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Connecting Biobrain® Supervise to the AVEVA™ PI System™ via OPC UA

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Abstract

Acquisition of data in data historians is commonly used to aggregate data from different sources. A typical data historian is the PI System™ from AVEVA™.

With its built-in OPC UA server, Sartorius Biobrain® Supervise offers the capability to provide data to any kind of OPC UA client that also includes the AVEVA™ PI System™.

This guide outlines the procedure on how to connect Biobrain® Supervise and the AVEVA™ PI System™ via OPC UA.

Find out more: www.sartorius.com/biobrain-supervise

Introduction

Biobrain® Supervise is a Supervisory Control and Data Acquisition (SCADA) system that monitors and controls a technical process. Since version 4.8, Biobrain® Supervise has been providing a built-in OPC UA server, which offers the possibility of connecting the widest variety of OPC UA clients.

The AVEVA™ PI System™ is a suite of software products that are used for collection, analysis and visualization of data. The PI System™ provides the capability of collecting data over different types of interfaces. One possible interface is OPC UA.

OPC Unified Architecture (OPC UA) is an open standard communication protocol for industrial automation developed by the OPC Foundation. It is manufacturer independent and can be used for different kinds of data exchange (machine to machine, machine to computer and computer to computer).

One possible equipment scenario could be to have different production facilities exchange data all across the globe. Each production facility would have one or more Biobrain® Supervise systems installed, ensuring reliable automated production (Figure 1). The large amount of data generated could then be archived and centralized in the AVEVA™ PI System™ via OPC UA.

In any case, the Biobrain® Supervise can be easily integrated into existing systems without the need for any special communication protocol. The following provides step-by-step guidance on how to connect the AVEVA™ PI System™ with Biobrain® Supervise via OPC UA.

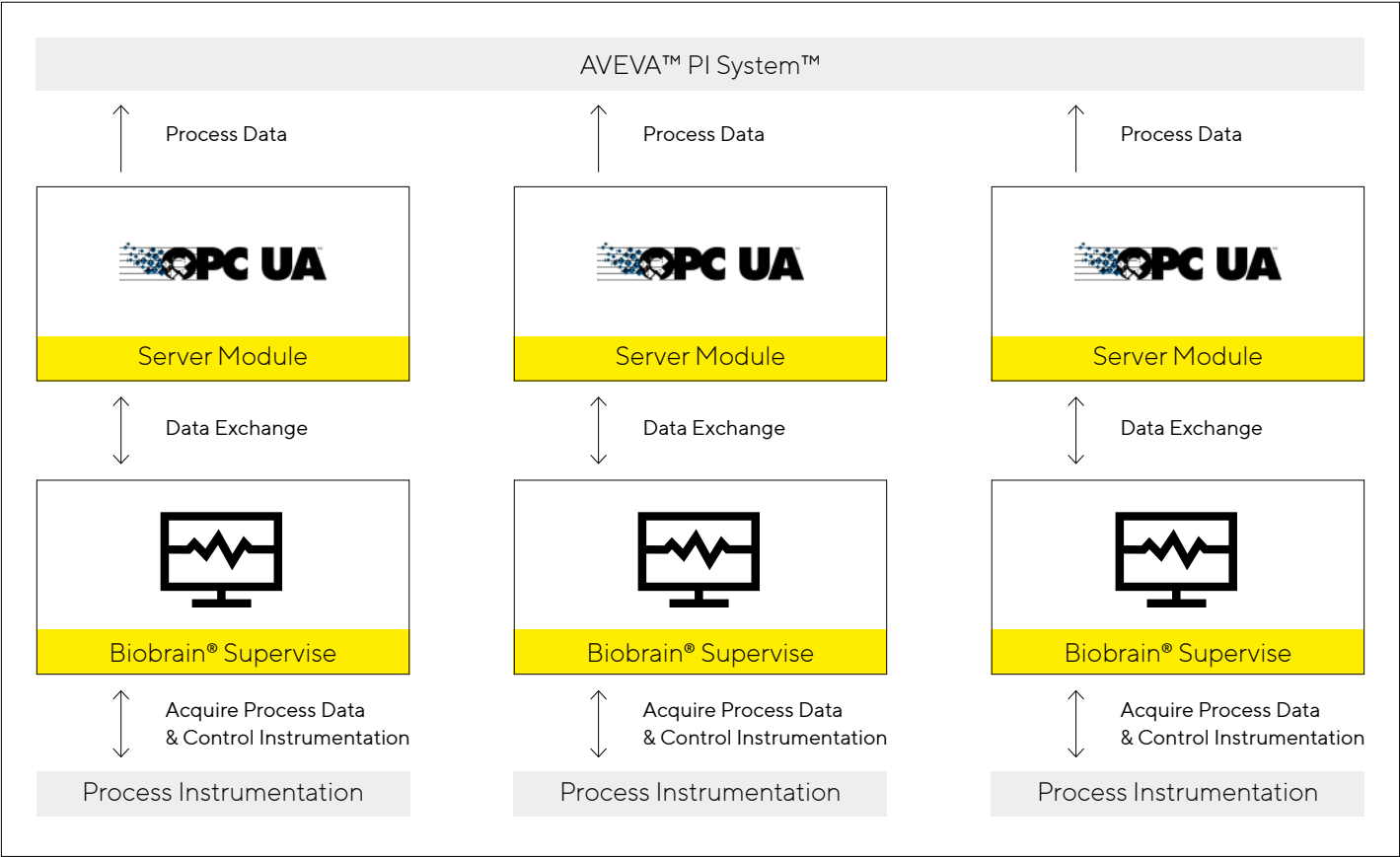


Figure 1: Example of an AVEVA™ PI System™ Collecting Data From Various Biobrain® Supervise Systems Installed

Prerequisites

Ensure that the Biobrain® Supervise OPC UA server is running and that PI Server 2018 SP3 (or newer) is installed (including the PI Data Archive and AF Server). Also make sure that the PI Connector Relay, PI Data Collection Manager (DCM) and the PI Connector for OPC UA are installed and that the ports used are known (Table 1).

AVEVA™ PI System™ Program	Port Used
PI Server 2018 SP3 (or newer)	-
PI Connector Relay	e.g. 5460
PI Connector for OPC UA	e.g. 5461
PI Data Collection Manager (DCM)	e.g. 5462

Table 1: Prerequisites

Configuring AVEVA™ PI System™

Set up a connector

Open PI Connector for OPC UA Administration in the start menu subfolder “PI System” or open it directly and use the hyperlink for the connector (Table 2).

Administration Section	Hyperlink
PI Connector for OPC UA Administration	<a href="https://<ComputerName>:<Port>/ui">https://<ComputerName>:<Port>/ui e.g., https://SartoriusServer:5461/ui
PI Data Collection Manager	<a href="https://<ComputerName>:<Port>/ui">https://<ComputerName>:<Port>/ui e.g., https://SartoriusServer:5462/ui

Table 2: Administration Sections Overview

Login with your user name and password of your domain account (e.g., “SARTORIUS\User”; the user must belong to the PI Connector Administrators group).

Click on Set Up Connector (Figure 2).

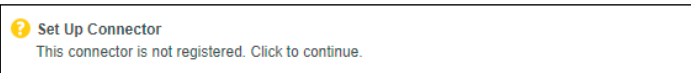


Figure 2: PI Connector for OPC UA Administration, Set Up Connector Button

Enter the address and port of the PI Data Collection Manager (Table 1) as the Registration Server Address, then click Request Registration and start the connector by clicking on Start Connector (Figure 3).

Connector Details

Connector Settings

Registration Server Address *

https://desktop-42:5462

Registration Server User Name *

SARTORIUS\User

Registration Server Password *

.....

Description

Description

The Administration service client configuration for localhost was suc

Connector Tools

Start Connector

Figure 3: PI Connector for OPC UA Administration; Connector Settings

Open the PI Data Collection Manager (Table 2). Click on Untitled Connector 1 in the Connectors column to approve your registration. Type in a name, such as OPC UA Connector, and then click on Approve This Registration and Configure (Figure 4).

Connector Settings

Name

Untitled Connector 1

Description

An optional description of the connector

Approve This Registration and Configure

Figure 4: PI Data Collection Manager; Connector Settings

Set up a relay

Open the PI Data Collection Manager (Table 2). Login with your credentials (the same rules apply here as in Set up a connector). Ensure that the window is maximized so that the middle block with the four columns is visible. Click on the plus-sign button in the Relays column header to add a new relay. Enter the port of the installed PI Connector Relay (Figure 5).

Relay Settings

Name

Relay

Address

localhost

Port

5460

User Name

SARTORIUS\User

Password

.....

Cancel

Save Settings

More ▾

Figure 5: Relay Settings Dialog

Set up a destination

Open the PI Data Collection Manager (Table 2). Click on the plus button in the Destinations column header to add a data archive. Type in the address of the Data Archive and the AF Server and click on Save Settings (Figure 6).

Destinations

New

New Destination Details

Configuration

Data

Destination Settings

Name

Data Archive

PI Data Archive Address

localhost

AF Server Address

localhost

Cancel

Save Settings

Figure 6: Destination Settings Dialog Box

Ensure that Biobrain® Supervise is running with variable type set to “Dataltem”

OPC SERVER

GENERAL

OPC server

On

Off

Status

Running

Port*

4840

Variable type

Property

Dataltem

Figure 7: Select the Variable Type in Biobrain® Supervise

Connect Biobrain® Supervise

Select the newly created OPC UA connector in the Connectors column. In the right-hand side menu, navigate to the Data tab and click on Add Data Source (Figure 8).

Destinations

OPC UA Connector Connect

Configuration

Data

This connector has no configured data s

Manage Data Sources

Connected Data Sources

Add Data Source

Remo

Figure 8: Add a Data Source for the OPC UA Connector

Enter the endpoint URL and, if defined, the credentials of the Biobrain® Supervise OPC UA server (Table 3). The port can be looked up in the Biobrain® Supervise Client; also ensure that the OPC UA server is running.

Biobrain® Supervise OPC UA server endpoint URL
opc.tcp://<ComputerName>:<Port>/BioPAT_MFCS
Example: opc.tcp://SartoriusServer:4840/BioPAT_MFCS

Table 3: Biobrain® Supervise OPC UA Server Endpoint URL

Certificates

Under Additional Settings select:

Incoming Timestamp: Server

Enable Property Subscription: active

Override Reconnection Logic: active

Advanced Configuration

Additional Settings

Incoming Timestamps

Server

PI Store Mode

Update

Preferred Locale

English - United States

Max Browse References to Return

100

Browse Block Size

1

Read Block Size

1000

☐ Allow Insecure Credentials

☒ Take DNS Name and Port from Discovery URL

☒ Enable Property Subscription

☐ Enable OPC UA Model Changes

☒ Override the Reconnection Logic

Figure 9: Configure the Data Source in OSI PI

To establish a connection between AVEVA™ PI System™ and Biobrain® Supervise, it is necessary that they trust each other's certificate.

Step 1

First determine whether the Biobrain® Supervise certificate got rejected by checking if the **AVEVA™ PI System™ rejected folder** (Table 4) includes a certificate named similarly to BioPAT_MFCS_OpcServer.

Location	Path
AVEVA™ PI System™ own folder	%PIHOME64%\Connectors\OPCUA\pkiclient\own\certs
AVEVA™ PI System™ rejected folder	%PIHOME64%\Connectors\OPCUA\pkiclient\rejected\certs
AVEVA™ PI System™ trusted folder	%PIHOME64%\Connectors\OPCUA\pkiclient\trusted\certs
Biobrain® Supervise own folder	%ProgramData%\Sartorius\BioPAT_MFCS\Services\OpcUa\Server\pki\own\certs
Biobrain® Supervise trusted folder	%ProgramData%\Sartorius\BioPAT_MFCS\Services\OpcUa\Server\pki\trusted\certs

Table 4: Certificate Paths

If that is the case, then cut it out and paste it in the **AVEVA™ PI System™ trusted folder** (Table 4); then continue with Step 3.

Step 2

If the rejected folder is empty, go to the **Biobrain® Supervise own folder** (Table 4) and copy the certificate, named similarly to BioPAT_MFCS_OpcServer, into the **AVEVA™ PI System™ trusted folder** (Table 4).

Step 3

Go to the **AVEVA™ PI System™ own folder** (Table 4) and copy the certificate named similarly to OPCUA.ConnectorHost into the **Biobrain® Supervise trusted folder** (Table 4).

Connect All Components

Open the PI Data Collection Manager (Table 2).
Click on a component in one of the four columns, e.g., Relay, to establish a connection to the other components by checking the checkboxes (Figure 10).

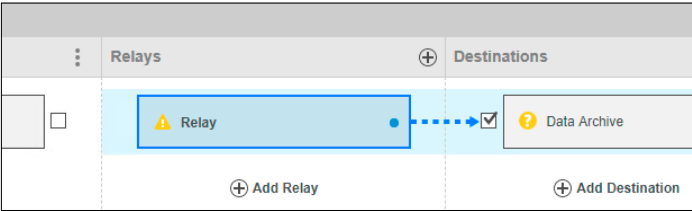


Figure 10: Connect a Relay to a Data Archive

Verify whether the relay and the connector are running by checking the Configuration tab on the right-hand side (Figure 11); otherwise, click on Start Relay or Start Connector.

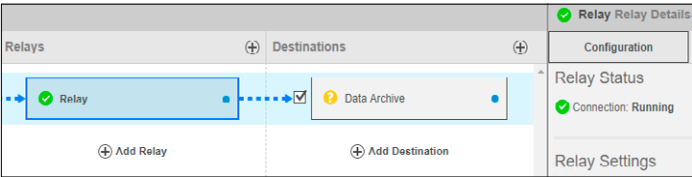


Figure 11: Check the Connection Status

Check if a destination path is defined (Figure 12).

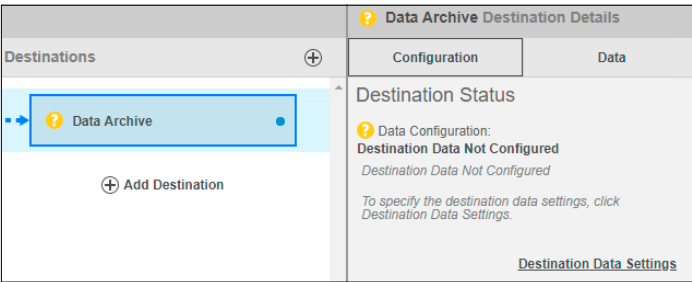


Figure 12: Check the Data Configuration in the Destination Details

If no destination path is defined, configure it by selecting a desired database (Figure 13).

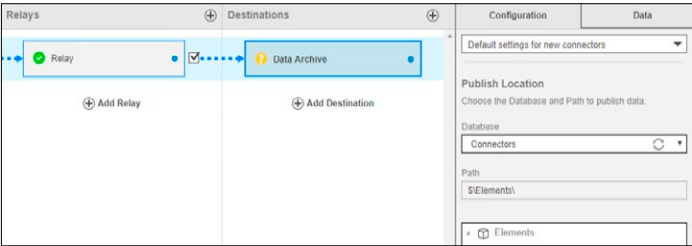


Figure 13: Define Destination Path

Add data

Select the Data Source that points to Biobrain® Supervise in the Data Source column, go to the Data tab and click on Discover Data Source Contents (Figure 14). This step must be repeated each time when changes are made to Biobrain® Supervise regarding the address space, such as by adding or deleting Control Modules.

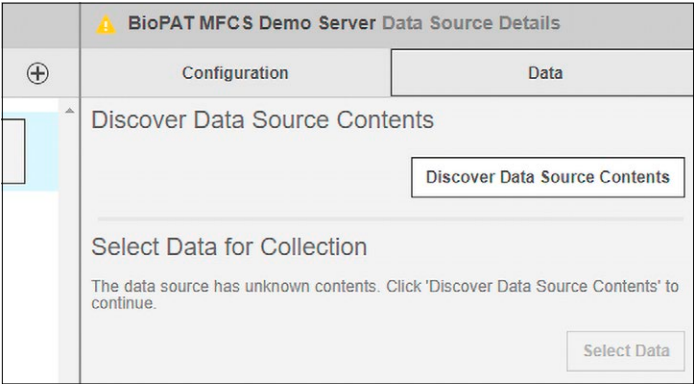


Figure 14: Discover Data Source Contents

Select the OPC UA connector in the Connectors column: go to the Data tab and click on Select Data (Figure 15).

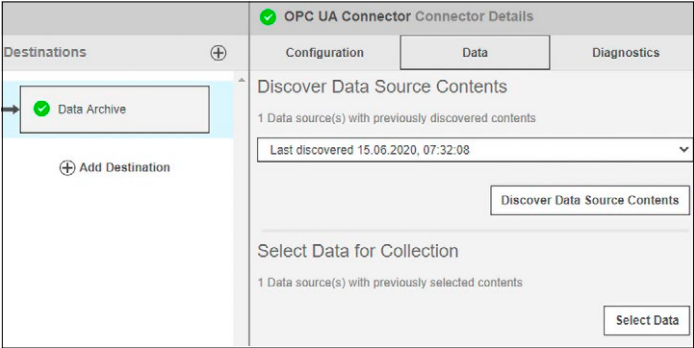


Figure 15: Access the Select Data dialog box via the Connector Details

Select every node of interest (Figure 16) and click on Next.

Select Data for OPC UA Connector > Configure Tags > View Summary

Selection Rules

Select Any Object and its Contents From MFCS\Objects

✓ Query executed successfully. Your selections have been updated.

Selected Data

☐	Name	Description
☒	MFCS	
☐	BuildInfo	
☐	CurrentTime	
☐	DataRate	
☐	DataSourceState	
☐	EndpointUri	
☒	Objects	
☒	System Resources	
☒	Units	
☐	ServerState	
☐	StartTime	

Figure 16: Select the Data Dialog Box

On the View Summary page, it is important to select “Use these selections as rules to automatically update destinations” (Figure 17) to ensure that the PI Point reference is not lost.

Select Data for OPC UA Connector > Configure Tags > View Summary

Selected Items | Selection Rules | Tag Names

Name

MFCS

599 of 610 (316 PI Tags)

Future changes to the data source structure are automatically detected. How do you want to handle these changes?

☐ Notify me so I can specify what content to include and exclude.

☒ Use these selections as rules to automatically update destinations.

Figure 17: Handle Changes by Automatically Updating Destinations

Now as all components are marked green (Figure 18) – which might take some time for every component to refresh – click on Save Configuration (Figure 19).

Components	Routing
Filter Components  Filter Options	Data Source
Data Sources	
✓ MFCS	✓ M
Connectors	
✓ OPC UA Connector OPC UA	
Relays	
✓ Relay	
Destinations	
✓ Data Archive PI Server	

Figure 18: Connection Established for All Components

Cancel and Revert Configuration Save Configuration

Figure 19: Save Configuration Button

Compare the values inside the PI System Explorer (Figure 20) to the values inside the Biobrain® Supervise Client to ensure that all values are received properly.

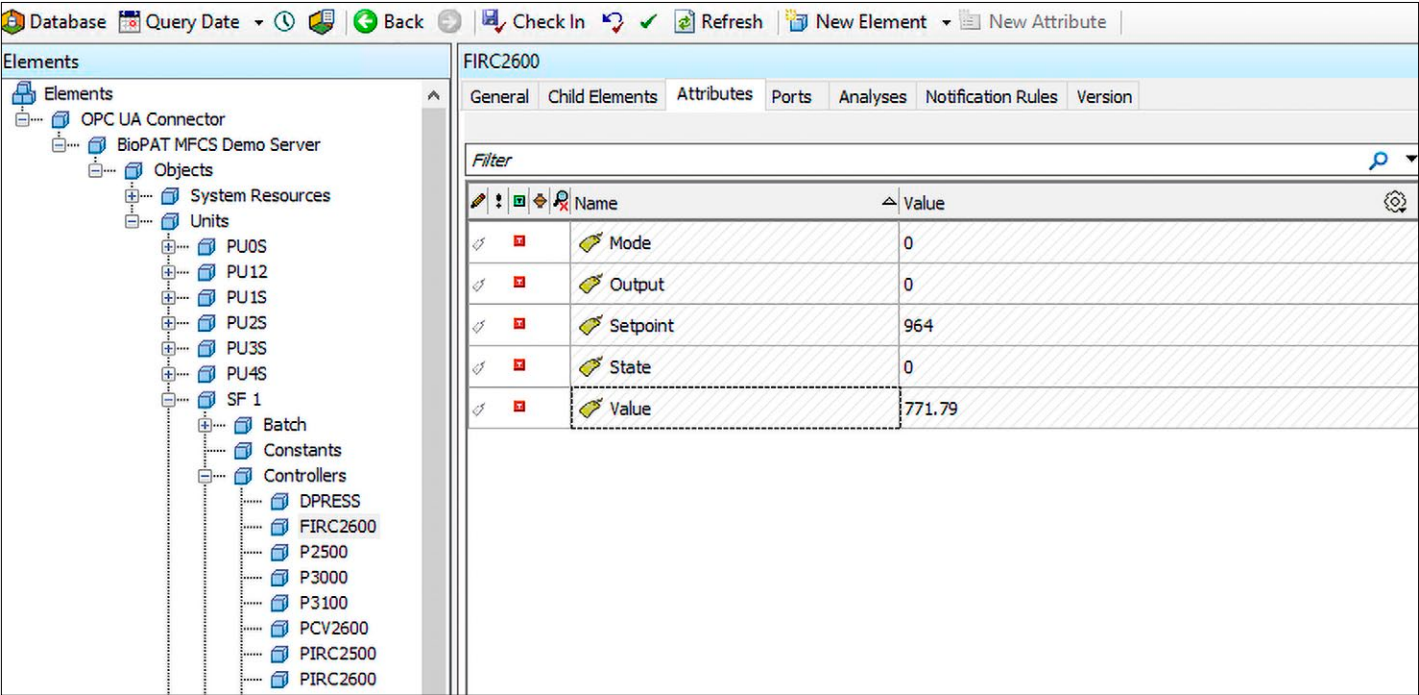


Figure 20: An Example of a Node Tree Shown in the PI System Explorer

Refresh data

If the OPC UA node tree provided by Biobrain® Supervise is static, the OSI PI connector works reliably. But once there are new nodes, e.g. by creating a unit, the OSI PI connector does not automatically discover the tree change. In those cases the “Discover Data Source Contents”-button (Figure 14) needs to be pressed manually.

Please note, that OSI PI can not handle nullable date-times. An example is the stopping of a Biobrain® Supervise batch. In this case, the Biobrain® Supervise OPC server sends ‘null’ for BatchStartTime. OSI PI would still show the old BatchStartTime in contrast to other OPC UA clients, that would display ‘null’. See figure 21.

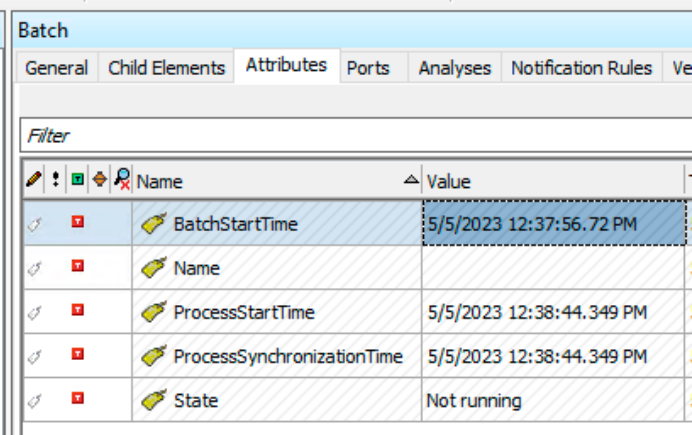


Figure 21: Not Empty BatchStartTime in PI System Explorer

Conclusion

This guide outlines how to successfully connect AVEVA™ PI System™ with Biobrain® Supervise via OPC UA and can be conveniently used for other data historians.

The OPC UA server functionality of Biobrain® Supervise offers a flexible and standardized way of integrating a Biobrain® Supervise server into an already existing infrastructure without the need for implementing any special communication protocol.

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