



Connectivity Guide

LinkMaster V3

January, 2023
V4.000

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1. Overview

This guide intends to demonstrate how to establish a connection between the KEPServerEX OPC server and Kepware's LinkMaster OPC Bridge. Users must complete the following before continuing with this tutorial:

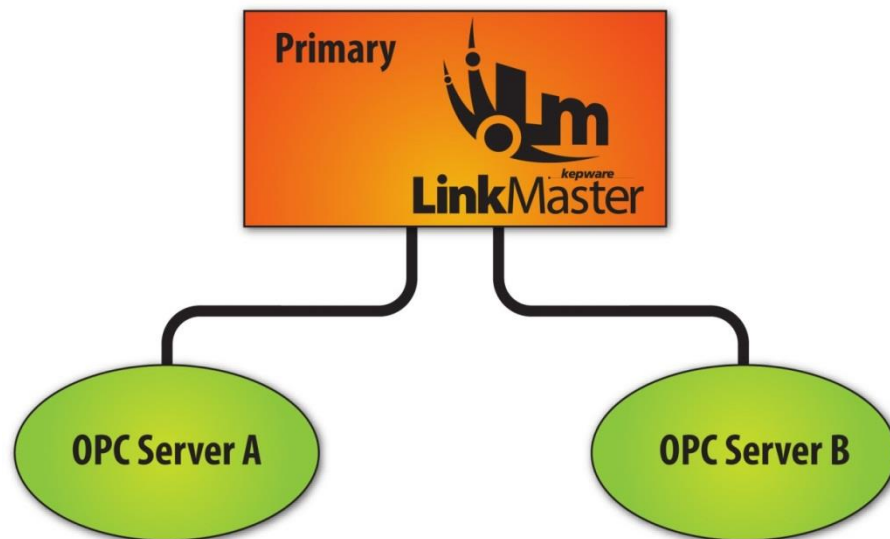
- Configure the server project. Users may either select the appropriate driver and settings or run the **Simulation Driver Demo** that is included with KEPServerEX. The Simulation Driver Demo project is used for all examples in the tutorial.
- Start KEPServerEX and load the Simulation Driver Demo project. Once the project is loaded, open the Runtime menu and verify that the server project has been connected.

1.1 About LinkMaster V3

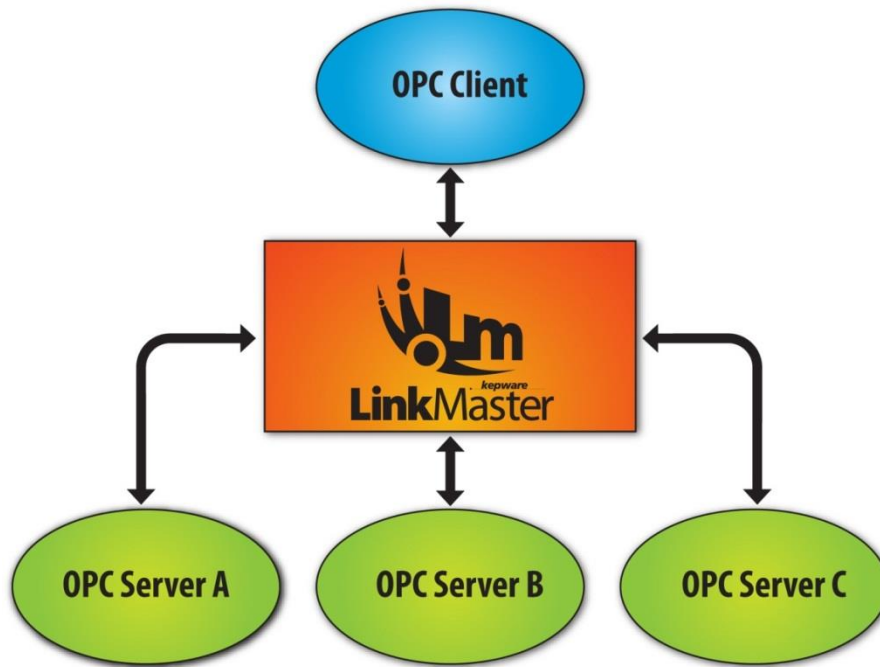
LinkMaster V3 is the next generation of the LinkMaster OPC Bridging product. It has been redesigned for use on Windows operating systems through the separation of the user interface from the Runtime for Session 0 operations. Other new features have also been added to improve performance and reliability. *For a complete list of features and options, refer to the LinkMaster help file.*

2. Using LinkMaster as an OPC Client

LinkMaster is an OPC DA Client and an OPC DA Server. It can be used to bridge data between devices in the same server or between different servers.



LinkMaster can also be used as a data concentrator by connecting to multiple OPC servers and providing a single OPC server interface to other OPC Clients.



2.1 Connecting to an OPC Server with LinkMaster

For information on creating a LinkMaster project to bridge two devices in one OPC server, refer to the instructions below. The same process can be used to bridge different servers on the same PC or on multiple PCs. Furthermore, this process can be used to connect to any third-party OPC server and bridge data: KEPServerEX is not required for use with this product.

• *This information is also available in the LinkMaster help file.*

2.1.1 Starting LinkMaster

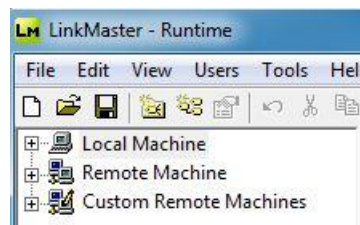
1. To start, double-click on the LinkMaster V3 Configuration desktop icon. Alternatively, click **Start | Programs | Kepware | LinkMaster 3** then select **LinkMaster 3 Configuration**.
2. The first time LinkMaster is opened, the configuration displays a new project. The next time it is opened, it displays the last project that was loaded. To start a new project, click **File | New**.



2.1.2 Browsing and Connecting to a Server

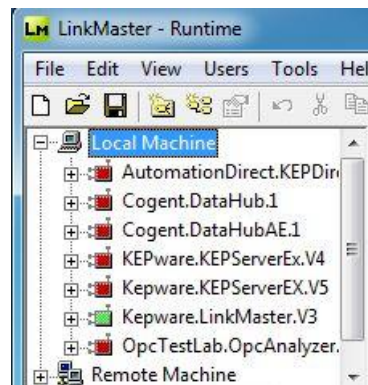
Although the following example browses the Local Machine, users can easily browse a Remote Machine. To do so, simply select the Remote Machine's expand icon or double-click on it.

- **Important:** Browsing for and connecting to servers requires that DCOM be properly configured on all PCs involved in the OPC process.



- To start, expand the **Local Machine** or **Remote Machine**.

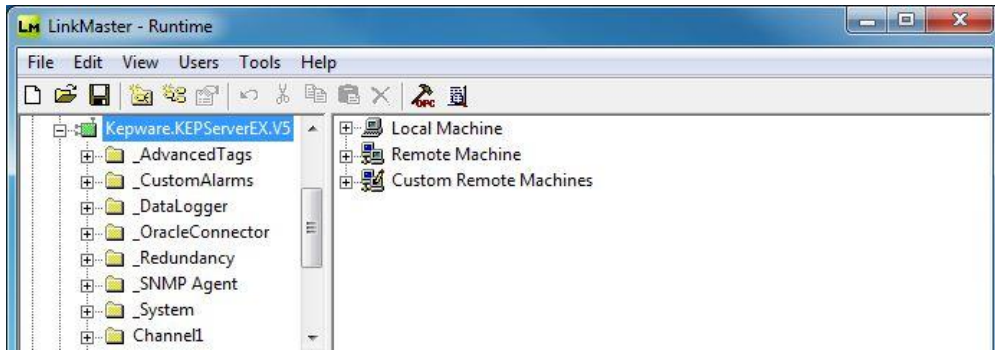
- **Note:** It takes a few seconds for LinkMaster to browse for and return a list of all the available OPC servers. For remote machines, users must select the PC running the server for which it is looking. To do so, browse the network. *For more information on custom remote machines, refer to the LinkMaster help file.*



- Next, locate the Program ID of the server to be connected. Then, click to establish a connection.

- **Tip:** The icon next to the Program ID should change from red to green, indicating that the connection is good.

- Expand the server connection to display the channels and devices that are currently configured.



- Tip:** Users can connect to multiple servers at one time by using one or both of the browse panes.

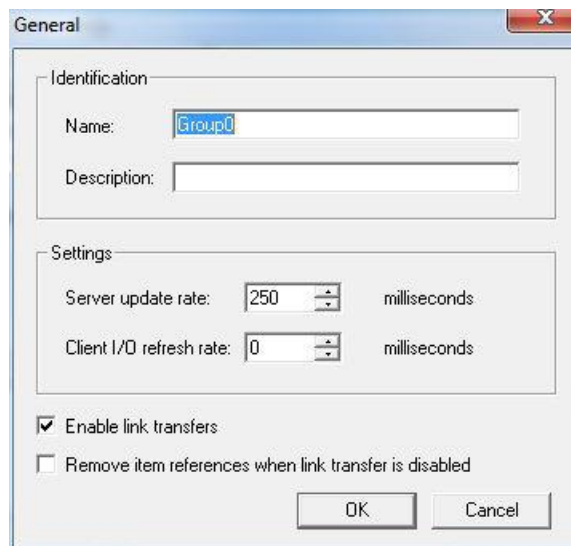
2.2 Creating a Link Group

Once connected to a server, users can start defining data links. For more information, refer to the instructions below.

- To add a new Link Group, click **Edit | New Link Group**.

- Tip:** Users can define as many Link Groups as needed within a single project.

- In this example, the default settings are acceptable. In the **Link Group Properties**, click **OK**.



Descriptions of the parameters are as follows:





- Name:** This parameter specifies the string that will represent the data available from this group. Each Link Group name must be unique and cannot exceed 80 characters.
- Description:** This parameter specifies an optional description. The string cannot exceed 64 characters.
- Server Update Rate:** This parameter specifies the desired value in milliseconds. The default setting is 250 milliseconds.

- **Note:** The Server Update Rate equates to the group update rate of the server and dictates the rate at which the OPC server polls its connected devices. If the device's data changes from one poll to the next, users can send the changed data back to LinkMaster in a data change event.
- **Client I/O Refresh:** This parameter specifies the desired value in milliseconds. This setting is used to force an update for the inputs of all links in the Link Group. As an Asynchronous Read, all items are returned regardless of whether they have changed since the last poll. Furthermore, all items are written to the Link Outputs. The default setting is 0 milliseconds.
 - **Note:** Writing from a high-speed input to a low-speed output can overload the write queue of the target OPC sever. This setting also overrides the normal polling done by the target server and forces a read of the device being polled. When used, it is recommended that this parameter be set to a different rate than the Server Update Rate.
- **Enable Link Transfers:** When checked, this option enables writes for the group. It can also be set by a client through the group's "_Enabled" System Tag. The default setting is checked.
- **Remove item references when link transfer is disabled:** When checked, this option removes the input and output item references when link transfers are disabled. This essentially stops the polling of the inputs. The default setting is unchecked.

3. Once finished, click **OK**.

2.2.1 The Link Group Icon

Link Groups are located in the lower-left pane of the LinkMaster user interface. Each Link Group displays an icon whose color will indicate the Link Group's status. Descriptions of the colors are as follows:

-  When the icon is green, the group is running without errors.
-  When the icon is grey, one or more items in the group are in error.
-  When the icon is red, the group's link transfers are disabled.
-  LinkMaster's Error Log contains detailed messages on each Link Item's error conditions.

2.3 Creating Link Items for the Link Group

Link Items can be added after a Link Group is created. When Link Transfers are enabled in the Link Group, the item requested from the server as soon as it has been added. If the server is not ready, errors are returned.

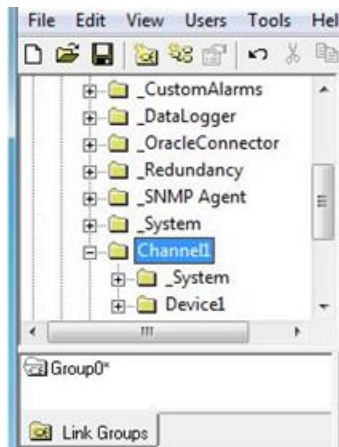
2.3.1 Adding Link Items Using Drag and Drop

For quick and easy project creation, users can create Link Items through drag and drop. For more information, refer to the instructions below.

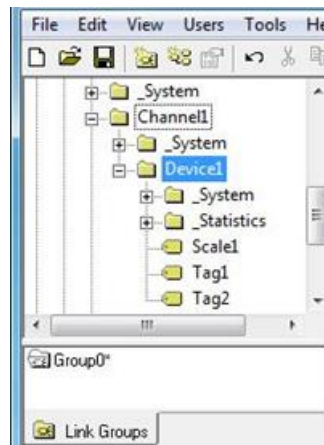
1. To start, select the group to which the Link Item are added.



- Next, expand the channels of the device from which the input item is taken.

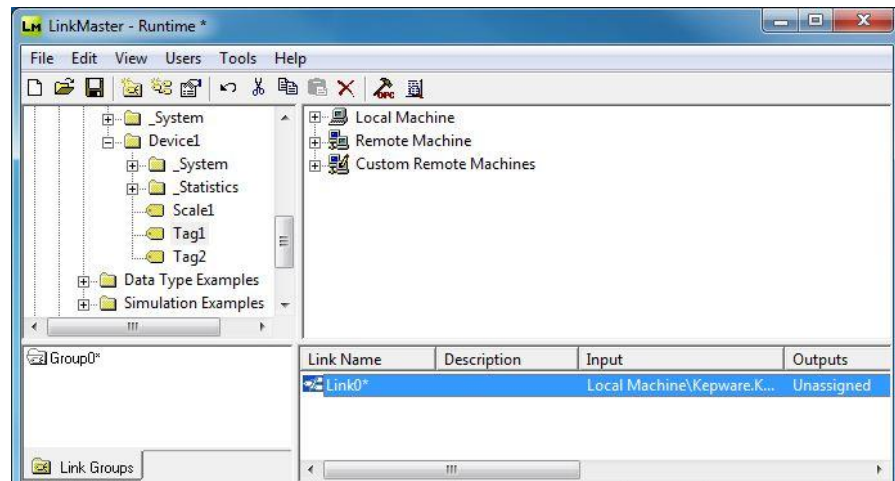


- Expand the device to display the available tags. If the tags are located at the device level in the server, they should be visible. If the tags are located in tag groups beneath the device, keep expanding until the tags are located.



- Browse to and select the desired tag. Press the left mouse button while dragging the tag to the Link Item pane then release it. In this example, "Tag_1" is selected.

● **Tip:** LinkMaster automatically creates a new link with the item as the input. This value is read from the target OPC server at the rate specified in the Link Group Properties.



5. If using LinkMaster to bridge two servers or devices, browse to and select the item to which the input value is written. Then, drag and drop the item on the newly created link.

- **Tip:** LinkMaster immediately starts writing the changing value to the output item.
- **Important:** Link items may be edited after creation to change name, input items, and output items (or to add a description or scaling).

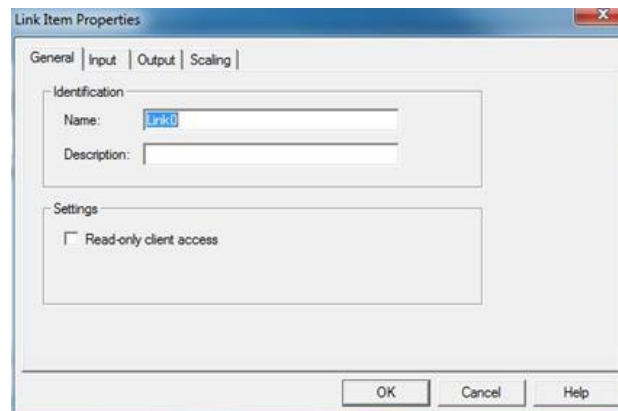
| Link Name | Description | Input | Outputs | Data Type | Raw Value | Scaled Value | Quality | Timestamp |
|-----------|----------------------------|-------------------------|-------------------------|-----------|-----------|--------------|----------|-----------|
| Link0* | Local Machine\Kepware.K... | Local Machine\Kepwar... | Local Machine\Kepwar... | Default | N/A | N/A | Unkno... | N/A |

Clients: 1 Item References: 0

2.3.2 Adding Link Items Manually

Users can also manually add Link Items to the Link Group. For more information, refer to the instructions below.

1. To start, select the Link Group.
 2. Next, add a new link by clicking **Edit | New Link**. Alternatively, click the **New Link** icon.
- **Tip:** The **Link Item Properties** displays the **General** tab. The new Link Item is given the next sequential default link name. This name can be changed any time.



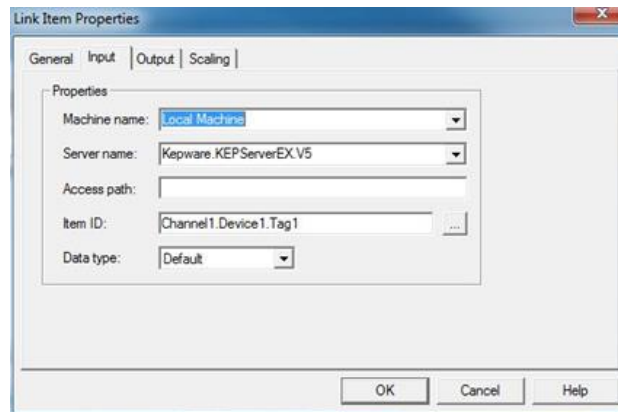
Descriptions of the parameters are as follows:

- **Name:** This parameter specifies a string up to 80 characters. It must be unique to the Link Group. For more information, refer to the LinkMaster help file.
- **Description:** This parameter specifies a string description up to 64 characters in length.
- **Read-only client access:** When checked, this option specifies whether the Link Item will be Read Only or Read/Write. When unchecked, this setting will allow client applications to change the Link Item's value. The default setting is unchecked.
- **Note:** Read Only access prevents client applications from changing the data contained in the Link Item's input and output tags.

2.3.3 Adding an Input to the Link Item

The Link Item Input defines the source of data that will be transferred to one or more output items. This value will be read from the target OPC server at the rate specified in the Link Group Properties. For more information, refer to the instructions below.

1. In **Link Item Properties**, open the **Input** tab.



2. Descriptions of the parameters are as follows:
 - **Machine Name:** This parameter is used to enter the local machine or a machine located on the local Ethernet network (if available). If the server is located on the same machine as LinkMaster, leave the setting as "Local Machine."
 - **Server Name:** This parameter is used to specify the OPC server that will be the data source. In this example, the input data is coming from KEPServerEX.
 - **Access Path:** This parameter is required by some OPC servers to complete an item's definition. For more information, refer to the OPC server's help documentation.
 - **Item ID:** This parameter specifies the OPC server's Item ID that will reference the data. If the server supports tag browsing, users can click the Browse icon to launch **Quick Browse**. After locating and selecting the

desired tag, the Item ID will be written to the Item ID field, and the data type will be changed to match the tag that was selected.

- **Data Type:** This parameter specifies the requested data type that should be used when communicating between the OPC server and LinkMaster. The data type should agree with the size and type of the register or memory location that is being addressed. Supported data types are as follows:

| Data Type | Description |
|----------------|---|
| Native | Default, as determined by the OPC server |
| Boolean | Single bit |
| Char | Signed 8-bit value |
| Byte | Unsigned 8-bit value |
| Short | Signed 16-bit value |
| Word | Unsigned 16-bit value |
| Long | Signed 32-bit value |
| DWord | Unsigned 32-bit value |
| Real | Single precision floating point value (32-bits) |
| Double | Double-precision floating point value (64-bits) |
| String | A null terminated character array |

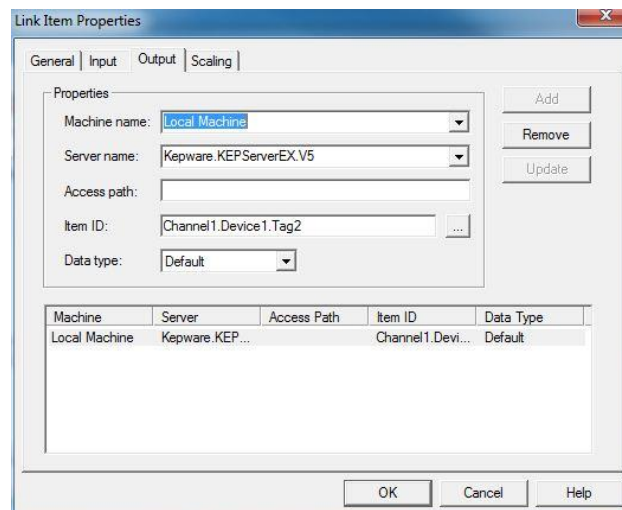
• **Tip:** All data types are available as array types.

3. Once complete, click **OK**.

2.3.4 Adding an Output to the Link Item

The Link Item Outputs defines one or more OPC items that will be written when the Input item changes. They should not be used if the LinkMaster project is being used to concentrate data into a single source.


1. In **Link Item Properties**, select the **Output** tab.
2. Enter the desired item in the Item ID field, and then, click **Add**.



Descriptions of the parameters are as follows:

- **Machine Name:** This parameter specifies the local machine or a machine located on the local Ethernet network (if available). If the server is located on the same machine as LinkMaster, leave the setting as "Local Machine."
- **Server Name:** This parameter specifies the OPC server that will be the data source. In this example, the Input data will be coming from KEPServerEX.
- **Access Path:** This parameter is required by some OPC servers to complete an item's definition. For more information on the access path, refer to the OPC server's help documentation.
- **Item ID:** This parameter specifies the OPC server item that will reference the data. If the server supports tag browsing, users can click the Browse icon to launch **Quick Browse**. For information on the correct Item Name syntax, refer to the server's help documentation.
- **Data Type:** This parameter specifies the requested data type that should be used when communicating between the OPC server and the OPC LinkMaster. The data type should agree with the size and type of the register or memory location being addressed. Supported data types are as follows:

| Data Type | Description |
|----------------|---|
| Native | Default, as determined by the OPC server |
| Boolean | Single bit |
| Char | Signed 8-bit value |
| Byte | Unsigned 8-bit value |
| Short | Signed 16-bit value |
| Word | Unsigned 16-bit value |
| Long | Signed 32-bit value |
| DWord | Unsigned 32-bit value |
| Real | Single precision floating point value (32-bits) |
| Double | Double-precision floating point value (64-bits) |
| String | A null terminated character array |

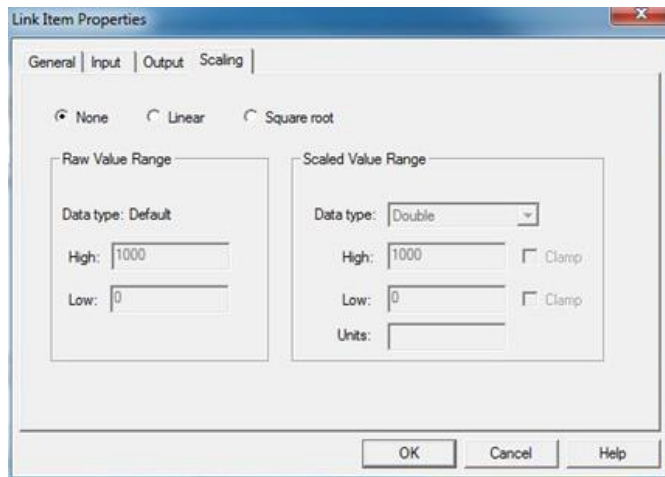
 **Tip:** All data types are available as array types.

2.3.5 Adding Scaling to a Link Item

LinkMaster supports Link Item Scaling, which allows raw input data from the server to be scaled to an appropriate range for the Link Output item or client application.

For example, a device that displays a temperature of 75.6 degrees on its panel may return that value as a raw integer of 756 when the temperature is read. The target output, however, may need that value as a floating point number. Scaling would read the raw input and then scale it to a floating point number.

Users can enable scaling operations for the Link Item by selecting either Linear or Square Root scaling.



Descriptions of the parameters are as follows:

- Raw Value Range:** This parameter specifies the range of raw data from the server. The valid range depends on the Link Item's data type. For example, if the data type is Short, the valid value range of the raw value will be -32768 to 32767. The Low and High raw values should match the values specified in the input server or device.
 - Note:** The raw high range must be greater than the raw low range.
- Scaled Value Range:** This parameter specifies the range of the resulting scaled value. The valid range depends on the data type of the scaled value. The default scaled data type is Double.
 - Note:** A scaled value is usually assumed to result in a floating-point value; however, LinkMaster does not make that assumption. The scaled value's data type can be set to any valid OPC data type. This provides users the ability to scale from a raw data type (such as Short) to an engineering value with a data type of Long.

2.4 Verifying the Link Item

Once one or more links have been created, users can verify the data by reading it as it changes. To do so, save the LinkMaster project so that it can be uploaded to the Runtime from the Configuration client. Once uploaded, users can view the Link Item's raw value and the scaled values (which will also be displayed if applied).

| Link Name | Description | Input | Outputs | Data Type | Raw Value | Scaled Value | Quality | Timestamp |
|-----------|-------------|----------------------------|-------------------------|-----------|-----------|--------------|---------|--------------|
| Link0 | | Local Machine\Kepware.K... | Local Machine\Kepwar... | Default | 33 | 33 | Good | 15:19:04:791 |

Clients: 1 | Item References: 5

2.5 Saving and Closing the Project

LinkMaster runs constantly. For information on saving the project, and stopping or closing LinkMaster, refer to the instructions below.

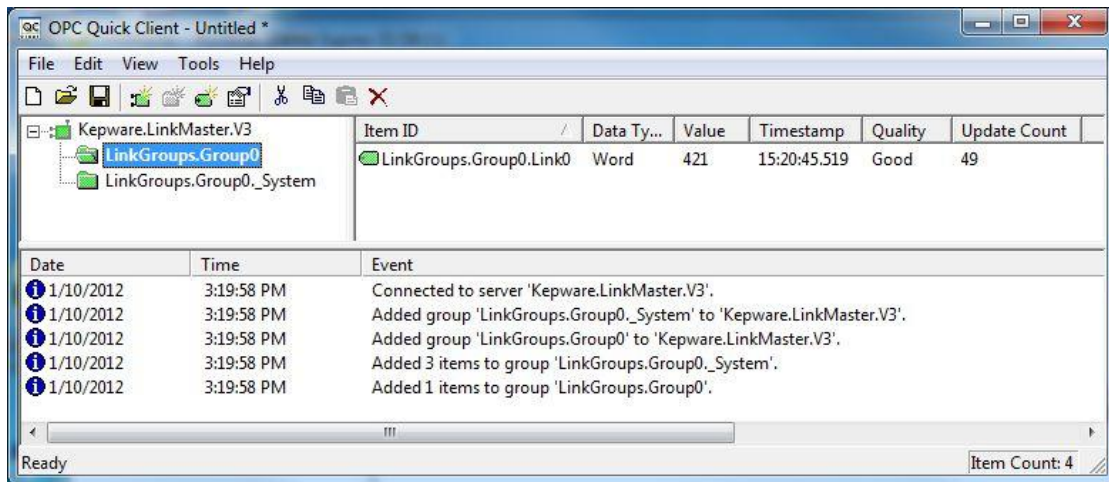
- To save a copy of the default project, click **File | Save As**.
- To close and stop LinkMaster, click **File | Exit and ShutDown**.

- To keep LinkMaster running but close the configuration, click **File | Exit**.
- Tip:** Any project that is loaded to the Runtime is loaded as the default ("default.Imf") project. Clicking **Save** loads the configuration project to the Runtime and rename it as default. To save named versions of the project, users must click **Save As**.

3. Using LinkMaster as an OPC Server

LinkMaster can also be used to concentrate data from multiple servers into a single data source (or to throttle client poll rates). For example, open LinkMaster and select the **Launch OPC Client** icon. This invokes the OPC Quick Client and automatically generates a project from the groups and items available in LinkMaster.

- Tip:** The OPC Quick Client has several groups that are not visible in the LinkMaster project. These groups contain system-level information specific to the Link Group and Link Item. *For more information, refer to the LinkMaster help file.*



4. Summary

At this point, users should have a better understanding of how to establish a connection between the KEPServerEX OPC server and Kepware's LinkMaster OPC Bridge.