



## DeltaV OPC Historical Data Access

This document provides information on how to obtain historical data from the DeltaV Continuous Historian using the DeltaV OPC History Server.



© Emerson Process Management 1996—2007 All rights reserved.

DeltaV, the DeltaV design, SureService, the SureService design, SureNet, the SureNet design, and PlantWeb are marks of one of the Emerson Process Management group of companies. All other marks are property of their respective owners. The contents of this publication are presented for informational purposes only, and while every effort has been made to ensure their accuracy, they are not to be construed as warranties or guarantees, express or implied, regarding the products or services described herein or their use or applicability. All sales are governed by our terms and conditions, which are available on request. We reserve the right to modify or improve the design or specification of such products at any time without notice.





## Contents

<b>Introduction</b> .....	<b>4</b>
<b>DeltaV OPC History Server Functional Overview</b> .....	<b>4</b>
<b>Properties and Methods</b> .....	<b>6</b>
<b>Browser</b> .....	<b>6</b>
<b>Performance</b> .....	<b>7</b>
<b>Troubleshooting</b> .....	<b>7</b>
<b>References</b> .....	<b>7</b>
<b>DeltaV OPC History Server</b> .....	<b>8</b>
<b>DeltaV OPC History Server COM Objects</b> .....	<b>8</b>
<b>OPC HDA Custom Interfaces and Methods</b> .....	<b>10</b>
IOPCCommon.....	10
IConnectionPointContainer .....	10
IOPCShutdown .....	10
IOPCHDA_Server .....	11
IOPCHDA_Browser .....	12
IOPCHDA_SyncRead.....	12
<b>OPC HDA Client Connectivity</b> .....	<b>13</b>
<b>Licensing Requirements</b> .....	<b>13</b>



## Figures

Figure 1 DeltaV OPC Architecture Diagram.....	5
Figure 2 OPC HDA Interfaces .....	6
Figure 3 OPC HDA Historian Server Model .....	8
Figure 4 OPC HDA Historian Browser Object.....	9
Figure 5 OPC HDA Historian Client Model .....	9



## Introduction

The DeltaV OPC Historical Data Access (OPC HDA) server (known as the DeltaV OPC History Server) provides an OPC Foundation HDA interface to the DeltaV Continuous Historian based on Microsoft's OLE/COM technology. The OPC HDA interface specification defines custom Microsoft COM interfaces to access continuous historical data.

This white paper is intended to provide an overview of the DeltaV OPC History Server and the associated OPC HDA interfaces and methods. This white paper may also serve as a guide for developers of OPC HDA compliant clients to use in building clients for use with the DeltaV OPC History Server.

It is assumed that the reader is familiar with Microsoft OLE/COM technology and is generally familiar with the OPC HDA specification. The DeltaV OPC History Server incorporates a subset of the functionality found in the OPC HDA specification; it includes all the required interfaces and methods and some of the optional methods. Through this technology, the DeltaV OPC History Server provides programmers with the ability to perform the following tasks:

- Connect to the DeltaV Continuous Historian database
- Read DeltaV historical data
- Browse for available ItemIDs

## DeltaV OPC History Server Functional Overview

The DeltaV OPC History Server provides a read-only interface to the historical data located in the DeltaV Continuous Historian. OPC HDA clients may use the DeltaV OPC History Server to view all historical data collected in the DeltaV Continuous Historian. OPC HDA clients request historical data for a given period of time. Browsing capability is provided by the DeltaV OPC History Server along with the use of wildcard filtering, making it easy for OPC HDA clients to view any or all historical data collected in the DeltaV Continuous Historian.

The DeltaV OPC History Server provides OPC HDA clients access to raw and interpolated data from the DeltaV Continuous Historian. Raw data is defined as data that is stored within the historian. The availability of raw data is based on the configuration settings of the parameter for history collection. Interpolated data is defined as data that is derived from the raw data in the historian, but for which there is no stored value. Interpolated data may be linearly derived from two stored data points on either side of the requested timestamp, or it may be extrapolated from the data in the archive by a more complex method.

The DeltaV Continuous Historian captures the quality status of every parameter configured for history collection. The DeltaV parameter quality is available for use by the DeltaV Continuous Historian client applications. The DeltaV parameter quality is also available through the DeltaV OPC History Server. In the DeltaV OPC History Server, the DeltaV parameter status is mapped to the OPC Historical Data Access quality to provide the complete quality status from the DeltaV Continuous Historian.

The DeltaV OPC History Server is available on the ProfessionalPLUS Station and the Application Station. The DeltaV OPC History Server is activated when the DeltaV Continuous Historian is enabled, configured, and downloaded.

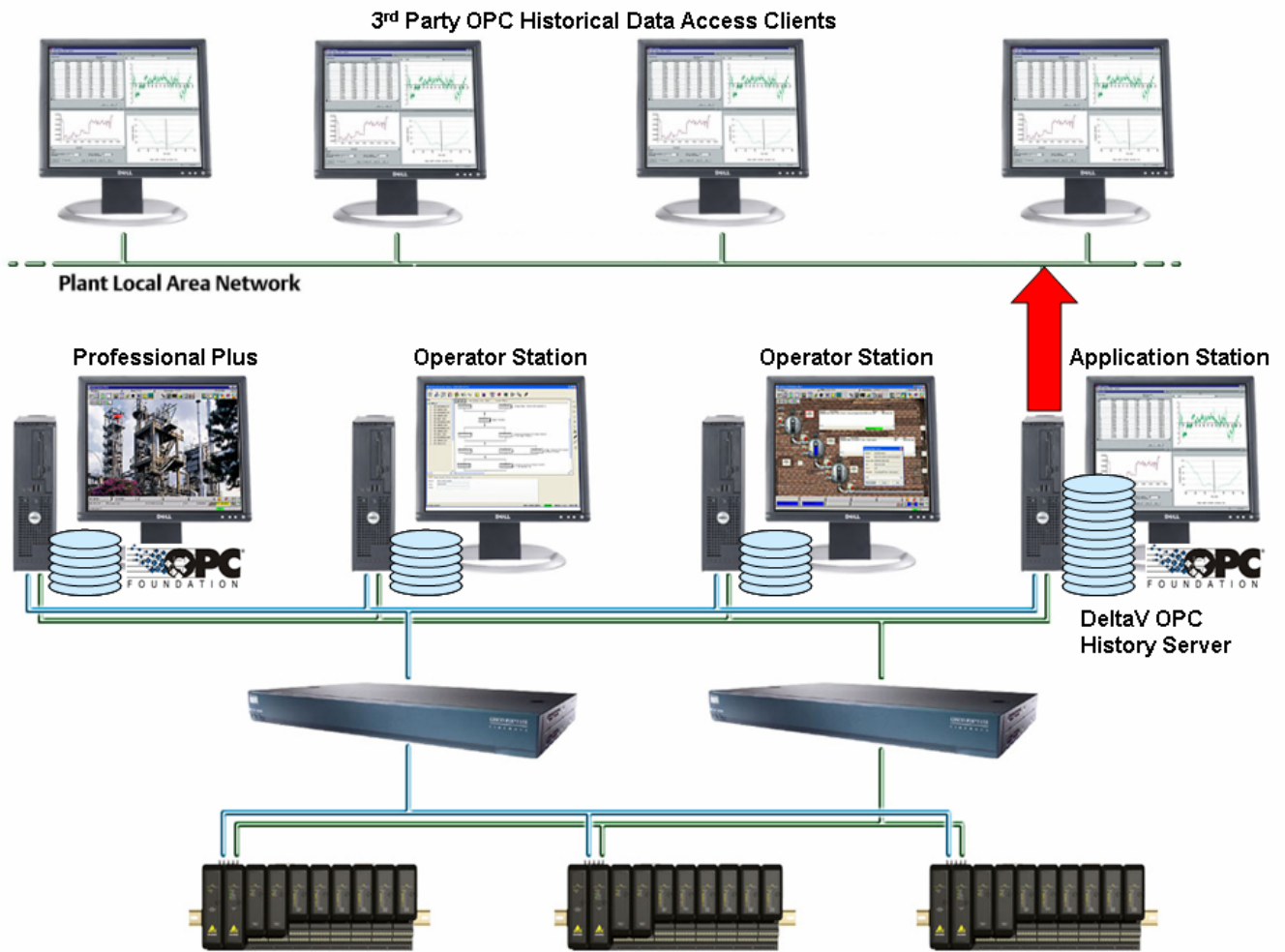


Figure 1 DeltaV OPC Architecture Diagram



OPC HDA client applications can use the COM compliant Custom Interface or the OLE Automation Interface of the DeltaV OPC History Server. The custom interface supports clients written in C++. The OLE Automation Interface supports higher level business applications, such as Excel and Visual Basic.



Figure 2 OPC HDA Interfaces

## Properties and Methods

The DeltaV OPC History Server incorporates all the required interfaces and methods of the OPC HDA Specification. It also incorporates the optional "ReadProcessed" method under the IOPCHDA\_SyncRead interface. Refer to the section "OPC HDA Custom Interfaces and Methods" for more information.

The DeltaV OPC History Server provides a timestamp and quality value associated with each history data value. For raw data values, the timestamp is the time the value was recorded by the DeltaV Continuous Historian. For processed data values, the timestamp is the start of the interval, with two exceptions, minimum and maximum, which can be requested with actual timestamps or interval timestamps. The OPC HDA quality value makes use of the parameter and collection status information that is available from the DeltaV Continuous Historian.

The DeltaV OPC History Server presents time to client applications in UTC. Client applications are responsible to make any necessary timestamp conversions (such as conversion to local time).

## Browser

The DeltaV OPC History Server has a browser that exposes all parameters stored in the DeltaV Continuous Historian. The browser supports the use of wild cards for string filters to assist in finding the stored parameters. A single character may be filtered using the question mark character "?". For example, requesting TIC-100?/PID1/PV.CV will return TIC-1000/PID1/PV.CV, TIC-1001/PID1/PV.CV, etc. Multiple characters may be filtered by the asterisk character "\*". For example, requesting TIC-1001/PID1/\*.CV will return TIC-1001/PID1/OUT.CV, TIC-1001/PID1/PV.CV, and TIC-1001/PID1/SP.CV. In addition, the logical operators equal to "=" and not equal to "!=" may be used with the wild card filters to further refine the parameter search.



## Performance

The DeltaV OPC History Server performance is determined by the OPC HDA client request loading. OPC HDA clients should be designed and tested to ensure that history collection performance is not degraded. The frequency of requests and the amount of data requested can both affect performance of the DeltaV OPC History Server. Each client request also imposes a load on the DeltaV Continuous Historian server, and care should be taken to avoid loading it to the point that data collection would be affected.

## Troubleshooting

Operating details involving the DeltaV OPC History Server (startup, shutdown, client interaction, etc.) are written to the Windows Event Log.

## References

Users that would like more information on OPC HDA or are interested in developing their own OPC HDA client applications should be familiar with the following specifications, available from the OPC Foundation:

- OPC Foundation - OPC Historical Data Access Specification - Version 1.20, Released December 10, 2003
- OPC Foundation - OPC Historical Data Access Automation Interface Standard - Version 1.0, Released January 26, 2001
- OPC Foundation - OPC Common Definitions and Interfaces - Version 1.0, Released October 27, 1998

Note that users wanting to develop OPC HDA clients using Visual Basic or VBA will find the Automation Interface Standard most helpful.



## DeltaV OPC History Server

The DeltaV OPC History Server provides access to continuous historical data stored by the DeltaV Continuous Historian.

### DeltaV OPC History Server COM Objects

The DeltaV OPC History Server provides the IOPCHDA Server Object, as illustrated below. The ProgID used to create an instance of the DeltaV OPC History Server is "DeltaV.OPCHDAsvr." An instance of the DeltaV OPC History Server (DOPCHDA1.exe) runs on each DeltaV node where the DeltaV Continuous Historian has been enabled. Each connection to the DeltaV OPC History Server has an instance of an IOPCHDA Server Object. The IOPCHDA Browser Object may only be created by invoking one of the methods in the IOPCHDA\_Server interface.

The optional IOPCHDA Client Object may be implemented by client applications needing to be notified when the DeltaV services are stopped. Clients implementing this interface must respond to the ShutdownRequest method in a timely manner.

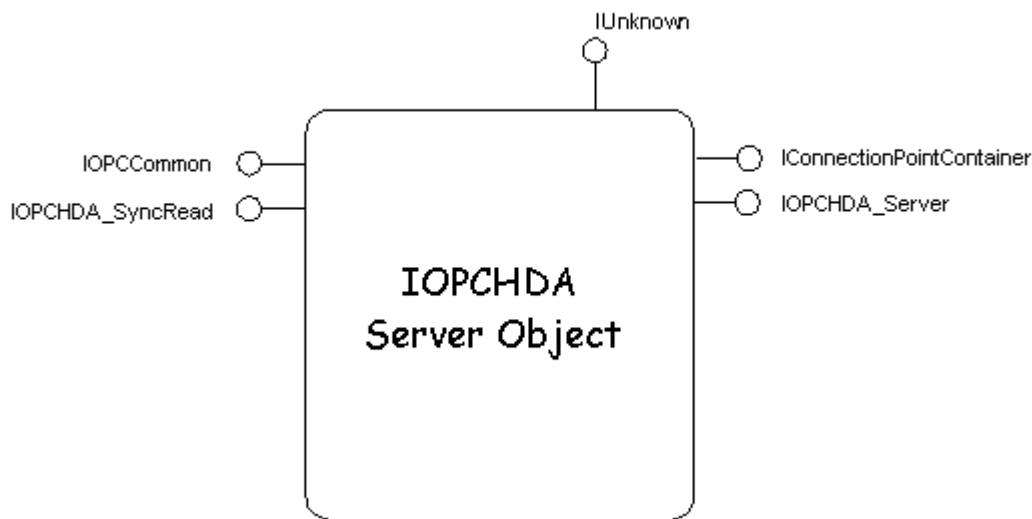


Figure 3 OPC HDA Historian Server Model

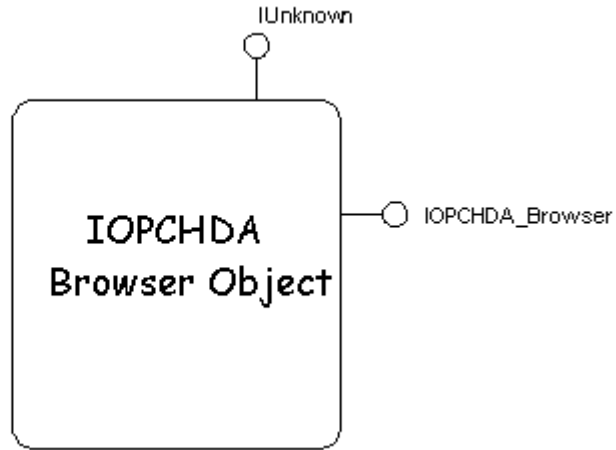


Figure 4 OPC HDA Historian Browser Object

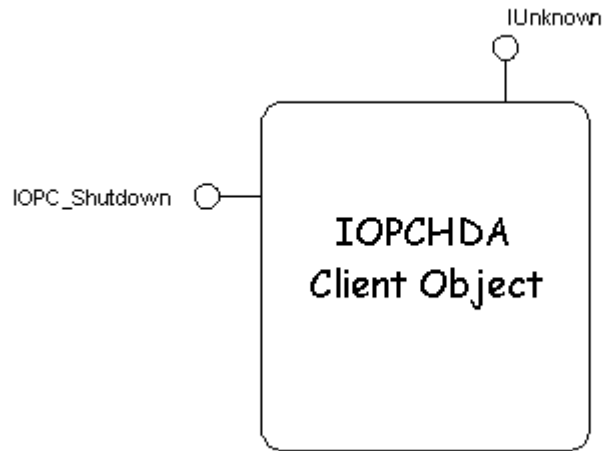


Figure 5 OPC HDA Historian Client Model



## OPC HDA Custom Interfaces and Methods

Individuals writing programs to access the DeltaV Continuous Historian data using the DeltaV OPC History Server should be familiar with the OPC Historical Data Access Specification, Version 1.2, released December 10, 2003. The DeltaV OPC History Server implements the following OPC HDA custom interfaces and methods.

### IOPCCommon

The IOPCCommon interface is defined in the OPC Common Definitions and Interfaces specification, Version 1.0, Dated October 27, 1998. The following methods make up this interface:

- **IOPCCommon::SetLocaleID**  
The only supported locale is English with a sublanguage of US English.
- **IOPCCommon::GetLocaleID**  
The value returned from this method corresponds to English with a sublanguage of US English.
- **IOPCCommon::QueryAvailableLocaleIDs**  
The available locale is returned by this method.
- **IOPCCommon::GetErrorString**  
This method may be used to convert from an HRESULT returned by any of the methods or the HRESULT for an HDA Item into a user friendly description of the error.
- **IOPCCommon::SetClientName**  
This method may be used by a client to set the name of the client. The client name is used in some of the events recorded in the Windows Event Log.

### IConnectionPointContainer

The IConnectionPointContainer is a Microsoft defined interface used to obtain call back interfaces. The DeltaV OPC History Server implements this interface in support of the client providing an IOPCShutdown interface. The methods making up this interface are:

- **IConnectionPointContainer::EnumConnectionPoints**  
Only the IOPCShutdown interface is included in the IEnumConnectionPoints enumerator.
- **IConnectionPointContainer::FindConnectionPoint**  
This method may be used to obtain the IConnectionPoint interface corresponding to the IID\_IOPCShutdown.

### IOPCShutdown

This is a client-side interface used by the DeltaV OPC History Server to notify clients when the supporting DeltaV services are shutting down. The single method provided by this interface is:

- **IOPCShutdown::ShutdownRequest**



This method is invoked by the DeltaV OPC History Server to notify the client that the DeltaV services are shutting down.

### IOPCHDA\_Server

This interface is the primary interface for the DeltaV OPC History Server. The IOPCHDA\_Server interface provides a method for setting up access to historical data values. The methods that make up this interface are:

- IOPCHDA\_Server::GetItemAttributes  
This method returns the list of attributes supported by the DeltaV OPC History Server. These are:

- Data Type
- Stepped
- ItemID
- Maximum Time Interval
- Minimum Time Interval
- Exception Deviation (result expressed in engineering units)
- Module Description\*
- Engineering Units\*
- Engineering Unit 100% (EU100)\*
- Engineering Unit 0% (EU0)\*
- Last Download\*
- Currently On Scan\*
- DeltaV Named Set\*

\* Represents the current value of the attribute as retrieved from the run-time system.

- IOPCHDA\_Server::GetAggregates  
This method returns the list of aggregates supported by the DeltaV OPC History Server. These are:

- Interpolative
- Time Average
- Count
- Minimum Actual Time
- Minimum
- Maximum Actual Time
- Maximum
- Start
- End
- Total
- Average
- Range
- Standard Deviation

- IOPCHDA\_Server::GetHistorianStatus  
This method may be used to obtain the status of the DeltaV OPC History Server.
- IOPCHDA\_Server::GetItemHandles



This method returns associations between server handles and client handles for specific OPC HDA items.

- **IOPCHDA\_Server::ReleaseItemHandles**  
This method releases associations between server handles and client handles for specific OPC HDA items.
- **IOPCHDA\_Server::ValidateItemIDs**  
This method validates that specific OPC HDA item IDs are known to the server.
- **IOPCHDA\_Server::CreateBrowse**  
This method returns a pointer to an **IOPCHDA\_Browser** interface. The Item ID filtering is specified as part of the creation of a new browser.

### **IOPCHDA\_Browser**

This interface provides a method to access the list of OPC HDA Item IDs that pass the filter criteria set when this browser was created. It should be noted that the DeltaV Continuous Historian provides a flat list of historical parameters. Thus, the DeltaV OPC History Server provides a flat list of OPC HDA Item IDs. The methods that make up this interface are:

- **IOPCHDA\_Browser::GetEnum**  
This method returns an enumeration containing all of the OPC HDA Item IDs provided by the DeltaV Continuous Historian that pass the filter criteria.
- **IOPCHDA\_Browser::ChangeBrowsePosition**  
This method may be used to move up and down the list of OPC HDA Item IDs or to move directly to a particular OPC HDA Item ID.
- **IOPCHDA\_Browser::GetCurrentItemID**  
This method provides a way to obtain the current OPC HDA Item ID.
- **IOPCHDA\_Browser::GetCurrentBranchPosition**  
This method provides the current OPC HDA Item ID.

### **IOPCHDA\_SyncRead**

This interface provides access to the data held by the DeltaV Continuous Historian.

- **IOPCHDA\_SyncRead::ReadRaw**  
This method reads the values, qualities, and timestamps from the DeltaV Continuous Historian database for the specified time domain for one or more OPC HDA Items.
- **IOPCHDA\_SyncRead::ReadProcessed**  
This method requests an aggregate value or values to be computed by the DeltaV Continuous Historian for one or more OPC HDA Items, providing values, qualities, and timestamps. See **IOPCHDA\_Server::GetAggregates** for a list of supported aggregates.
- **IOPCHDA\_SyncRead::ReadAtTime**  
This is an optional method and is not supported by the DeltaV OPC History Server at this time.



- IOPCHDA\_SyncRead::ReadModified  
This is an optional method and is not supported by the DeltaV OPC History Server at this time.
- IOPCHDA\_SyncRead::ReadAttribute  
This method reads the attribute values and timestamps for the specified time domain for an item. The DeltaV OPC History Server only supports current values for attributes. See IOPCHDA\_Server::GetItemAttributes for a list of supported attributes.

## OPC HDA Client Connectivity

OPC HDA clients may be installed on the Application Station and connect locally to the DeltaV OPC History Server or they may be installed on non-DeltaV workstations and connect remotely to the DeltaV OPC History Server. If an OPC HDA client is installed on a non-DeltaV workstation, the DeltaV OPC client utility OPC Remote must be installed on the non-DeltaV workstation. OPC Remote is required on the non-DeltaV workstation in order to establish client connection to the DeltaV OPC History Server. Installing the OPC Remote utility on the non-DeltaV workstation will create a DeltaV Admin account and install and register the appropriate OPC proxy/stub DLLs required by the DeltaV OPC History Server. To install the OPC Remote utility, use the setup file located in the OPC Remote directory on the DeltaV Installation DVD (Disk 1, DV\_Extras\OPCRemote.exe). The version of OPC Remote must be the same as the installed version of the DeltaV system software.

## Licensing Requirements

The DeltaV OPC History Server is available on the ProfessionalPLUS Station and the Application Station. One OPC Historical Data Access client connection is provided free of charge. If more than one concurrent OPC Historical Data Access client connection is required, the DeltaV OPC History Server may be purchased to provide up to 25 concurrent OPC HDA client connections on the ProfessionalPLUS Station and the Application Station. Contact your local Emerson Process Management sales office for more information.