connection reference.	This is an SAPI error.	Report the error to Siemens/SIMATIC NET.
s7_get_multiple_write_cnf (cpd=<cp>,cref=<cref>,orderid =<order id>): wrong message state (<state>)	SAPI returned a message while in a different state.	This is an SAPI error.	Report the error to Siemens/SIMATIC NET.
s7_get_multiple_read_init_cnf: can't find message (cpd=<cp>,cref=<cref>,orderid =<order id>) [(<errno>) <errstring>]	SAPI returned a cyclic message init confirmation for a message that was already deleted.	SAPI did not process the stop cyclic service call yet, and an unsuccessful ret code was supplied.	Check the connection and SAPI configuration.
s7_get_cycl_read_init_cnf: can't find message (cpd=<cp>,cref=<cref>,orderid =<order id>) [(<errno>) <errstring>]	SAPI returned a cyclic message init confirmation for a message that was already deleted.	SAPI did not process the stop cyclic service call yet.	No actions are required.

Error Message	Explanation	Probable Cause	Solution
(<ret>) s7_get_cycl_read_init_cnf: (cpd=<cp>,cref=<cref>,orderid =<order id>) got cnf for timed out message	SAPI returned a cyclic message init confirmation for a message that had timed out.	SAPI returned the confirmation later than the time-out time.	Check the time-out setting.
(<ret>) s7_get_cycl_read_start_cnf: can't find message (cpd=<cp>,cref=<cref>,orderid =<order id>) [(<errno>) <errstring>]	SAPI returned a cyclic message start confirmation for a message that was already deleted.	SAPI did not process the stop cyclic service call yet and an unsuccessful ret code was supplied.	Check the connection and SAPI configuration.
s7_get_cycl_read_start_cnf: can't find message (cpd=<cp>,cref=<cref>,orderid =<order id>) [(<errno>) <errstring>]	SAPI returned a cyclic message start confirmation for a message that was already deleted.	SAPI did not process the stop cyclic service call.	No actions are required.
s7_get_cycl_read_start_cnf: message m_cref (<cref>) doesn't match (cpd=<cp>,cref=<cref>,orderid =<order id>) [(<errno>) <errstring>]	SAPI returned an incorrect connection reference.	This is an SAPI error.	Report the error to Siemens/SIMATIC NET.
(<ret>) s7_get_cycl_read_start_cnf: message m_cref (<cref>) doesn't match (cpd=<cp>,cref=<cref>,orderid =<order id>) [(<errno>) <errstring>]	SAPI returned an incorrect connection reference and a bad return code.	This is an SAPI error.	Report the error to Siemens/SIMATIC NET.
(<ret>) s7_get_cycl_read_start_cnf (cpd=<cp>,cref=<cref>,orderid =<order id>): wrong message state (<state>)	SAPI returned a message, while in a different state, and a bad return code.	This is an SAPI error.	Report the error to Siemens/SIMATIC NET.
s7_get_cycl_read_start_cnf (cpd=<cp>,cref=<cref>,orderid =<order id>): wrong message state (<state>)	SAPI returned a message while in a different state.	This is an SAPI error.	Report the error to Siemens/SIMATIC NET.
s7_get_cycl_read_ind: message m_cref (<cref>) doesn't match (cpd=<cp>,cref=<cref>,orderid =<order id>) [(<errno>)<errstring>]	SAPI returned an incorrect connection reference.	This is an SAPI error.	Report the error to Siemens/SIMATIC NET.
s7_get_cycl_read_ind: (cpd=<cp>,cref=<cref>,orderid =<order id>): wrong message state (<state>)	SAPI returned a message while in a different state.	This is an SAPI error.	Report the error to Siemens/SIMATIC NET.

Error Message	Explanation	Probable Cause	Solution
(<ret>) s7_get_cycl_read_ind: message m_cref (<cref>) doesn't match (cpd=<cp>,cref=<cref>,orderid =<order id>) [(<errno>)<errstring>]	SAPI returned an incorrect connection reference and a bad return code.	This is an SAPI error.	Report the error to Siemens/SIMATIC NET.
s7_get_cycl_read_ind: message m_cref (<cref>) doesn't match (cpd=<cp>,cref=<cref>,orderid =<order id>) [(<errno>)<errstring>]	SAPI returned an incorrect connection reference.	This is an SAPI error.	Report the error to Siemens/SIMATIC NET.
(ret) s7_get_cycl_read_delete_cnf (cpd=<cp>,cref=<cref>,orderid =<order id>): wrong message state (<state>)	SAPI returned a message while in a different state and returned a bad return code.	This is an SAPI error.	Report the error to Siemens/SIMATIC NET.
s7_get_cycl_read_delete_cnf (cpd=<cp>,cref=<cref>,orderid =<order id>): wrong message state (<state>)	SAPI returned a message while in a different state.	This is an SAPI error.	Report the error to Siemens/SIMATIC NET.
s7_get_msg_initiate_cnf (cpd=<cp>,cref=<cref>,orderid =<order id>) invalid msg order id (<order id>)	SAPI returned a message with an invalid order id.	This is an SAPI error.	Report the error to Siemens/SIMATIC NET.
s7_get_msg_abort_cnf (cpd=<cp>,cref=<cref>,orderid =<order id>) invalid msg order id (<order id>)	SAPI returned a message with an invalid order id.	This is an SAPI error.	Report the error to Siemens/SIMATIC NET.
Wrong Cyclic state (msg_state=<state>) in message send	There is an internal error in the state management.	It is a program error.	Restart DASS7.
Send failure because of wrong order id	SAPI and DASS7 server are out-of-sync with respect to order ids.	It is a program error.	Restart DASS7.

Server-Specific Error Messages

The S7SIMATIC-DAServer-specific error messages and the description of each are listed in the following table.

Error Message	Description
POKE_ERROR: poking item: <item name> for <device group name>	Writing a value to an item failed.
POKE_ERROR: invalid value, cannot convert for poking item: <item name> on <device group name>	An invalid value has been specified for poking data. Value cannot be converted and write operation is aborted.
ERROR: Invalid item name: <item name> (<device group name>)	Item name does not exist. Check for the correct item name.
POKE_ERROR: Write complete fails – item: <item name> on <device group name>	A write operation has failed on item with <item name>.
ERROR: Cannot load S732.DLL	There is no SIMATIC NET component for S7 installed on your computer. The needed dynamic link library was not found.
BLOCK_ERROR: Block services not available in this version of the SIMATIC NET driver	Block services are not available because they are not supported under this version of your SIMATIC NET component.
CONNECTION_ERROR(<errorlevel>): s7_init (CP=<CP-name>,VFD=<VFD-name>	Your configured CP/VFD could not be initialized.
CONNECTION_ERROR(<errorlevel>): s7_get_initiate_cnf (cpd=<CP-handle> cref=<Con-handle> <CP-name> <VFD-name> <Con-name>) [(<errorcode>) <errormessage>]	The initialization of the configured connection failed. Check the error code in your Siemens manuals and whether your remote PLC is available.
<error type>_ERROR(<error level>): <name of failed function call>(orderid=<orderid>): [(<error code>) <error message>]	A general error message describing the failure of an S7 SAPI activity. Check remote device for troubleshooting and check the Siemens manual for error codes.
<error_type>_ERROR: <function name>: wrong message state -> discarding it (cpd=<CP-handle>,cref=<Conn-handle>,orderid=<orderid>	Function call and message state for this order ID do not fit. Discard the message and/or cancel a cyclic message.
ERROR: s7_get_abort_ind OK (cpd=<CP-handle> cref=<Con-handle>)	This error message indicates that the communications to this connection has been aborted by the remote PLC. Check the state of the remote device.
TRACE: Device group allocated: <device group name>	A device group has been created (client has connected on this device group).

Error Message	Description
TRACE: Free device group: <device group name>	A device group has been freed (client has disconnected from this device group).
TRACE: Item <item name> created on <device group name>	An item has been created in the S7SIMATIC DAServer.
TRACE: Free item <item name> on <device group name>	An item has been freed.
POKE_TRACE: Write complete ok - item: <item name> on: <device group name>	The write operation was completed successfully on the protocol. The PLC has confirmed the reception of data.
POKE_TRACE: invalid value, clamp at high limit for poking item: <item name> on <device group name>	An invalid value has been specified for poking data. Value is clamped and transferred to the PLC.
POKE_TRACE: invalid value, clamp at low limit for poking item: <item name> on <device group name>	An invalid value has been specified for poking data. Value is clamped and transferred to the PLC.
<trace_type>_TRACE: <function for receiving data>: can't find message -> discarding it (cpd=<CP-handle>,cref=<Conn-handle>,orderid=<orderid>	There is no database for the received data. Message is discarded. This may occur when items have been deactivated.
CONNECTION_TRACE: Set state of connection to <state>	Connection to PLC has gone bad or to good.
<trace_type>_TRACE: <calling function name> dumping s7 objects (containing <number of items> items)	Dumps all S7 objects of one message which contain <number of items> items.
index=<index in message> var_name=<message name> var_length=<variable size>	Dumps all S7 objects of one message which contain <number of items> items.
<trace_type>_TRACE: <receive function name> dumping [read/write] values	Dumps all S7 objects of one cyclic, read or write message which contain items. For block items, the whole block is dumped. This condition could seriously affect your S7SIMATIC DAServer's performance.
<S7 name>: result=<message result>, value=<HEXASCII value>, var_length=<variable size>	Dumps all S7 objects of one cyclic, read or write message which contain items. For block items, the whole block is dumped. This condition could seriously affect your S7SIMATIC DAServer's performance.

Generic DAServer Error Codes

The following table lists the generic DAServer error codes, error messages, and their descriptions.

Code	Error Message	Description
C004D000L	Invalid item name	The requested item name has bad syntax.
C004D001L	Item name not exist	The requested item name has good syntax, but it does not exist.
C004D002L	Device not connect	The device is not connected, therefore data cannot be acquired.
C004D100L	Device off scan	The device is communicating, but it cannot accept queries for data items.
C004D101L	Timeout	A message transaction with the device timed out.

CHAPTER 5

Reference

Contents

- DAServer Architecture
- Component Environments

DAServer Architecture

Note This DAServer is supported on Microsoft Windows Server 2003, Windows 2000 Server, Windows 2000 Advanced Server, Windows 2000 Professional, and Windows XP Professional.
NetDDE protocol is not supported by DAServers.

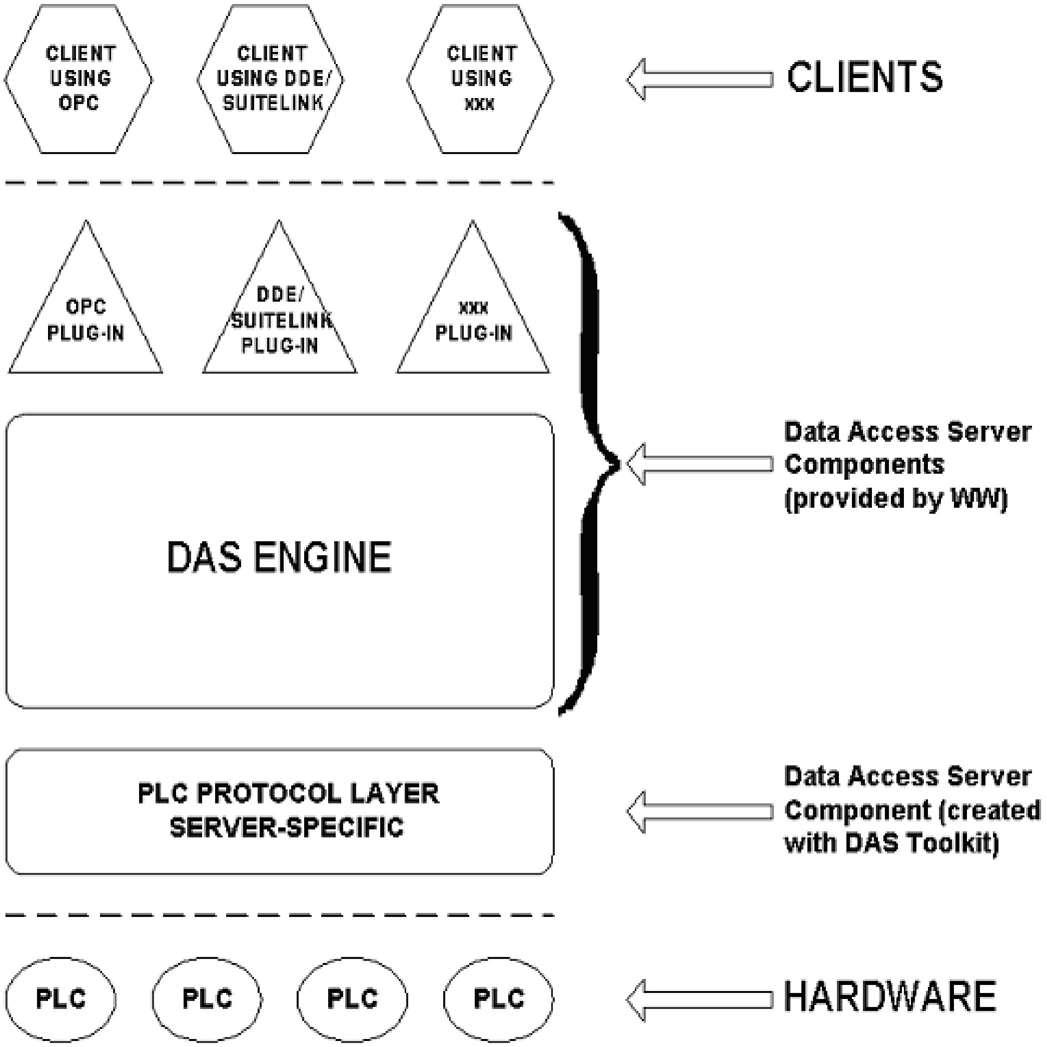
This DAServer is a collection of components that work in concert to provide communications access with hardware field devices. These components include:

- **DAServer Manager**: This is the Microsoft Management Console (MMC) snap-in, supplied with the DAServer, that provides the necessary user interface for diagnostics, configuration, and activation.
- **Client Plug-ins**: These are the components that are added to a DAServer to enable communications with clients.
  Examples are: OPC 2.03, DDE/Suitelink, and so on.
- **DAS Engine**: This is the library that contains all the common logic to drive data access.
- **Device Protocol**: This is the custom code provided by the DAServer to define the communications with a particular device.

DAServers

A DAServer is comprised of three physical parts (see the following figure). They are the following:

- P**lug-in Component(s)**: Responsible for communicating with clients.
- **DAS Engine**: This common component is used by all DAServers.
- **PLC Protocol Layer, DAServer-specific**: Responsible for communicating with the hardware.


CLIENT USING OPC
CLIENT USING DDE/ SUITELINK
CLIENT USING xxx
CLIENTS
OPC PLUG-IN
DDE/ SUITELINK PLUG-IN
xxx PLUG-IN
DAS ENGINE
Data Access Server Components (provided by WW)
PLC PROTOCOL LAYER SERVER-SPECIFIC
Data Access Server Component (created with DAS Toolkit)
PLC
PLC
PLC
PLC
HARDWARE

DAServer Architecture

Each physical part of a DAServer is comprised of a set of .exe and/or .dll modules. Wonderware provides the Plug-ins and DAS Engine. The DAS Toolkit user creates the PLC Protocol Layer (DAServer-specific) modules. All three sets of modules are required for a fully functioning DAServer.

Plug-ins

Plug-ins provide a protocol translation function for device integration clients. Typical Plug-ins communicate in DDE, SuiteLink, or OPC protocol, and serve as interfaces between their clients and the DAS Engine.

Note Items of an array are not supported in the DDE/SL plug-in. These arrays are converted to HEXASCII strings, which provide legacy behavior for DAServers that support this in the DAServer-specific code.

DAS Engine

The DAS Engine is a middleware component that exposes two sets of unique interfaces, one for communicating with the Plug-ins and one for communicating with the PLC Protocol Layer components.

PLC Protocol Layer

The PLC Protocol Layer provides a protocol translation function for specific hardware such as ModBus, and serves as an interface between the DAS Engine and the hardware.

Component Environments

Stand-alone DAServers have the following characteristics:

- The DAS Engine is dynamically linked to the other DAServer components. In other words, a new DAS Engine (feature enhancement or bug fix) would not require relinking to the other components nor re-QA of those other components. When deployed to the system, the new DAS Engine would attach to all existing DAServer components.
- Newly deployed Plug-ins (feature enhancements or bug fixes) do not require relinking nor re-QA of associated components. Even new Plug-ins (for example, OPC Alarm & Events) would not require any development changes to the other components, and therefore no relinking in a customer-installed base. In fact, it is feasible to implement new functionality in a Plug-in to enhance the DAServer without involvement of the code of the other components.
- DAServers can be configured in one stand-alone configuration utility (DAServer Manager), capable of displaying specific configuration pages for all DAServers. This utility allows browsing and editing of DAServers on different nodes.
- The DAServer Manager diagnostics tool displays generic diagnostic objects common to all DAServers, as well as DAServer-specific/ DAServer-developer-defined diagnostic data.

The DAServer data configuration format is XML. Any XML-enabled program (for example, XML Editor) can read this format.

Index