OPC Controller Reference

Honeywell

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1 Getting Started

This Controller Reference provides the information you need to set up, configure, and test OPC controller communications with the server. There is detailed information for defining the controller using Quick Builder.

Complete each step before commencing the next.

Steps for Connecting and Configuring an OPC Controller:

Steps	***Go to***
Complete any OPC Server setup and configuration as required. Refer to any setup and installation instructions provided by the OPC Server manufacturer.	page 6
Install any OPC Server configuration files on the OPC Client machine as required. Refer to any setup and installation instructions provided by the OPC Server manufacturer.	
Test communications between OPC Client machine and the OPC Server machine.	page 22
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Support and Documentation for OPC

OPC Models Supported

The OPC (OLE for Process Control) Interface is an OPC client which supports communications to OPC servers that meet the specification of the OLE for Process Control Standard version 1.0A.

The OPC Interface supports both local and remote OPC servers.

Other Documentation for OPC

Before using or installing the interface, be sure you have on hand for reference all setup and installation instructions provided by the OPC Server manufacturer.

OPC-specific Terms

item

A single data of the OPC server.

OPC

OPC is specific interface protocols (based on the functional requirements of Microsoft's COM/OLE technology) to be observed by OPC Clients and Servers. This set of standards was established by the OPC Foundation to foster greater interoperability between automation and control applications, field systems and devices, and business and office applications.

ProgID

A programmatic identifier. A registry entry that can be associated with a CLSID. The format of a ProgID is <*Vendor*>.<*Component*>.<*Version*>, separated by periods and with no spaces. The ProgID identifies a class, but with less precision. The ProgID is used to identify the OPC Server from other COM/DCOM components on the same PC. For more details, refer to any setup and installation instructions provided by the OPC Server manufacturer.

update rate

The internal update rate of the items in the OPC server.

2 OPC Controller Setup

This chapter explains how to set up an OPC controller for the system.

For details about:	***Go to:***
Description of OPC and how data transfer works	page 6
Supported architectures	page 7

Description of OPC

OPC provides data from a data source and communicates the data to any client application in a standard way, thereby eliminating the requirement for an application to have specific knowledge about a particular data source, such as internal structure and communications protocols.

An OPC Server and an OPC Client, can reside either on the same machine (local server) or they can reside on different machines (remote server).

How OPC Data Transfer Works

OPC Server data is available to the OPC Client as items.

To receive items from the OPC Server, the OPC Client must gather one or more *items* into a *group*. The OPC Client requests the OPC Server to create a *group* with a client-specified minimum update rate and a deadband. The OPC Client then requests the OPC Server to add items to the group. The update rate and the deadband of a group apply to all items in that group.

Note Although the OPC Client can specify any minimum update rate for a group, the OPC Server decides whether the request is honored.

Callback

Generally, the OPC Server sends data to OPC Clients through callbacks. After a group has been created, the OPC Server creates a cache for the group items. The cache is updated according to the group's update rate. The OPC Server sends only updated values to the OPC Client for items in the group if there has been significant change since the last cache update (based on the group's deadband).

This method of data update significantly reduces traffic between the OPC Client and the OPC Server as there is no need for periodic read requests to the OPC Server. An OPC Client gets data when there is a significant change. The level of change required to trigger an update from the OPC Server is defined by the OPC Client.

Synchronous Read Request

The OPC Client can also send synchronous read requests to the OPC Server, independent of the server callbacks. The OPC Client specifies whether the data should come from the OPC Server's internal cache or from the field/hardware device. This method of scanning is less efficient than callback.

Architectures

For the OPC Interface to communicate with an OPC Server, the OPC Server must first be installed on an appropriate machine. The OPC Server does not need to reside on the same machine as the OPC Interface.

To install an OPC Server, follow the installation instructions provided by the OPC Server vendor.

Valid OPC Interface Configurations

The server OPC interface supports single-channel communications.

Single Channel Communications

A single-channel configuration.

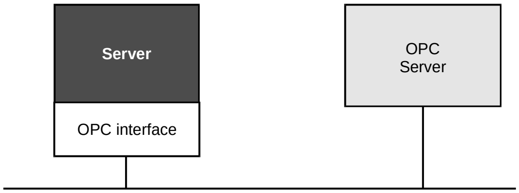

Figure 2.1 OPC Interface Single Channel Connection

Alternate Data Source

The OPC Interface also supports an alternate data source. If the OPC Interface connection to an OPC server fails, the OPC Interface connects to the substitute data source.

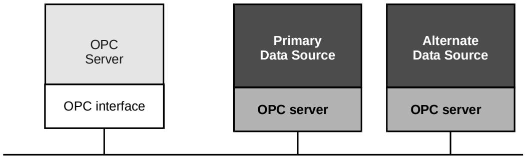

Figure 2.2 OPC Redundant Server Connection

OPC Server Installation

Before the OPC Interface can communicate with an OPC Server, the OPC Server must first be installed on the appropriate machine.

Each OPC server vendor is responsible for providing installation instructions for their server.

3 OPC Controller Configuration and Addressing

This chapter explains how to configure a OPC controller for the system using Quick Builder. For each configuration procedure, there is detailed information covering all supported OPC devices.

The Quick Builder controller configuration tasks are described:

Defining a OPC Channel

An OPC channel operates as follows:

- Each channel provides a communication link to a single OPC Server.

  Note The OPC server may or may not reside on the same machine as the server.

- A diagnostic scan period can be configured for each OPC channel. This determines how often the OPC interface tests the status of the OPC Server to ensure that it is OK.
- A background read scan period can be configured for each OPC channel. This determines how often the OPC interface performs a synchronous read of all items configured on the channel.

  Note The “items” referred to here are parameters of points which have source addresses and non-zero scan periods built on controllers on this channel.

Use Quick Builder to add a channel. Remember that for each OPC Server, a unique OPC channel must be configured in the system server database.

To define a channel using Quick Builder:

1. Click on to add a channel.
2. In the Add Items dialog box, choose **Channel** as the item and **OPC** as the channel type.
3. Enter the channel details on the Main property page for the channel. For help with the channel definitions, see “OPC Channel Main Properties” on page 11.

OPC Channel Main Properties

Use the Main tab to enter the basic channel properties for a OPC channel.

> **Note** If an alternate source Host Name is entered on the Main tab, Quick Builder builds a redundant OPC channel. See the *Configuration Guide* for your server for information about monitoring redundant channels.

Property	***Description and Notes***
Name	The unique name of the channel. A maximum of 10 alphanumeric characters (no spaces or double quotes).
Description	(Optional) Type a description of the channel. A maximum of 30 characters can be used, including spaces.
Marginal Alarm Limit	The communications alarm marginal limit at which the channel is declared to be marginal. When this limit is reached, a high priority alarm is generated. A channel barometer monitors the total number of requests and the number of times the controller did not respond or response was incorrect. The barometer increments by 2 or more, depending on the error and decrements for each good call. To calculate an acceptable limit, multiply the square root of the number of controllers on the channel by the **Marginal Alarm Limit** defined for those controllers. (Normally, you specify the same value for all controllers on a channel). For example, if there are 9 controllers on the channel and their **Marginal Alarm Limit** is set to 25, the value would be [3 is square root] x 25= 75.
Fail Alarm Limit	Communications alarm fail limit at which the channel is declared to have failed. When this barometer limit is Set this to double the value specified for the channel **Marginal Alarm Limit**.
ProgID	Enter the ProgID for the OPC Server that is to be connected.
Background Scan Period	Enter the background scanning period (in seconds) set to one of the valid server scan period (defaults to 60). This value is used as the rate for sending synchronous read requests if a controller is also configured to do this.

Property	***Description and Notes***
Diagnostic Scan period	The amount of time, in seconds, between diagnostic scans. The diagnostic rate must be set to one of the valid server scan periods. The default is **60** seconds. This value is used as the rate for sending synchronous requests for checking the server's current status.
Host Name (preferred)	The name of the machine on which the preferred OPC server software resides. If the OPC Server is on the same machine as the OPC Client, the Host name must be **LocalHost**.
Host Name (alternate)	(Optional) The name of the machine on which the alternate OPC Server software resides. If the OPC Server is on the same machine as the OPC Client, the Host name must be **LocalHost**. **Note:** If a name is entered here, Quick Builder builds a redundant channel OPC connection. See the *Configuration Guide* for the server for information on monitoring the status of redundant channels.
Connect Timeout	Amount of time, in seconds, the server waits to connect to the OPC server before abandoning the connection. The default is **10** seconds.
Read Timeout	Amount of time, in seconds, the server waits for a reply from the OPC server after a sychronous read request. The default is **2** seconds.
Item Type	Shows the type of item specified when this item was created.
Last Modified	Shows the date of the most recent modification to this channel's property details.
Last Downloaded	This shows the date that the item was last downloaded to the server.
Item Number	This field displays the unique item number currently assigned to this item by Quick Builder. You can change the item number displayed in this field if you need to match your current server database configuration. The item number must be between 1 and the maximum number of channels allowed for your system.

Defining a OPC Controller

Each controller built on an OPC channel manages a number of OPC groups, as follows:

- A group is created in each controller for each scan period used by points on that controller. All parameters of points with source addresses built with the same scan period are placed in the same group.

  Note All points on an OPC controller have the same OPC deadband. This deadband is configured in Quick Builder for each controller. This is the OPC deadband, as distinct from the point processing deadband that is built for each point.
- For each controller, you select whether or not to perform a background read of its points (at the background read rate defined for the channel).
- The maximum number of different items (point parameters) that can be configured in a controller is 705.

Define an OPC controller to contain points referencing OPC Items. All points built on a controller will have the same OPC group deadband and scanning mode (that is, background scanning enabled or disabled).

The maximum number of different items for a controller is 705.

To define a controller using Quick Builder:

1. Click ✚ to add a controller.
2. In the Add Items dialog box, choose **Controller** as the item and **OPC** as the controller type.
3. Enter the property definitions for the controller on the controller Main property page.

OPC Controller Main Properties

Use the Main tab to define the basic properties for a OPC controller.

Property	***Definition and Notes***
Name	The unique name of the controller. A maximum of 10 alphanumeric characters (no spaces or double quotes).
Description	(Optional) Type a meaningful description for this controller. A maximum of 30 characters, including spaces, can be entered.
Channel Name	The name of the channel on which the controller communicates. In the list of channel names, click the name. You need to have defined the channel in order for it's name to appear in the list.
Marginal Alarm Limit	The communications alarm marginal limit at which the controller is declared to be marginal. When this value is reached, a high priority alarm is generated. This limit applies to the controller barometer which monitors the total number of requests to the controller and the number of times the controller did not respond or response was incorrect. The barometer increments by 2 or more, depending on the error and decrements for each good call. The default value is `25`.
Fail Alarm Limit	The communications alarm fail limit at which the controller is declared to have failed. When this barometer value is reached, an urgent alarm is generated. Set this to double the value specified for the controller **Marginal Alarm Limit**.
Background Scan	Specify whether or not the synchronous read requests are to be performed at the channel background scan period in addition to normal callback operation. Select **Enabled** if you do not want the default (**Disabled**).

Property	***Definition and Notes***
Deadband	This deadband applies to all OPC server items referenced by point parameters belonging to this controller. All items for a controller are updated by OPC server callbacks when there is a change greater than the deadband. The deadband Indices are defined as: 0 = 0.000% 1 = 0.001% 2 = 0.002% 3 = 0.005% 4 = 0.010% 5 = 0.020% 6 = 0.050% 7 = 0.100% 8 = 0.200% 9 = 0.500% 10 = 1.000% 11 = 2.000% 12 = 5.000% 13 = 10.000% 14 = 20.000% 15 = 50.000%
Item Type	Shows the type of item specified when this item was created.
Last Modified	Shows the date of the most recent modification to this channel's property details.
Last Downloaded	This shows the date that the item was last downloaded to the server.
Item Number	This field displays the unique item number currently assigned to this item by Quick Builder. You can change the item number displayed in this field if you need to match your current server database configuration. The number must be between 1 and the maximum number of controllers allowed for your system.

Defining a OPC Address for a Point Parameter Value

- An OPC point parameter represents a single item in the OPC server.
- The scan rate of the point parameter is the update rate of the OPC item.
- Periodic scanning is based on OPC callbacks, not on OPC synchronous read requests.

Entering an Address

For **PV Source Address**, **Source Address**, and **Destination Address** the format for a OPC controller address is:

```
ControllerName Location
```

Part	***Description***
ControllerName	The name of the controller. You need to have defined the controller for the name to appear in this list.
Location	The location in the controller where the value is recorded. See “Location Syntax” on page 17.

If you would like help with the address location, you can use the Address Builder. To display the Address Builder, click ... next to **Address**. For help using Address Builder, see the online help.

Location Syntax

The format for the location is:

```
[AccessPath]OPCItemName [DataFormat]
```

Part	***Description***
[`AccessPath`]	The access path, which is not normally required. However, it is required for OPC servers developed using the Rockwell OPC Toolkit. You need to refer to the vendor's documentation to determine whether an access path is required. The access path generally represents a device driver or topic (if the server was previously developed as a DDE server). **Note, if you do specify an access path:** • You must include the square brackets. (In this particular case, they do not simply indicate an optional part of the syntax.) • There is no space between the access path and the *`OPCItemName`*.
`OPCItemName`	The location in the controller where the value is recorded. You need to refer to the vendor's documentation for the syntax. For example, if you are using the system OPC Server to access the PV of a point named *sinewave* the location would be `sinewave.PV`.
`DataFormat`	The data format. If you do not specify a data format, the default is `IEEEFP`. See "Data Format Definitions" on page 18.

Data Format Definitions

Format	***Counts***
IEEEFP	IEEE single-precision floating point
U3BCD	0 to 999 BCD
U4BCD	0 to 9999 BCD
U4095	0 to 4095
U999	0 to 999
U9999	0 to 9999
U100	0 to 100
U1023	0 to 1023
U8B	0 to 255
S16B	-32768 to 32767
S8B	-127 to 127
S9999	-9999 to 9999
U16B	0 to 65535
U15B	0 to 32767
U14B	0 to 16384

Optimizing Scanning Performance

The maximum amount of data that can be acquired from an controller is influenced by the rate of sending scan packets to the controller. An understanding of the OPC scan packets will help you configure points so that optimal data acquisition performance can be achieved by maximizing the amount of data acquired with each scan packet.

The scan packets that have been built can be listed by using the utility **lisscn** (list scan). Listing scan packets helps verify the scanning strategy. Refer to the *Configuration Guide* for your server for usage of **lisscn**.

OPC Scan Packets

OPC groups are collections with the same callback period and deadband. In order to reduce the number of OPC groups (and hence OPC scan packets) you should:

- Assign all points with the same deadband to the same controller where possible, remembering a maximum of 705 points can be assigned to a single controller.
- Reduce the number of scan period of points on a single controller, remembering that an OPC group will be created on the controller for each scan period used.

4 Server and Station Tasks for OPC

This section covers tasks for the OPC controller that you perform either on the server or from any Station.

Testing Communications with the Server

The **opctst** utility is a windows based diagnostic utility that you use to test the:

- Connection to an OPC Server
- Creation of OPC groups on a server
- Addition of OPC Items into groups
- Reading and writing of values to OPC Items on the OPC Server machine

Before you use **opctst** you need to:

1. Complete any OPC Server setup and configuration as required. Refer to any setup and installation instructions provided by the OPC Server manufacturer.
2. Install any OPC Server configuration files on the OPC Client machine as required. Refer to any setup and installation instructions provided by the OPC Server manufacturer.

To run the opctst utility:

Open a Command Prompt window and type **`opctst`** and press <Enter>.

When the window application starts, select the OPC menu option and perform each of the menu operations in turn (that is, Initialize COM, Connect to OPC Server, and so on).

Troubleshooting OPC Communication Errors

If you experience difficulty getting the OPC Interface to communicate with an OPC Server, refer to the system server log file (accessible via an icon in the Diagnostic Tools folder). The log file gives an indication as to the cause of any OPC communications problems.

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