

GE Ethernet Global Data Driver Help

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GE Ethernet Global Data Driver Help

Help version 1.035

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Overview

The GE Ethernet Global Data (EGD) Driver provides an easy and reliable way to connect GE Ethernet Global Data (EGD) devices to OPC Client applications, including HMI, SCADA, Historian, MES, ERP and countless custom applications.

Device Setup

Supported Devices

GE devices that support EGD transactions. These devices require CPU-364 or higher.
Any device that supports the EGD protocol.

Ethernet Global Data

Ethernet Global Data is a communications protocol developed by GE in 1998. It allows a device (the Producer) to transfer data to other devices (the Consumers) on the network. Applications that require high-speed networking and coordination from PLC to PLC (or PLC to GE Variable Frequency Drives) can take advantage of EGD. It is up to ten times more efficient on bandwidth utilization than the normal polling system.

Server Project Channel Setup

When setting up a server project for this driver, it is recommended that users only include one channel. If more than one channel is used in a server project, each channel must be configured to bind to a unique network adapter.

Communication Protocol

Ethernet using Winsock V1.1 or higher.

Device ID

This arbitrary field is not used by the driver.

Connection Timeout

This parameter specifies the time that the driver will wait for a connection to be made with a device. Depending on network load, the connect time may vary with each connection attempt. The valid range is 1 to 60 seconds. The default setting is 3 seconds.

Request Timeout

This parameter specifies the time that the driver will wait on a response from the device before giving up and going on to the next request. Longer timeouts only affect performance if a device is not responding. The valid range is 100 to 30000 milliseconds. The default setting is 1000 milliseconds.

Retry Attempts

This parameter specifies the number of times the driver will retry a message before giving up and going on to the next message. The valid range is 1 to 10. The default setting is 3.

See Also: [Name Resolution](#) and [Exchange Configuration](#).

Cable Diagrams

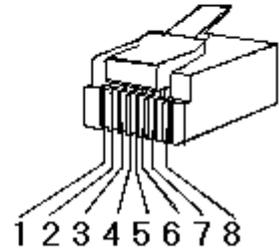
The following diagram illustrates the cable connections that are required to communicate with the GE EGD device.

Patch Cable (Straight Through)

TD + 1	OR/WHT	OR/WHT	1 TD +
TD - 2	OR	OR	2 TD -
RD + 3	GRN/WHT	GRN/WHT	3 RD +
4	BLU	BLU	4
5	BLU/WHT	BLU/WHT	5
RD - 6	GRN	GRN	6 RD -
7	BRN/WHT	BRN/WHT	7
8	BRN	BRN	8

RJ45 RJ45

10 BaseT



Crossover Cable

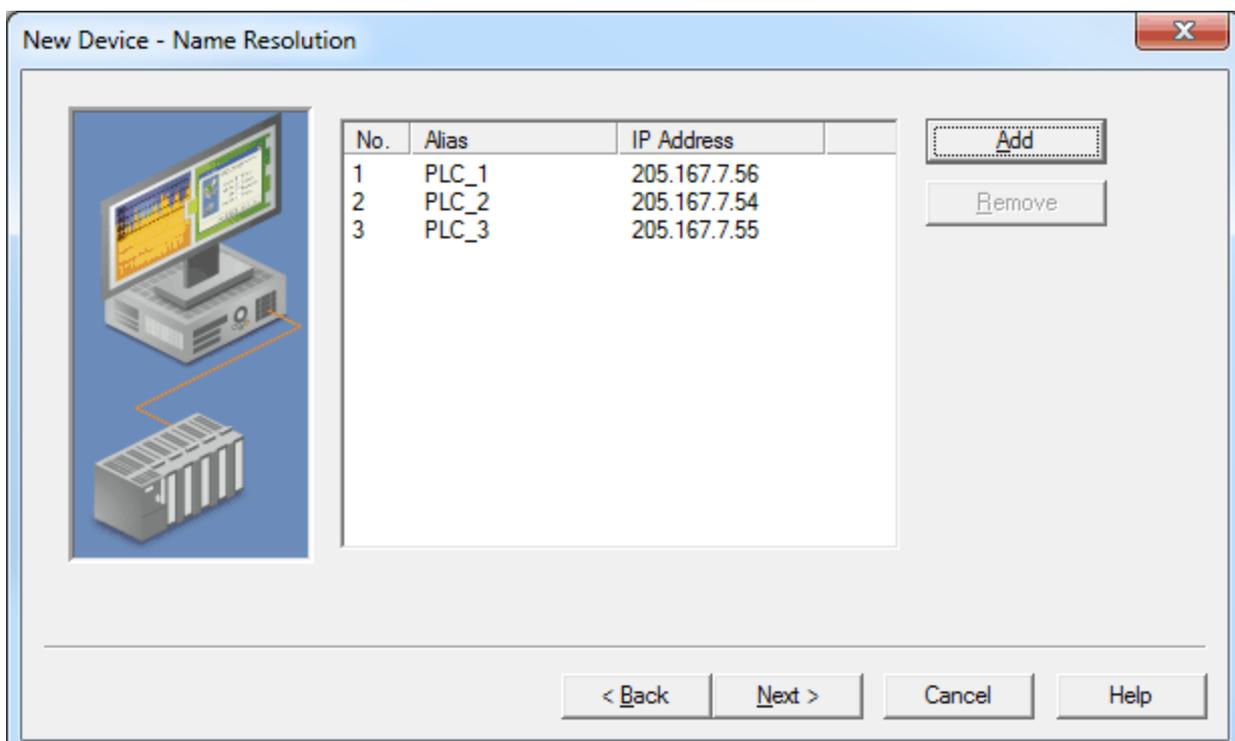
TD + 1	OR/WHT	GRN/WHT	1 TD +
TD - 2	OR	GRN	2 TD -
RD + 3	GRN/WHT	OR/WHT	3 RD +
4	BLU	BLU	4
5	BLU/WHT	BLU/WHT	5
RD - 6	GRN	OR	6 RD -
7	BRN/WHT	BRN/WHT	7
8	BRN	BRN	8

RJ45 RJ45

8-pin RJ45

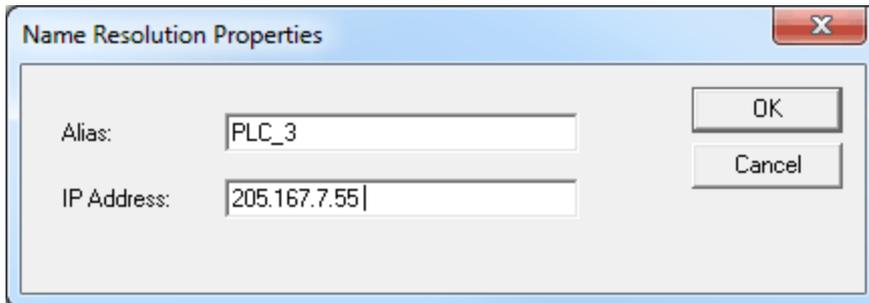
Name Resolution

This dialog is used to assign logical names to IP addresses for EGD Producer Exchanges. For access after device creation, right-click on the device and then select **Properties | Name Resolution**.



Adding a New Alias

1. In **Name Resolution**, click **Add**.
2. In **Alias**, enter an alias name.
3. In **IP Address**, enter an IP address to perform mapping.



4. Once finished, click **OK**.

Note: To remove an entry from the list, select an entry and then click **Remove**.

See Also: [Exchange Configuration](#)

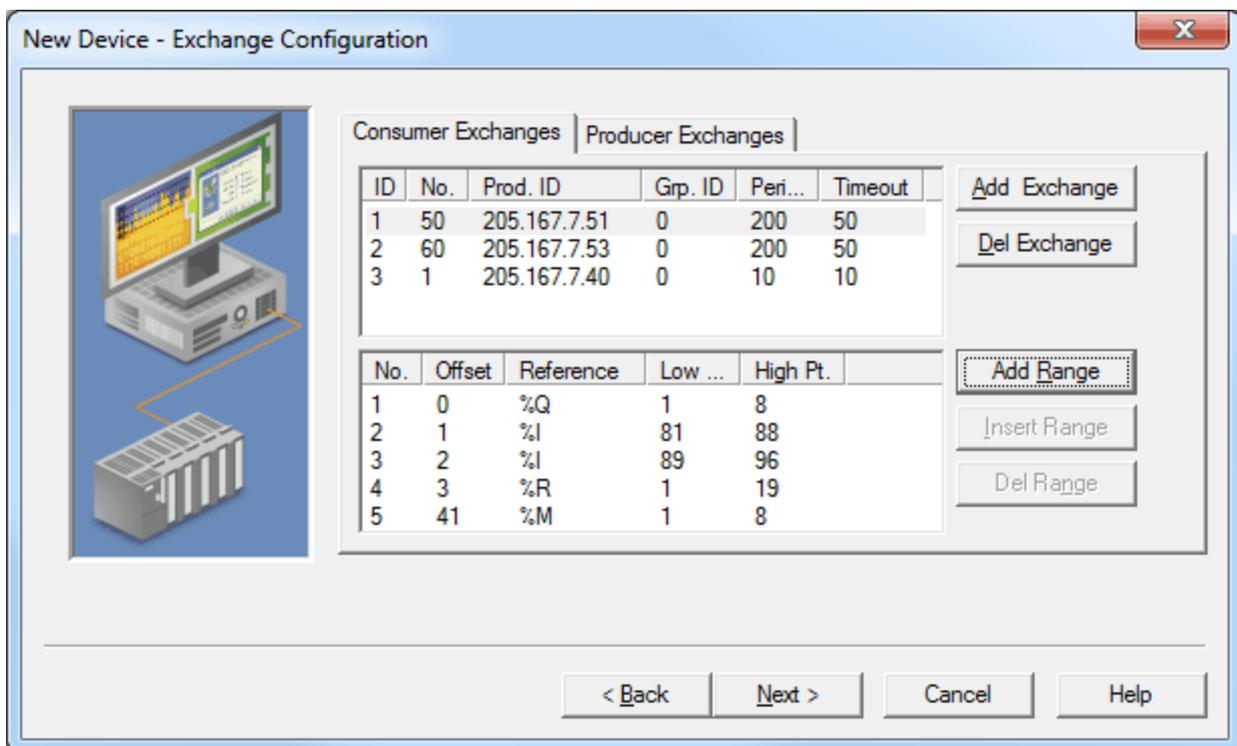
Exchange Configuration

Consumer and producer exchanges can be configured within the GE Ethernet Global Data Driver. They must match the exchanges configured in the producing/consuming GE EGD Devices.

Consumer Exchanges

A consumer exchange defines an exchange that will be consumed by the GE EGD Driver. It is configured in a GE EGD device as a producer exchange with a consumed address equal to the IP address of the machine running the device driver. To configure a consumer exchange, right-click on the device and select **Properties | Exchange Configuration**.

Note: For information on Device Properties, refer to the server help file.

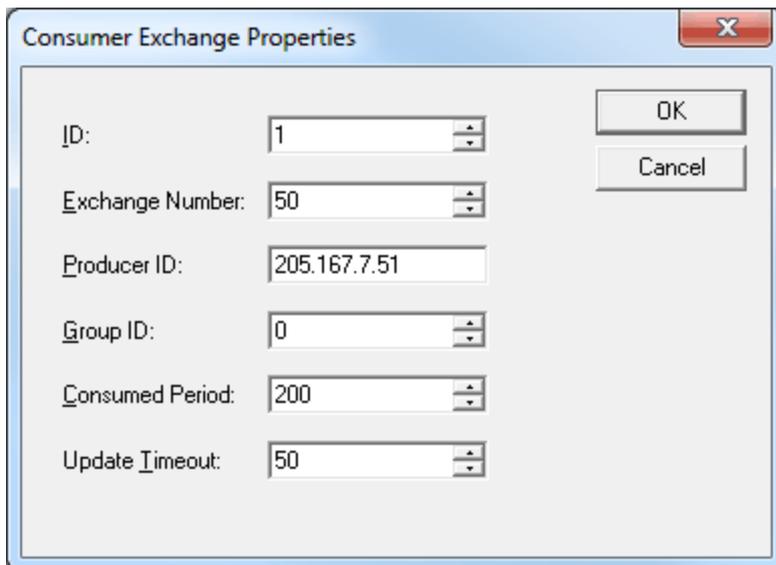


Descriptions of the parameters are as follows:

- **ID:** This parameter specifies a user-defined Exchange ID number that will be used when defining tags to reference the exchange. It allows users to change the exchange parameters without reconfiguring the pre-existing tags. The default setting is 0. For more information, refer to [Address Descriptions](#).
- **Exchange Number:** This parameter specifies the exchange number. It must match the exchange number of the producing node. The default setting is 0.
- **Producer ID:** This parameter specifies the IP address of the producing node. The default setting is blank.
- **Group ID:** This parameter specifies the multicast group ID for when there is more than one consumer receiving the same exchange. The default setting is 0.
- **Consumed Period:** This parameter specifies the time interval in which the consuming node should receive updates from the producing node. The default setting is 10 milliseconds.
- **Update Timeout:** This parameter specifies the timeout after which the consumer will declare an error if a consumed exchange is not received. The default setting is 10 milliseconds.

Defining a New Consumer Exchange

To define a new consumer exchange, click **Add Exchange**.



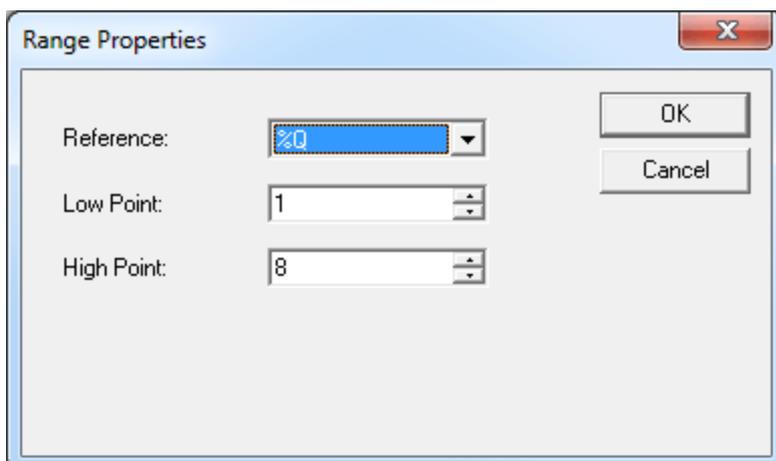
The screenshot shows a dialog box titled "Consumer Exchange Properties" with a close button (X) in the top right corner. The dialog contains six input fields, each with a label and a value:

ID:	1
Exchange Number:	50
Producer ID:	205.167.7.51
Group ID:	0
Consumed Period:	200
Update Timeout:	50

On the right side of the dialog, there are two buttons: "OK" and "Cancel".

Defining Range Properties

To define a new range, select an exchange and then click **Add Range**. To edit a previously created range, simply double-click on it.



The screenshot shows a dialog box titled "Range Properties" with a close button (X) in the top right corner. The dialog contains three input fields, each with a label and a value:

Reference:	%0
Low Point:	1
High Point:	8

On the right side of the dialog, there are two buttons: "OK" and "Cancel".

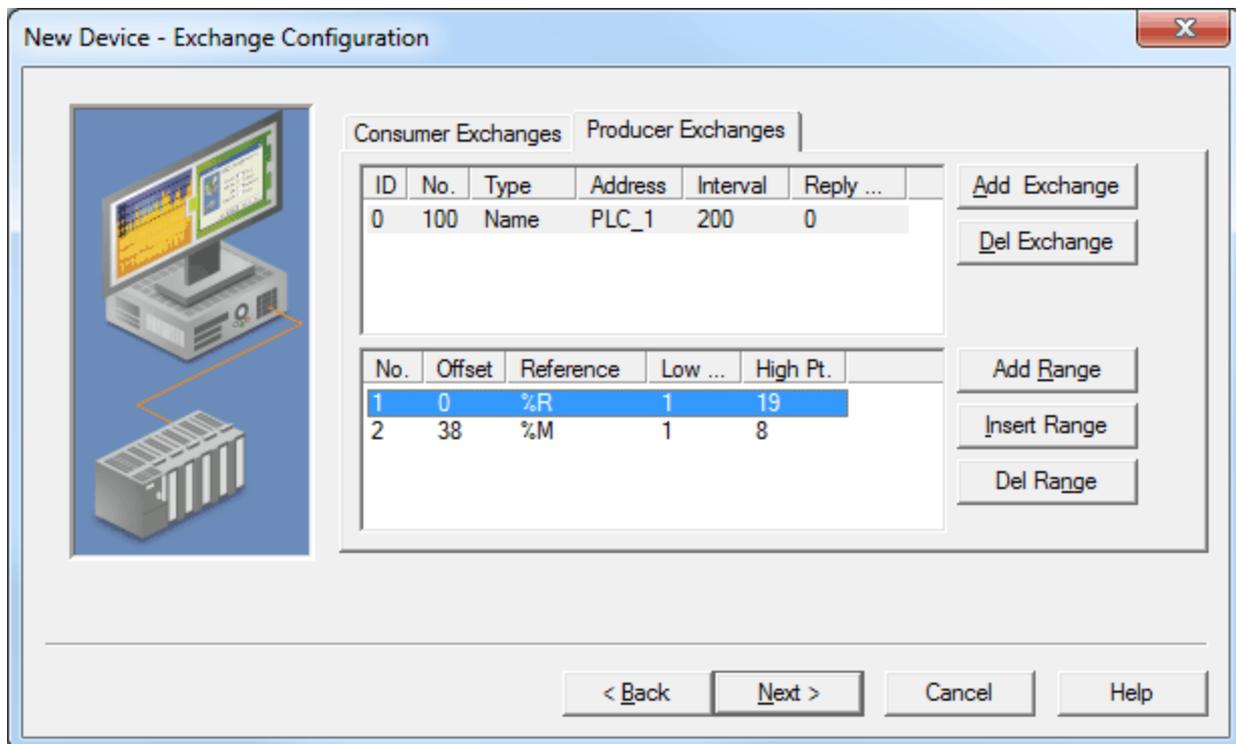
Descriptions of the parameters are as follows:

- **Reference:** This parameter specifies the memory type mnemonic corresponding to the type of data being transferred. The default setting is %AI.
- **Low Point:** This parameter specifies the starting address offset. The default setting is 0.
- **High Point:** This parameter specifies the ending address offset. The default setting is 0.

Note: The total amount of range data for an exchange cannot exceed 1400 bytes.

Producer Exchange

A producer exchange defines an exchange that will be produced by the GE Ethernet Global Data Driver. It will be configured in a GE EGD device as a consumer exchange with a producer address equal to the IP address of the machine running the device driver. To configure a producer exchange, right-click on the device and then select **Properties | Exchange Configuration**.



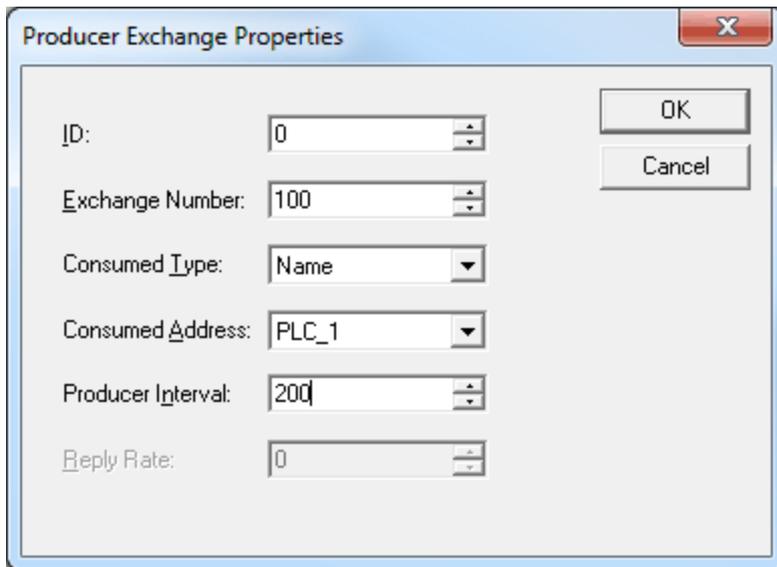
Descriptions of the parameters are as follows:

- **ID:** This parameter specifies a user-defined Exchange ID number that will be used when defining tags to reference the exchange. It allows users to change the exchange parameters without reconfiguring pre-existing tags. The default setting is 0. For more information, refer to [Address Descriptions](#).
- **Exchange Number:** This parameter specifies the exchange number. It must match the exchange number of the consuming node. The default setting is 0.
- **Consumed Type:** This parameter specifies the type of consumer address defined in the following field. Options include Group ID, IP, and Name. The default setting is IP.
- **Consumed Address:** This parameter specifies the consumer address. When the Consumed Type is Name, the address will be a name defined in the Name Resolution dialog. When the Consumed Type is IP, the address will be an IP address in dotted decimal form (XXX.XXX.XXX.XXX). When the Consumed Type is Group ID, the address will specify the multicast Group ID.
- **Producer Interval:** This parameter specifies the time interval in which the GE Ethernet Global Data Driver should produce data and send it to the consuming nodes. The default setting is 10 milliseconds.
- **Reply Rate:** This parameter is currently not used.

See Also: [Name Resolution](#)

Defining a New Producer Exchange

To add a new producer exchange, click **Add Exchange**.



Producer Exchange Properties

ID: 0

Exchange Number: 100

Consumed Type: Name

Consumed Address: PLC_1

Producer Interval: 200

Reply Rate: 0

OK

Cancel

Data Types Description

Data Type	Description
Boolean	Single bit
Byte	Unsigned 8 bit value bit 0 is the low bit bit 7 is the high bit
Char	Signed 8 bit value bit 0 is the low bit bit 6 is the high bit bit 7 is the sign bit
Word	Unsigned 16 bit value bit 0 is the low bit bit 15 is the high bit
Short	Signed 16 bit value bit 0 is the low bit bit 14 is the high bit bit 15 is the sign bit
DWord	Unsigned 32 bit value bit 0 is the low bit bit 31 is the high bit
Long	Signed 32 bit value bit 0 is the low bit bit 30 is the high bit bit 31 is the sign bit
BCD	Two byte packed BCD Value range is 0-9999. Behavior is undefined for values beyond this range.
LBCD	Four byte packed BCD Value range is 0-99999999. Behavior is undefined for values beyond this range.
Float	32 bit floating point value. The driver interprets two consecutive 16 bit registers as a floating point value by making the second register the high word and the first register the low word.
Double	64 bit floating point value

Address Descriptions

The Consumer Exchange format is *Cx:r:MMyyyyy*. The Producer Exchange format is *Px:r:MMyyyyy*. Descriptions of the syntax are as follows:

- **C**: This defines a consumer exchange.
- **P**: This defines a producer exchange.
- **x**: This defines the Exchange ID.
- **r**: This defines the Range Number.
- **MM**: This defines the Memory Type Mnemonic.*
- **yyyyy**: This defines the Memory Address.*

*For more information, refer to "Addressing" below.

See Also: [Exchange Configuration](#)

Addressing

This driver supports the following memory type, mnemonics, and address ranges. The actual number of addresses for each type depends on the GE Ethernet Global Data Exchange Configuration. The default data types for dynamic tags are shown in **bold**. Consumer exchange references are Read Only, whereas Producer exchange references are Read/Write.

Note: The total amount of range data for an exchange cannot exceed 1400 bytes.

Description	Memory Type and Range	Data Type*
Discrete Inputs	I0001 to I32760 I0001 to I32753 (every 8th bit) I0001 to I32745 (every 8th bit) I0001 to I32729 (every 8th bit)	Boolean Byte Word, Short, BCD DWord, Long, Float, LBCD
Discrete Outputs	Q0001 to Q32760 Q0001 to Q32753 (every 8th bit) Q0001 to Q32745 (every 8th bit) Q0001 to Q32729 (every 8th bit)	Boolean Byte Word, Short, BCD DWord, Long, Float, LBCD
Discrete Globals	G0001 to G32760 G0001 to G32753 (every 8th bit) G0001 to G32745 (every 8th bit) G0001 to G32729 (every 8th bit)	Boolean Byte Word, Short, BCD DWord, Long, Float, LBCD
Internal Coils	M0001 to M32760 M0001 to M32753 (every 8th bit) M0001 to M32745 (every 8th bit) M0001 to M32729 (every 8th bit)	Boolean Byte Word, Short, BCD DWord, Long, Float, LBCD
Temporary Coils	T0001 to T32760 T0001 to T32753 (every 8th bit) T0001 to T32745 (every 8th bit) T0001 to T32729 (every 8th bit)	Boolean Byte Word, Short, BCD DWord, Long, Float, LBCD
Status References (Same for SB, SC)	SA0001 to SA32760 SA0001 to SA32753 (every 8th bit) SA0001 to SA32745 (every 8th bit) SA0001 to SA32729 (every 8th bit)	Boolean Byte Word, Short, BCD DWord, Long, Float, LBCD
Register References	R0000 to R32767 R0000 to R32766 R0000 to R32764	Word , Short, BCD DWord, Long, LBCD, Float Double
Analog Inputs	AI0000 to AI32767 AI0000 to AI32766 AI0000 to AI32764	Word , Short, BCD DWord, Long, LBCD Float Double
Analog Outputs	AQ0000 to AQ32767 AQ0000 to AQ32766 AQ0000 to AQ32764	Word , Short, BCD DWord, Long, LBCD Float Double

*The default data type Boolean will become a Byte when an array specification is given.

Array Support

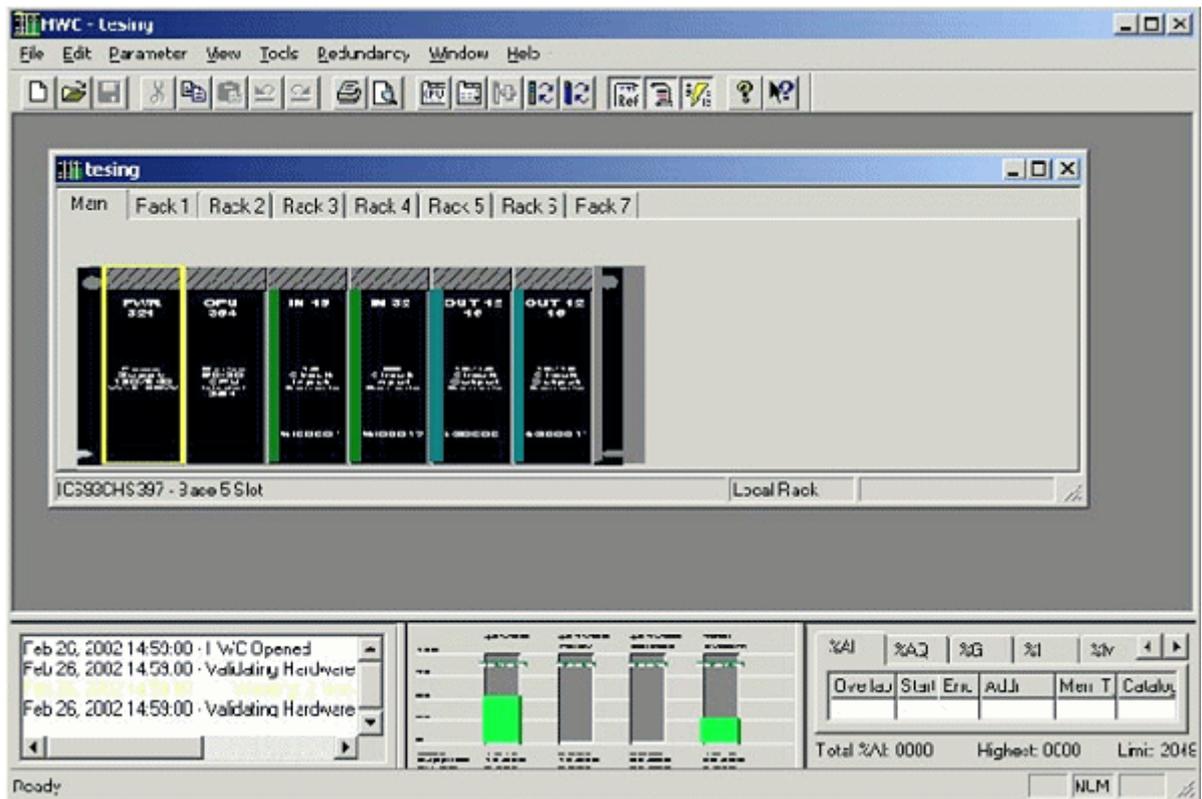
An array is a collection of contiguous elements of a given data type. The maximum array size is 16 Doubles, 32 DWords (Longs, Floats), 64 Words (Shorts), or 128 Bytes for a total of 1024 bits. The following data types support arrays: Byte, Word, Short, DWord, Long, Float, and Double. For examples on how to specify an array, refer to the table below.

'P50:2:M1' references internal coil 1 which is defined in range 2 of producer exchange 50.	
'C100:3:R2' references register 2 which is defined in range 3 of consumer exchange 100.	
'C1:2:G1 [4]' includes the following byte addresses:	G1,G9,G17,G25 1 row implied = 4 bytes 4 x 8 (byte) = 32 total bits
Note: G25 indicates the fourth byte beginning at bit 25.	
'P2:1:R16 [3][4]' includes the following Word addresses:	R16,R17,R18,R19 R20,R21,R22,R23 R24,R25,R26,R27 3 rows x 4 columns = 12 words 12 x 16 (word) = 192 total bits

Configuring EGD in VersaPro and the OPC Server

The example below uses VersaPro v2.01.

1. To start, launch VersaPro. Then, click **File | New Folder**.
2. Next, name the project and then click **Finish**. Alternatively, if a project already exists, click **File | Open Folder**. Then, locate and open the project.
3. The hardware modules on the GE 90-30 PLC must be configured first in the **Hardware Configuration Utility** that is included with VersaPro. To do so, double-click on **Hardware Configuration** in the **Folder Browser**.



4. Once finished, open the **Ethernet** tab in the CPU's configuration window. Then, set the following parameters:
 - **Adapter Name:** This parameter specifies the PLC during EGD configuration in VersaPro. It may be named as desired.
 - **IP Address**
 - **Subnet Mask**
 - **Gateway IP Address**
 - **Status Address:** This parameter specifies the start of an 80 bit global status area. It may be 80 consecutive single-bit locations or 5 consecutive 16 bit registers, and may kept at the default setting.

Note: Users should be aware of this address so that there are no later attempts to allocate something else in that same register space.
5. Once the hardware configuration is complete, save it to disk. Then, return to VersaPro and select **Tools | Communications Setup** to invoke the **Communication Configuration Utility**.
6. Ensure that the PLC is listed in this utility with the correct IP address. If it is not, add the PLC using **Port ENET**. Then, click **OK** to save the changes and exit the communication configuration utility.

7. In VersaPro, click **PLC | Connect** to test the PLC's connectivity. Once established, click **Edit | Rack Operations | Ethernet Global Data**.

Ethernet Global Data

Produced Exchanges | Consumed Exchanges

Exchanges:

Exchange ...	Adapter Name	Cons Type	Cons Address	Send Type	Prod Period	Reply R
1	Station1	IP Address	192.168.111.43	Always	200	C

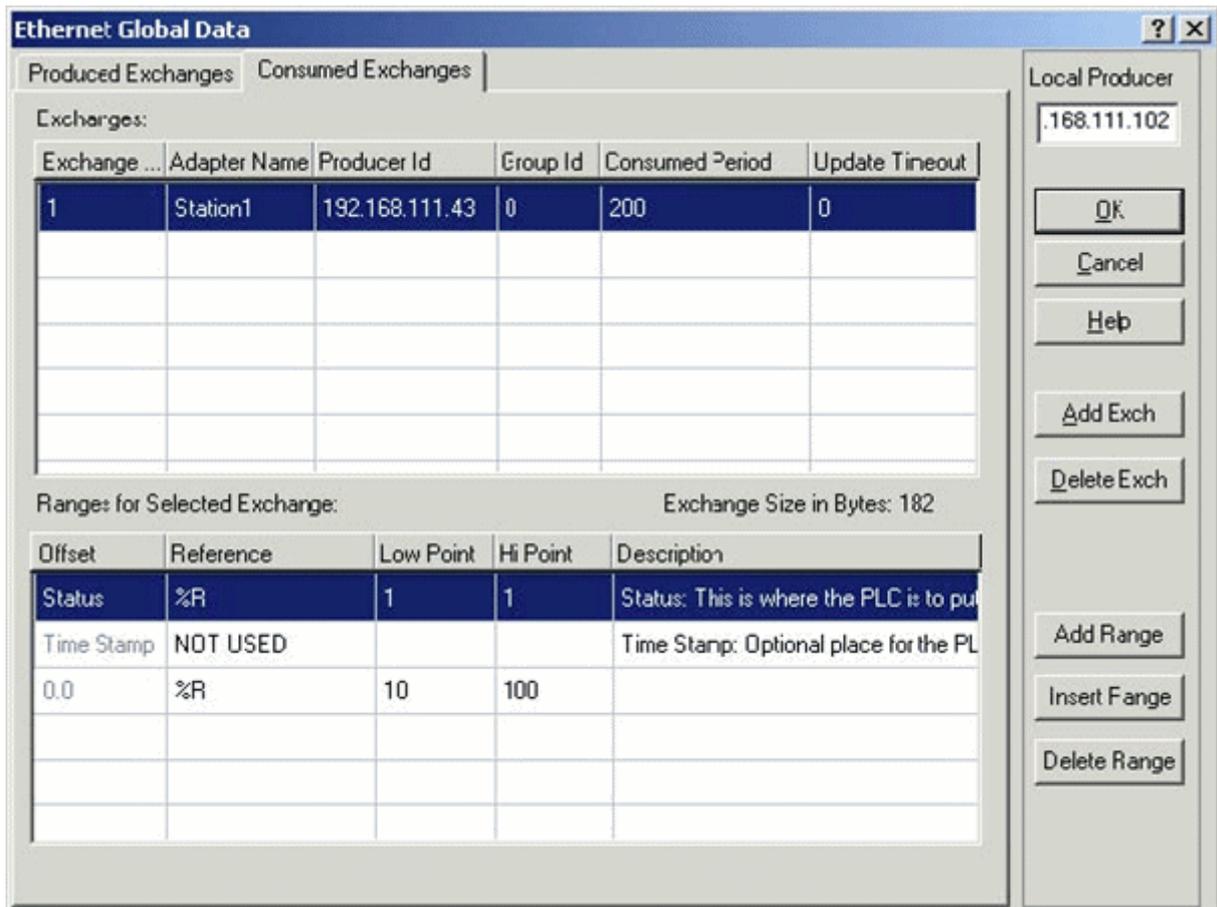
Local Producer: .168.111.102

Buttons: OK, Cancel, Help, Add Exch, Delete Exch, Add Range, Insert Range, Delete Range

Local Producer Identifier: A unique number (in IP Address Format) to identify the PLC

8. In **Produced Exchanges**, complete the following:
- Enter the PLC's IP address in **Local Producer**.
 - Click on **Add Exch** to make a new exchange.
 - In **Exchange ID**, enter 1.
 - In **Cons Address**, enter the IP address of the PC running the OPC server.
 - In **Prod Period**, specify how often the PLC will send the data to the consumers in milliseconds. The consumers (or OPC Server) must be set to receive data at this same period.
 - Define a 16 bit Exchange Status Area. In this example, %R2 has been selected. Users must ensure that this status area does not overlap the global status area already defined. After the exchange status area is defined, add the ranges of data that the PLC will produce.

9. When all is finished, click the **Consumed Exchanges** tab.

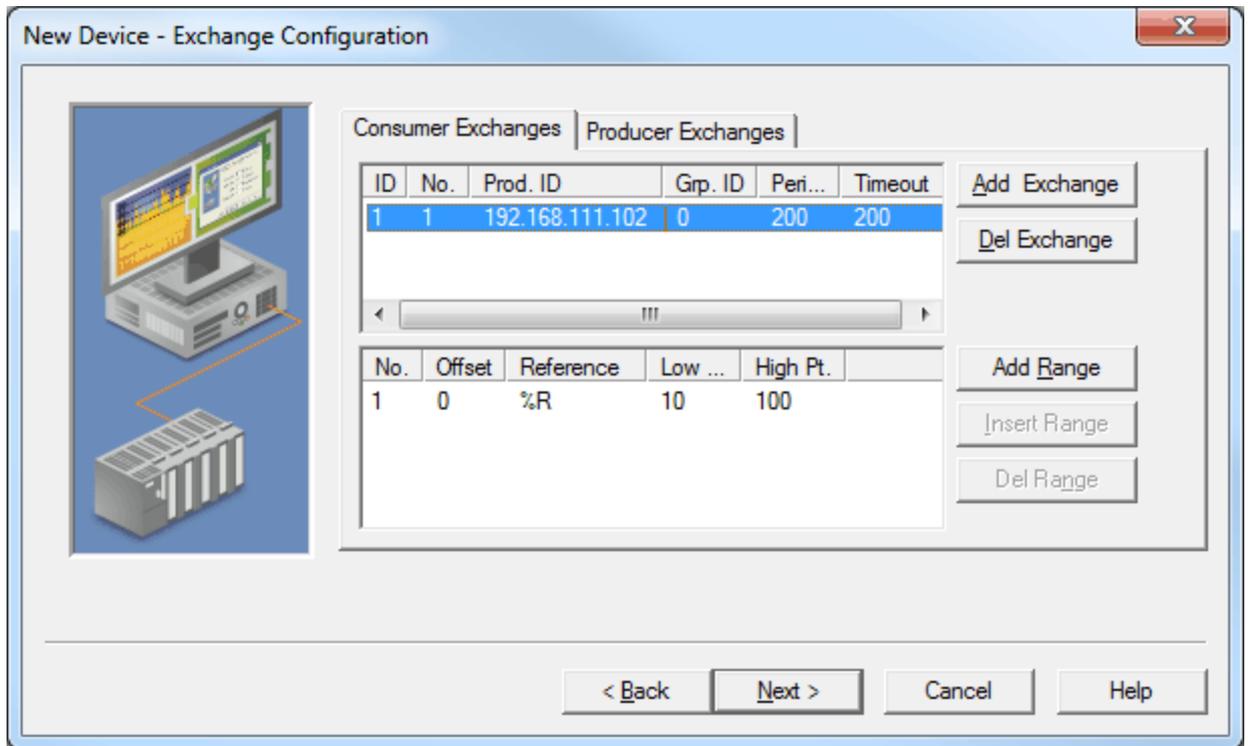


10. In **Consumed Exchanges**, complete the following:
- Match the Producer ID with the IP address of the PC running the OPC Server.
 - In **Consumed Period**, specify how often the PLC will expect the data from the Producer. The Producer (or OPC Server) must be set to send data at this same period.
 - Define a 16 bit Status Area. In this example, %R1 has been selected.
- Note:** In this example, the data ranges are set to match those in the Produced Exchanges screen. That is, a bi-directional transfer of this register range is set up over EGD. This causes the Hardware Configuration Utility to display non-fatal warnings that the ranges in the producer and consumer exchanges are overlapping. These warnings may be ignored because they would not appear if the register range was only set to be produced or consumed.
11. Once the parameters are set, click **OK**.
12. In VersaPro, click **PLC | Store** to download the configuration to the PLC. Then, turn on **Store Hardware Configuration and Motion to the PLC** and click **OK**.
13. Next, click **PLC | Run** to start the program in the PLC.

Note: In order to communicate using EGD, the PLC must be in "Enabled" mode (outputs enabled).

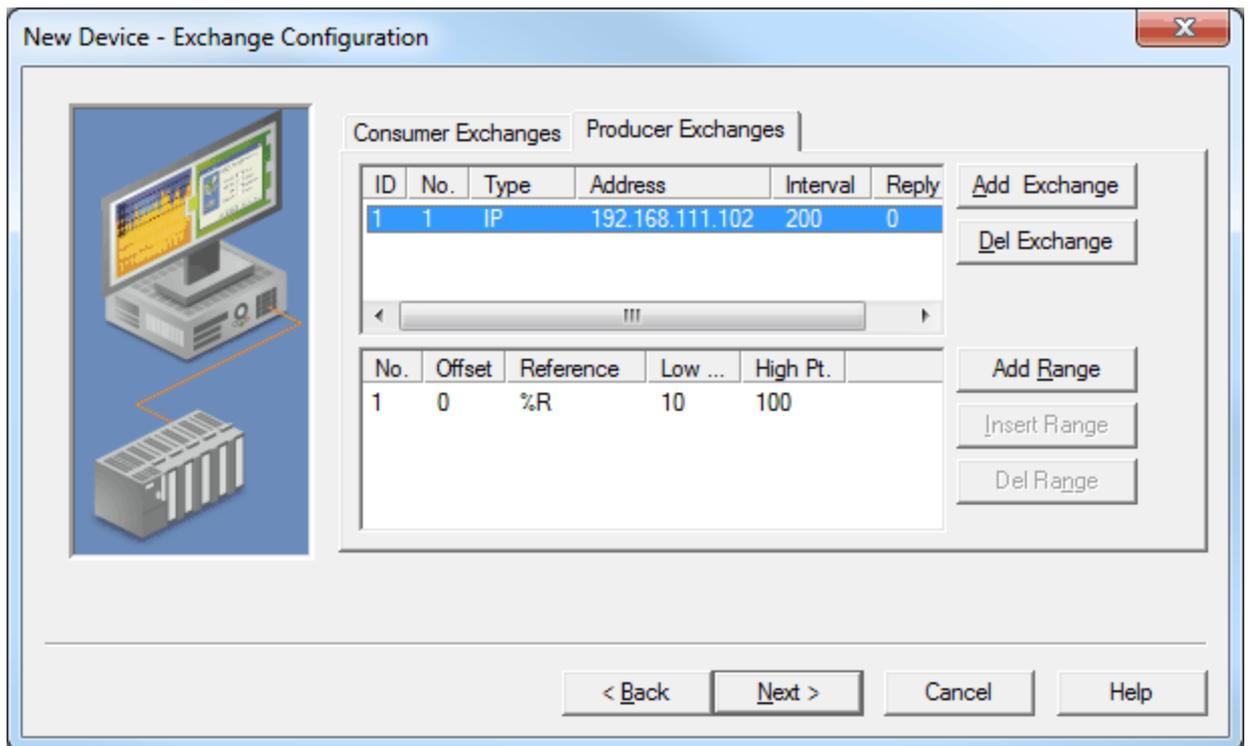
Configuring EGD in the OPC Server

1. To start, create a new OPC Server project.
2. Then, add a new channel. In **Device Driver**, select **GE Ethernet Global Data** from the drop-down menu. Continue through the Channel Wizard, specifying the channel settings as desired. Once complete, click **Finish**.
3. Next, add a new device. Accept the default settings until reaching the **Exchange Configuration** dialog.
4. Open the **Consumer Exchanges** tab.



5. Then, click **Add Exchange** and specify the following:
 - **ID:** 1.
 - **Exchange Number:** 1.
 - **Producer ID:** The IP address of the PLC.
 - **Consumed Period:** This value must match the "Prod. Period" value entered in VersaPro.
 - **Update Timeout:** A minimum setting of 100 milliseconds is suggested. In this example, 200 milliseconds is used.
6. Next, select the newly added exchange and then click **Add Range**. Add the address range that was specified in VersaPro. The status area does not need to be defined.

- Open the **Producer Exchanges** tab.



- Then, click **Add Exchange** and specify the following:
 - ID:** 1.
 - Exchange Number:** 1.
 - Consumed Type:** The IP.
 - Producer Interval:** This value must match the Consumed Period value entered in VersaPro.
 - Consumed Address:** IP address of the PLC.
- Next, select the newly added exchange and then click **Add Range**. Add the address range that was specified in VersaPro. The status area does not need to be defined.
- Click **Next | Finish**.
- Then, save the project.
- In the OPC Server, "Channel1" and "Device1" should now be visible. Right-click on "Device1," and then select **Properties | Database Creation**.
- Next, click **Auto Create**. Then, press **OK**.

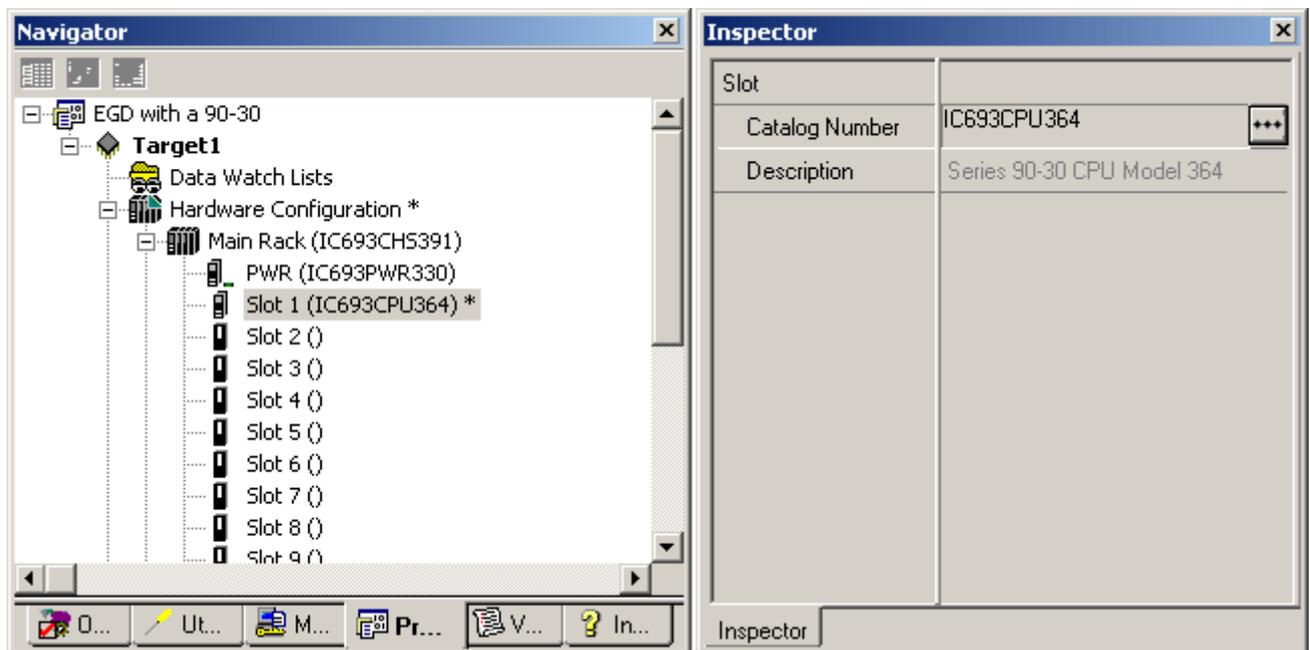
Note: To display the newly-added tag groups for the consumer and producer exchanges, click on the plus sign located to the left of "Device1" to expand it. The tag groups will contain tags that correspond to the ranges that were set in VersaPro.
- Launch the OPC Quick Client. Good values should be displayed in both tag groups.

Configuring EGD in GE Proficy Machine Edition

The example below uses GE Proficy version 6.0. The PLC's IP address is 192.168.0.0 and the OPC server's IP address is 192.168.0.99.

1. To start, open GE Proficy. Then, use the project templates to create a new, generic project for a GE Series 90-30 PLC.
2. In the **Navigator** window, open the **Project** tab to display the Project tree and select a CPU.
3. Under **Hardware Configuration**, select **Main Rack (IC693CHS391)**. Then, click **Slot1 (IC693CPU3xx)** to display the CPU's properties in the **Inspector** window.

Note: When an item is selected in the Navigator's Project tree, its properties will become visible in the Inspector window. Both the Navigator and Inspector windows float in the main GE Proficy window.

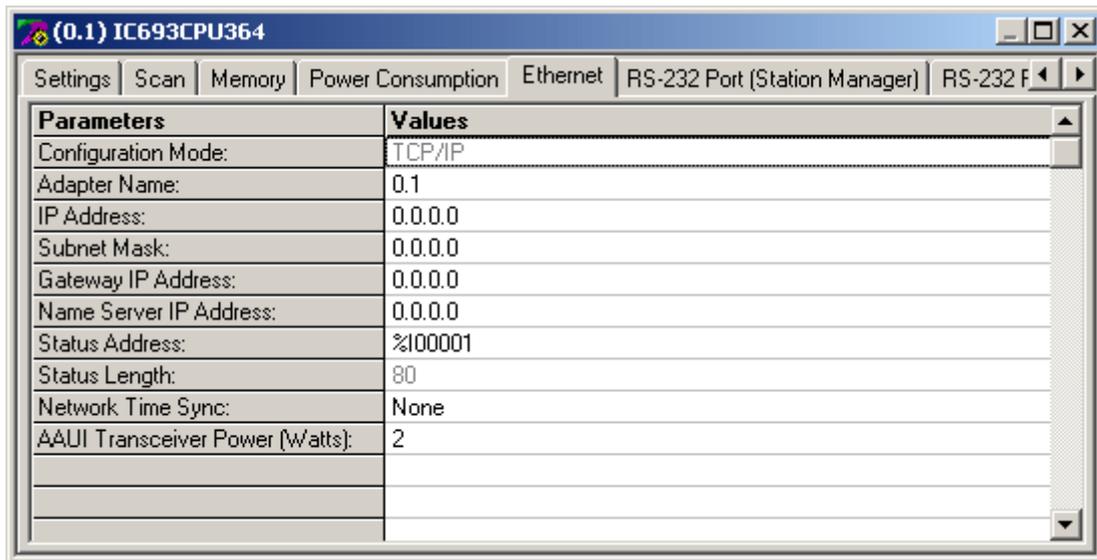


Note: A default catalog number will be displayed (such as "IC693CPU374"). For more options, click the **Selection** icon and then choose the desired CPU. In this example, "IC693CPU364" is used.

4. Next, select a power supply for the project. To do so, locate **Main Rack (IC693CHS391)** and then click **PWR (IC693PWR3xx)** to display the power supply's properties in the Inspector window.

Note: A default catalog number will be displayed (such as "IC693PWR330"). For more options, click **Selection** and then choose the desired power supply. In this example, "IC693PWR321" is used.

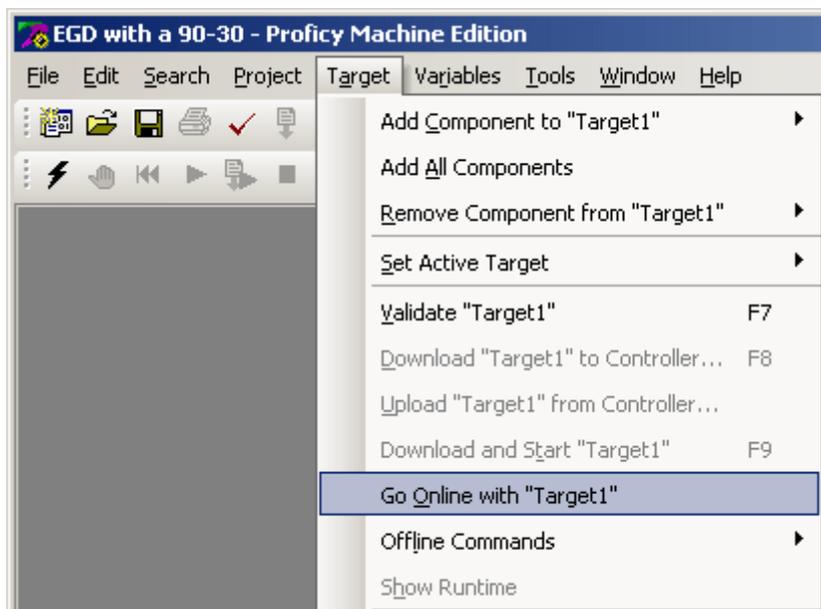
5. Select modules as needed for the remaining slots under Main Rack. Then, configure the CPU. In the project tree, under **Hardware Configuration | Main Rack (IC693CHS391)**, double-click on **Slot1 (IC693CPU364)** to display the CPU's configuration window.



Note: Almost all of the entries in the **Ethernet** tab will be defaulted to zeros.

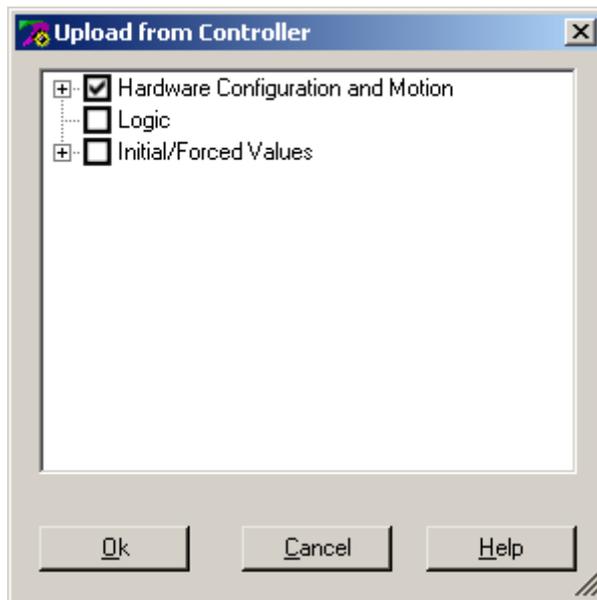
Important: It is strongly recommended that the PLC's pre-existing CPU configuration be uploaded into Proficy instead of entered manually. To do so, a serial connection is required between the PLC and the computer that is running Proficy. Use the PLC's SNP port and an SNP cable for the upload. For more information on uploading the CPU configuration, refer to the instructions below.

1. To get online with the PLC, click the lightning bolt icon in the menu bar. Alternatively, open **Target** at the top of the Proficy screen and then select **Go online with "Target1"**.



Note: A connection will be established after several seconds. If the PLC's configuration does not match the Proficy project's configuration, a red cross will appear over "Target1" in the project tree. This cross is informational and should not cause concern.

2. In the **Target** drop-down menu, select **Upload "Target1" from controller**.
3. In **Upload from Controller**, check **Hardware Configuration and Motion**. Leave the remaining two options unchecked. Once finished, click **OK**.



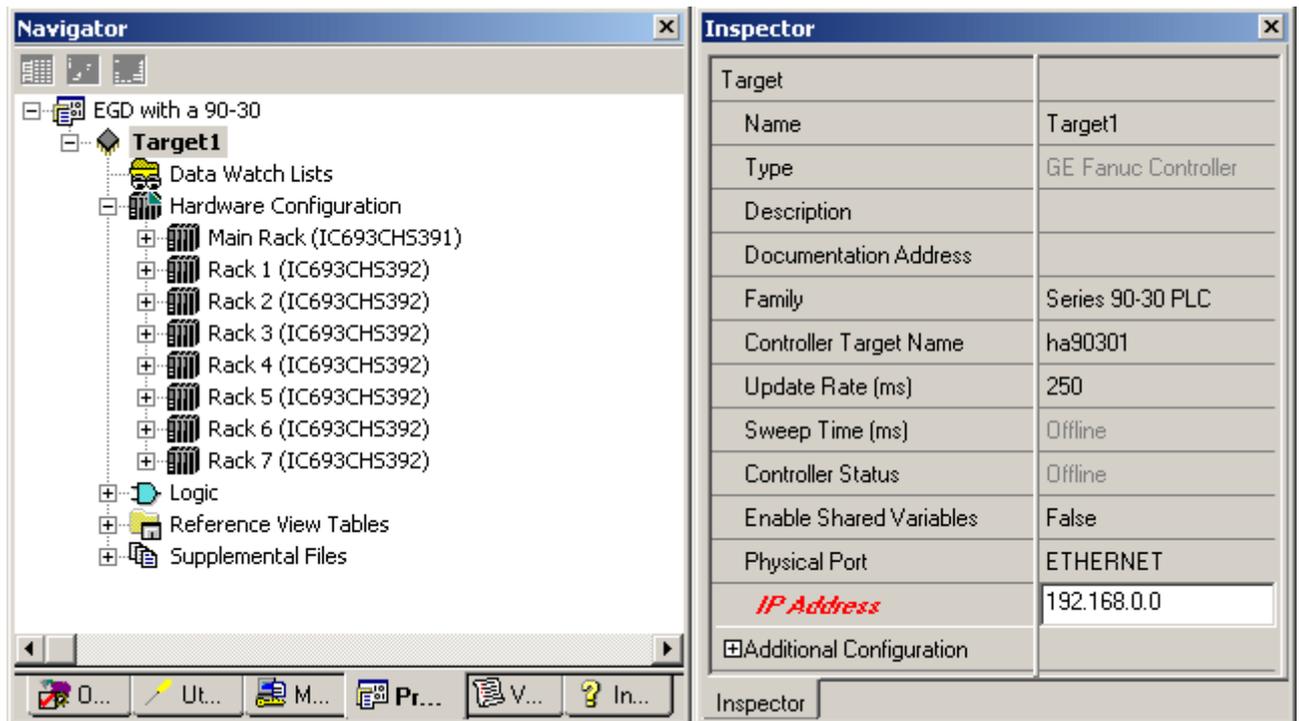
- Next, re-open the CPU configuration and examine the **Ethernet** tab. An Ethernet configuration should have been uploaded from the PLC, and all parameters (except for the Adapter Name) should now contain values. Users must enter a valid Adapter Name at a later time, and note the IP Address for later use.

Note: The red cross should still be displayed over the **Target1** icon because a partial upload of the PLC was performed.

- Next, open the **Target** drop-down menu and select **Go offline with Target1**. This will disconnect the serial connection between Proficy and the PLC, remove the red cross from Target1.

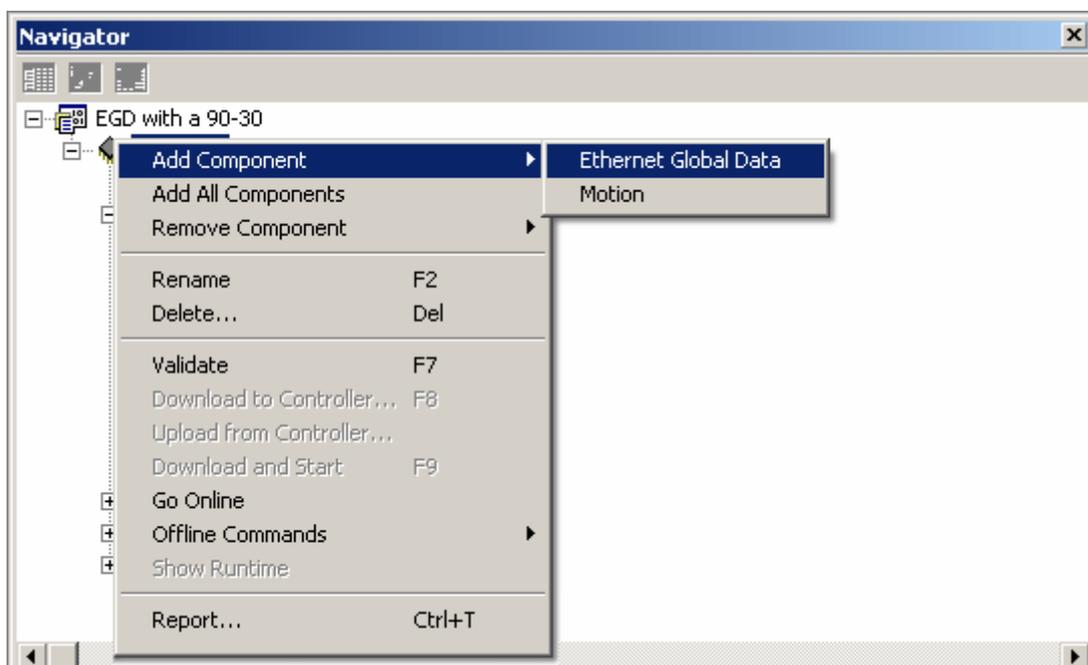
Note: The serial connection can also be used to download a new CPU configuration.

- Next, select **Target1** at the top of the project tree. In the Inspector window, locate the **Physical Port** parameter and change it to "ETHERNET". In the **IP Address** parameter, enter the same IP address that appears in the CPU's Ethernet configuration.



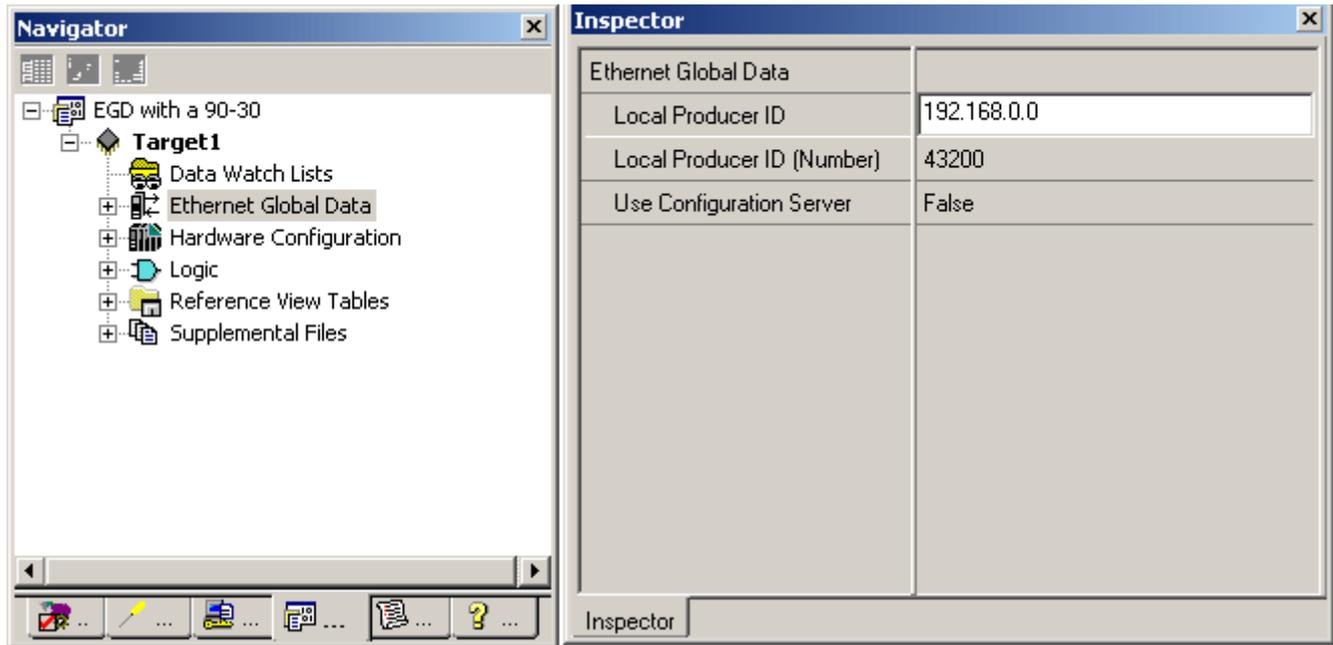
7. Next, enter an Adapter Name in the CPU's configuration. To do so, double-click on **Slot1 (IC693CPU364)** and then select the **Ethernet** tab.
8. Double-click in the value field of **Adapter Name** and type "0.1."

Note: At this point, a serial connection is not necessary.
9. Next, add EGD components to the project by right-clicking on **Target1** and then selecting **Add Component | Ethernet Global Data**.

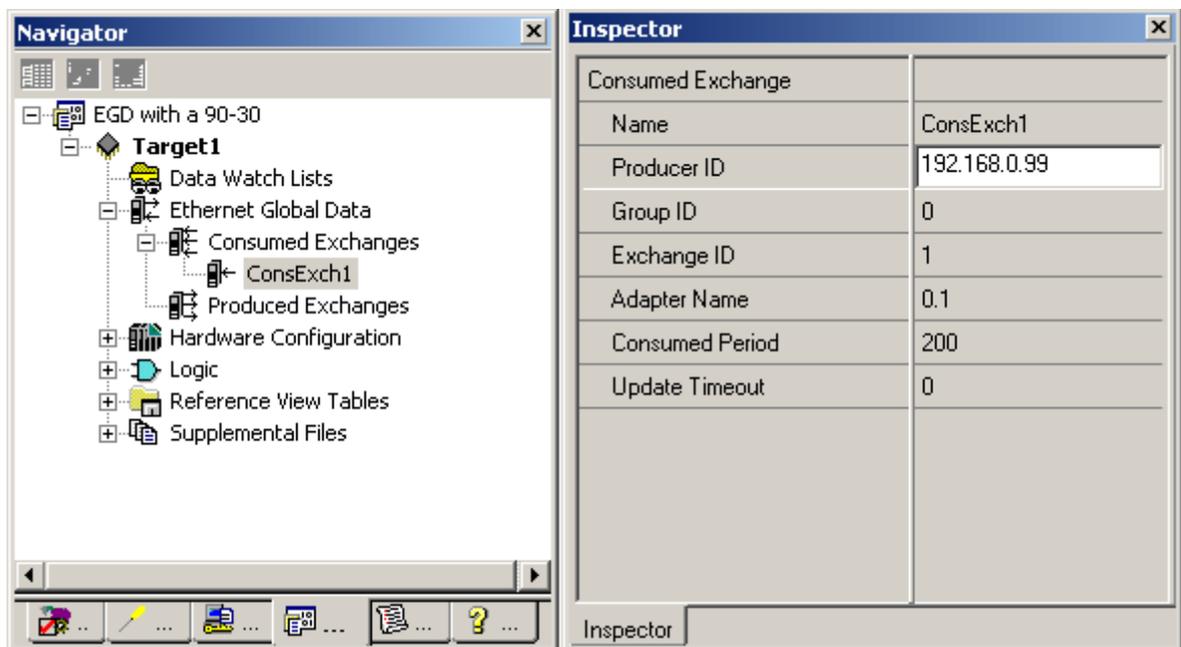


Note: The **Ethernet Global Data** icon should now appear in the project tree. Open its properties in the

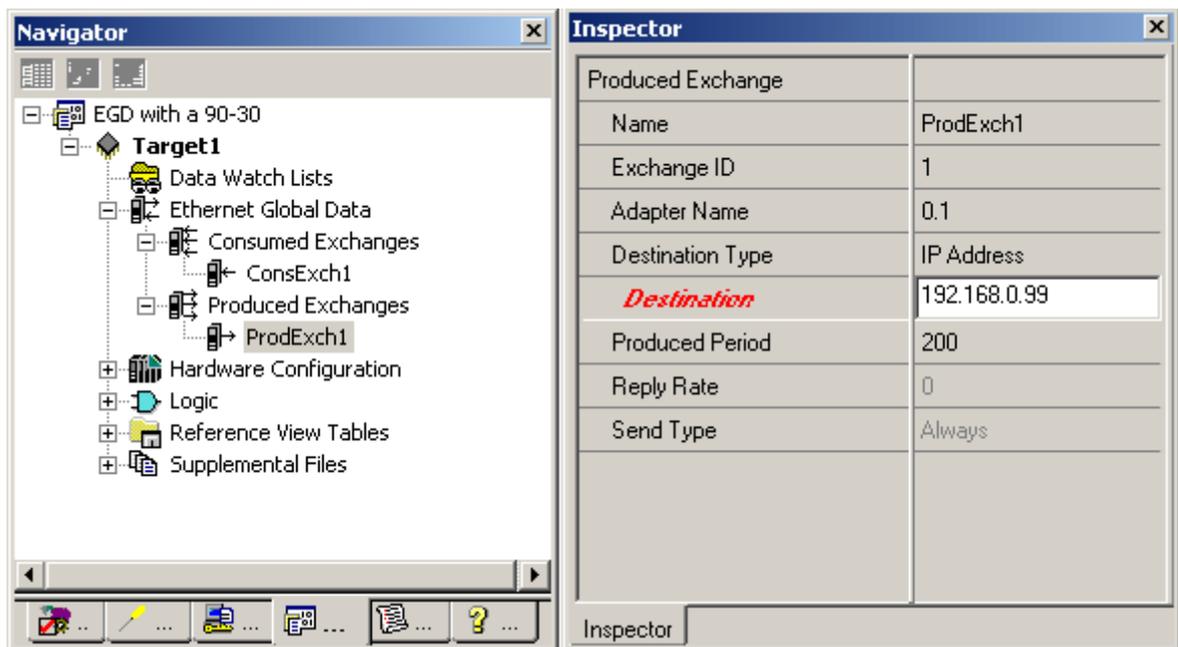
Inspector window, and then locate the **Local Producer ID** parameter and enter the EGD Producer's IP address. In this example, the PLC's IP address is used.



10. Expand the Ethernet Global Data icon to reveal the **Consumed Exchanges** and **Produced Exchanges** icons.
11. Next, right-click on **Consumed Exchanges** and select **New**. The icon **ConsExch1** will appear. Display its properties in the Inspector window and then locate the **Producer ID** parameter. Enter the IP address of the computer on which the OPC server will be running.



12. Next, right-click on Produced Exchanges and select **New**. The icon **ProdExch1** will appear. Display its properties in the Inspector window and then locate the **Destination Type** and **Destination** parameters. In **Destination Type**, set the parameter to "IP Address." In **Destination**, enter the IP address of the computer on which the OPC server will be running.



13. Next, double-click on **ConsExch1** to invoke the "ConsExch1" window, which is used to add register addresses to the Consumer Exchange. Then, click **Add** to insert a new row. In this demonstration, the new row's **Ref Address** is set to "%AI1030." The **Length** is set to 14.

ConsExch1						
Add		Insert		Delete		Length (Bytes): 28
Offset (Byte.Bit)	Variable	Ref Address	Ignore	Length	Type	Description
Status		%I00001	N/A	16	BIT	
TimeStamp		NOT USED	N/A	0	BYTE	
0.0		%AI1030	N/A	14	WORD	

14. Then, double-click on **ProdExch1** to invoke the "ProdExch1" window, which is used to add register addresses to the Producer Exchange. Then, click **Add** to insert a new row. In this demonstration, the new row's **Ref Address** is set to "%R00101." The **Length** is set to 14.

ProdExch1						
Add		Insert		Delete		Length (Bytes): 28
Offset (Byte.Bit)	Variable	Ref Address	Ignore	Length	Type	Description
Status		%I00017	N/A	16	BIT	
0.0		%R00101	N/A	14	WORD	

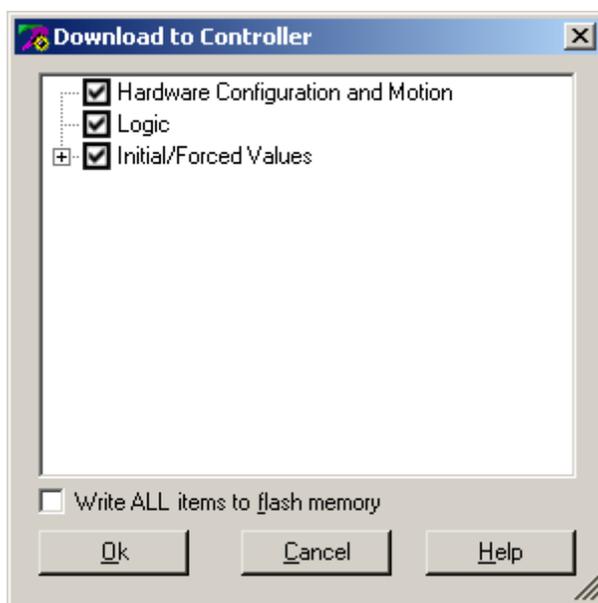
15. Next, create ladder logic for the project by expanding the **Logic** icon in the Project tree and then double-clicking on "_Main." This will invoke a window for creating and editing ladder logic.

Important: In order to place the PLC into the Run state, a ladder must be present in the PLC's memory.

As such, ladder logic must be included in an EGD configuration for the 90-30 PLC even if the logic is not directly relevant.

Downloading the Project to the PLC

1. To start, save the Proficy project and then get online with the PLC by clicking the lightning bolt icon. Alternatively, click **Target | Go online with Target1**.
2. The project must be validated before a download can be attempted. To do so, open the **Target** menu and then select **Validate "Target1"**. Then, check for validation errors by opening the **Feedback Zone** window. If there are no errors, continue on.
3. Next, toggle Proficy into Programmer Mode by clicking the green hand icon (located in the Proficy toolbar). Then, click **Target | Download** and select **Target1**.
4. In the **Download to Controller** window, ensure that all three items in the window are checked. Then, click **OK**.

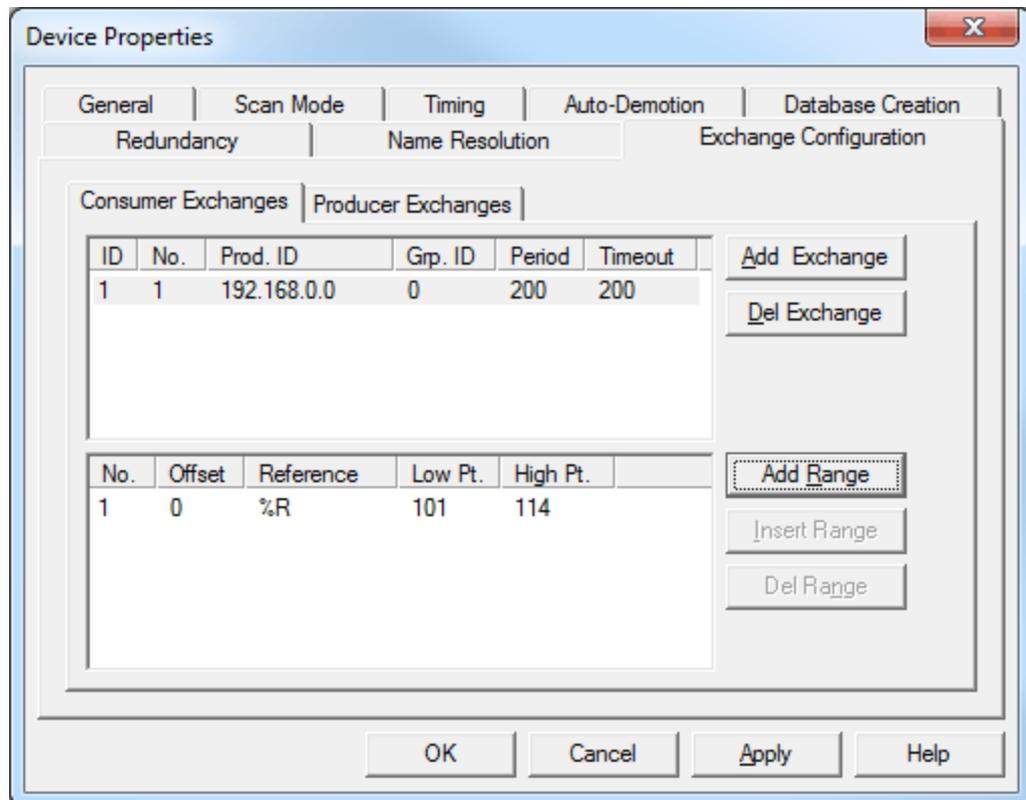


Note: If the download was successful, the Feedback Zone window should report no errors. The red cross should no longer be over Target1 because the PLC's configuration will match the Proficy project's configuration.

Configuring an OPC Server Project

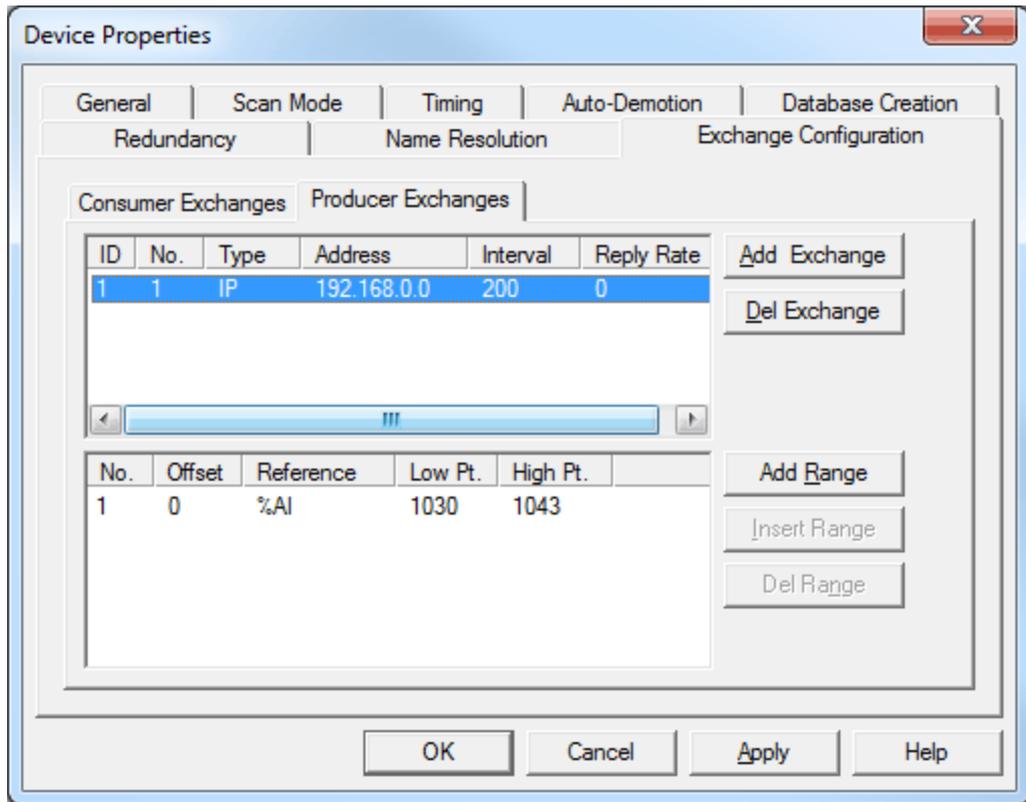
1. To start, open a new server project and then create a channel. In **Device Driver**, specify **GE Ethernet Global Data**. Continue through the Channel Wizard, specifying the channel settings as desired. Once complete, click **Finish**.
2. Next, add a new device. Accept the default settings until reaching the **Exchange Configuration** dialog. Then, select the **Consumer Exchanges** tab and click **Add Exchange**. Set the parameters to the following:
 - **ID:** 1.
 - **Exchange Number:** 1.
 - **Producer ID:** The 90-30 PLC's IP Address.
 - **Group ID:** 0.
 - **Consumed Period:** 200.
 - **Update Timeout:** 200.

3. Then, click **OK**.
4. Next, select the newly-created Consumer Exchange and then click **Add Range**. Set the parameters to the following:
 - **Reference:** %R.
 - **Low Point:** 101.
 - **High Point:** 114.



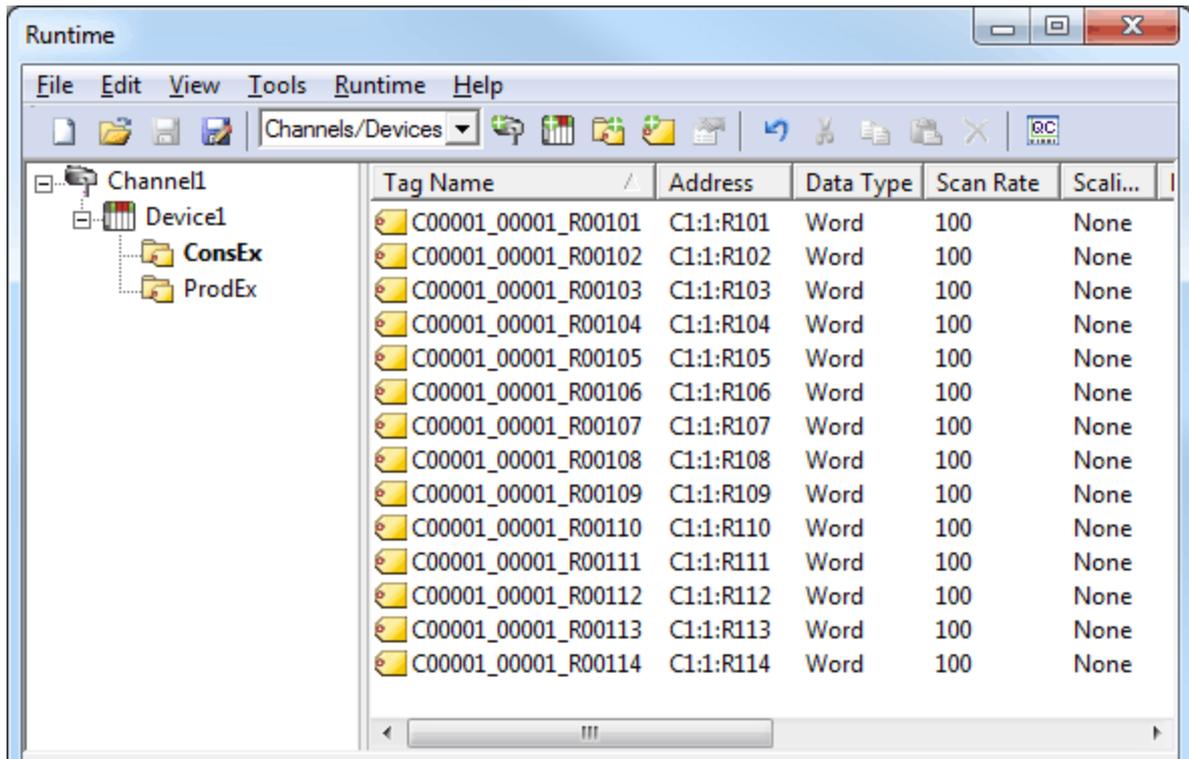
5. Then, click **OK**.
6. Next, select the **Producer Exchanges** tab and click **Add Exchange**. Set the parameters to the following:
 - **ID:** 1.
 - **Exchange Number:** 1.
 - **Consumed Type:** IP.
 - **Consumed Address:** The 90-30 PLC's IP address.
 - **Producer Interval:** 200.
7. Then, click **OK**.
8. Next, select the newly-created Producer Exchange and then click **Add Range**. Set the parameters to the following:
 - **Reference:** %AI.
 - **Low Point:** 1030.

- **High Point:** 1043.

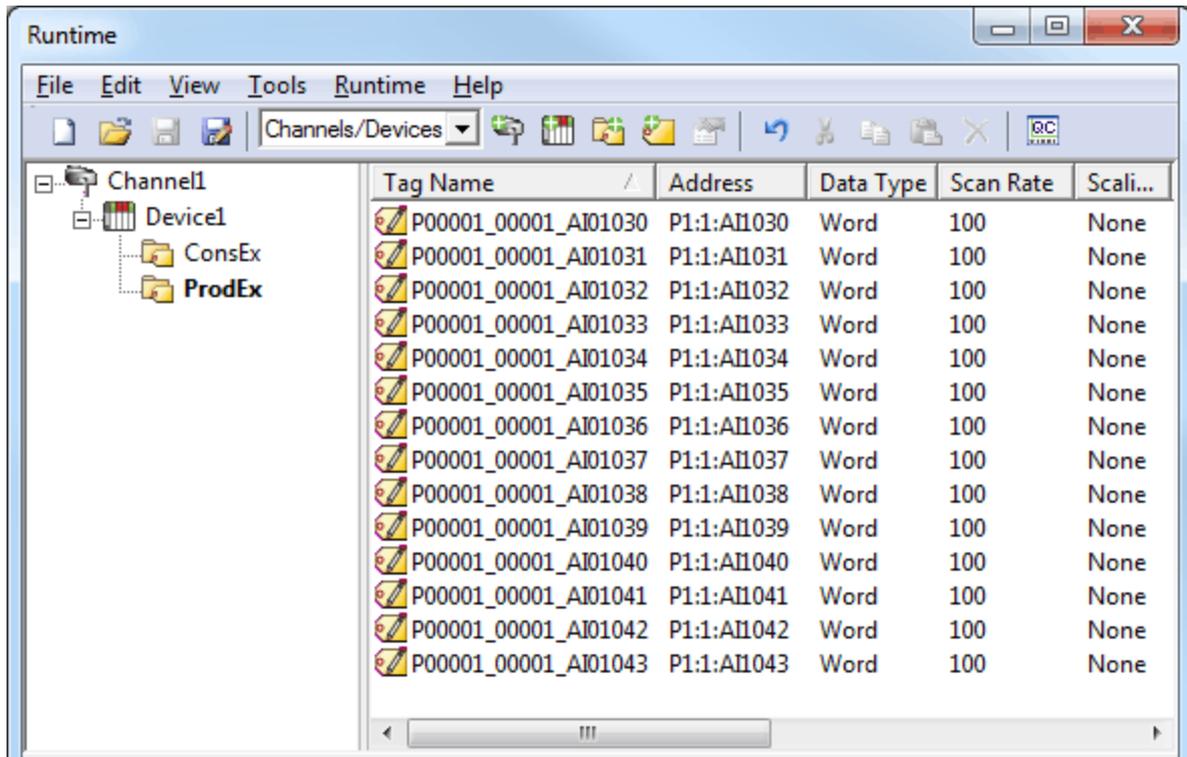


9. Then, click **OK**.
10. Next, add a new tag group beneath the device. To do so, right-click on the device and then select **New Tag Group**. In **Name**, enter "ConsEx". Then, click **OK**.

11. Open the folder and create new tags at the addresses "C1:1:R101" through "C1:1:R114".



12. Next, add a new tag group beneath the device. To do so, right-click on the device and then select **New Tag Group**. In **Name**, enter "ProdEx". Then, click **OK**.
13. Open the folder and create new tags at the addresses "P1:1:AI1030" through "P1:1:AI1043".



The screenshot shows the 'Runtime' application window. The title bar reads 'Runtime'. The menu bar includes 'File', 'Edit', 'View', 'Tools', 'Runtime', and 'Help'. The toolbar contains various icons for file operations and a dropdown menu set to 'Channels/Devices'. On the left, a tree view shows a hierarchy: 'Channel1' containing 'Device1', which in turn contains 'ConsEx' and 'ProdEx'. The main area displays a table with the following columns: 'Tag Name', 'Address', 'Data Type', 'Scan Rate', and 'Scali...'. The table lists 14 tags, all of which are 'Word' type with a 'Scan Rate' of 100 and 'Scali...' set to 'None'. Each tag name starts with 'P00001_00001_' followed by an AI register address.

Tag Name	Address	Data Type	Scan Rate	Scali...
P00001_00001_AI01030	P1:1:AI1030	Word	100	None
P00001_00001_AI01031	P1:1:AI1031	Word	100	None
P00001_00001_AI01032	P1:1:AI1032	Word	100	None
P00001_00001_AI01033	P1:1:AI1033	Word	100	None
P00001_00001_AI01034	P1:1:AI1034	Word	100	None
P00001_00001_AI01035	P1:1:AI1035	Word	100	None
P00001_00001_AI01036	P1:1:AI1036	Word	100	None
P00001_00001_AI01037	P1:1:AI1037	Word	100	None
P00001_00001_AI01038	P1:1:AI1038	Word	100	None
P00001_00001_AI01039	P1:1:AI1039	Word	100	None
P00001_00001_AI01040	P1:1:AI1040	Word	100	None
P00001_00001_AI01041	P1:1:AI1041	Word	100	None
P00001_00001_AI01042	P1:1:AI1042	Word	100	None
P00001_00001_AI01043	P1:1:AI1043	Word	100	None

- Next, start the OPC Quick Client. If the PLC is online and the Proficy project created earlier has been downloaded to the PLC, the tags should show Good quality. Users should also be able to write to the Producer Tags.
- By going online with Proficy, users can check the values held by PLC registers at the addresses %AI1030 to %AI1043 and %R101 to %R114. To find the registers, return to the project tree and then click **Reference View Tables | Default Tables**.

Error Descriptions

The following error/warning messages may be generated. Click on the link for a description of the message.

Address Validation

[Address '<address>' is out of range for the specified device or register](#)

[Array size is out of range for address '<address>'](#)

[Array support is not available for the specified address: '<address>'](#)

[Data Type '<type>' is not valid for device address '<address>'](#)

[Device address '<address>' contains a syntax error](#)

[Device address '<address>' is not supported by model '<model name>'](#)

[Device address '<address>' is Read Only](#)

[Missing address](#)

GE Ethernet Global Data Device Specific Messages

[Consumer exchange \(<Exchange ID>\) on channel '<channel>' contains an invalid signature from producer \(<producer IP>\)](#)

[Consumer exchange \(<Exchange ID>\) on channel '<channel>' is not receiving production data from producer \(<producer IP>\)](#)

[Consumer exchange \(<Exchange ID>\) on channel '<channel>' is not receiving updates within the configured period \(elapsed time <time>ms\)](#)

[Consumer exchange \(<Exchange ID>\) on channel '<channel>' is receiving an unsynchronized timestamp from producer \(<producer IP>\)](#)

[Consumer exchange \(<Exchange ID>\) on channel '<channel>' is receiving out of date data from producer \(<producer IP>\)](#)

[No exchanges have been configured. Tags not generated](#)

[Non-production exchange \(<Exchange ID>\) received from producer \(<producer IP>\)](#)

[Received exchange \(<Exchange ID>\) with an unsupported protocol version \(<protocol version received>\) from producer \(<producer IP>\)](#)

[The driver has not been properly configured to receive exchange \(<Exchange ID>\) from producer \(<producer IP>\)](#)

[The xml file contains an alias name which has illegal characters. Only alphanumeric and underscore characters are valid](#)

[Unable to bind consumer socket on '<device>'. \(Error Code = <error code>\)](#)

[Unable to bind producer socket required for multicasting on '<device>'. \(Error Code = <error code>\)](#)

[Unable to bind to adapter: '<adapter>'. Connect failed](#)

[Unable to create a producer socket on '<device>'. \(Error Code = <error code>\)](#)

[Unable to create a consumer socket on '<device>'. \(Error Code = <error code>\)](#)

[Unable to determine host name for producing node. \(Error Code = <error code>\)](#)

[Unable to get host address for producing node. \(Error Code = <error code>\)](#)

[Unable to join multicast group on '<IP address>'. \(Error Code = <error code>\)](#)

[Unable to read producer exchange \(<Exchange ID>\) configuration data on channel '<channel>'. Terminating producer exchange](#)

[Terminating producer exchange](#)

[Unable to reuse consumer socket on '<device>'. \(Error Code = <error code>\)](#)

[Unable to set time to live for multicasted socket on '<device>'. \(Error Code = <error code>\)](#)

[Winsock initialization failed \(OS Error = n\)](#)

[Winsock V1.1 or higher must be installed to use the GE Ethernet device driver](#)

Address Validation

The following error/warning messages may be generated. Click on the link for a description of the message.

Address Validation

[Address '<address>' is out of range for the specified device or register](#)

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[Data Type '<type>' is not valid for device address '<address>'](#)

[Device address '<address>' contains a syntax error](#)

[Device address '<address>' is not supported by model '<model name>'](#)

[Device address '<address>' is Read Only](#)

[Missing address](#)

Address '<address>' is out of range for the specified device or register

Error Type:

Warning

Possible Cause:

A tag address that has been specified statically references a location that is beyond the range of supported locations for the device.

Solution:

Verify the address is correct; if it is not, re-enter it in the client application.

Array size is out of range for address '<address>'

Error Type:

Warning

Possible Cause:

A tag address that has been specified statically is requesting an array size that is too large for the address type or block size of the driver.

Solution:

Re-enter the address in the client application to specify a smaller value for the array or a different starting point.

Array support is not available for the specified address: '<address>'

Error Type:

Warning

Possible Cause:

A tag address that has been specified statically contains an array reference for an address type that doesn't support arrays.

Solution:

Re-enter the address in the client application to remove the array reference or correct the address type.

Data Type '<type>' is not valid for device address '<address>'

Error Type:

Warning

Possible Cause:

A tag address that has been specified statically has been assigned an invalid data type.

Solution:

Modify the requested data type in the client application.

Device address '<address>' contains a syntax error

Error Type:

Warning

Possible Cause:

A tag address that has been specified statically contains one or more invalid characters.

Solution:

Re-enter the address in the client application.

Device address '<address>' is not supported by model '<model name>'

Error Type:

Warning

Possible Cause:

A tag address that has been specified statically references a location that is valid for the communications protocol but not supported by the target device.

Solution:

Verify that the address is correct; if it is not, re-enter it in the client application. Also verify that the selected model name for the device is correct.

Device address '<address>' is Read Only

Error Type:

Warning

Possible Cause:

A tag address that has been specified statically has a requested access mode that is not compatible with what the device supports for that address.

Solution:

Change the access mode in the client application.

Missing address

Error Type:

Warning

Possible Cause:

A tag address that has been specified statically has no length.

Solution:

Re-enter the address in the client application.

GE Ethernet Global Data Device Specific Messages

The following error/warning messages may be generated. Click on the link for a description of the message.

GE Ethernet Global Data Device Specific Messages

[Consumer exchange \(<Exchange ID>\) on channel '<channel>' contains an invalid signature from producer \(<producer IP>\)](#)

[Consumer exchange \(<Exchange ID>\) on channel '<channel>' is not receiving production data from producer \(<producer IP>\)](#)

[Consumer exchange \(<Exchange ID>\) on channel '<channel>' is not receiving updates within the configured period \(elapsed time <time>ms\)](#)

[Consumer exchange \(<Exchange ID>\) on channel '<channel>' is receiving an unsynchronized timestamp from producer \(<producer IP>\)](#)

[Consumer exchange \(<Exchange ID>\) on channel '<channel>' is receiving out of date data from producer \(<producer IP>\)](#)

[No exchanges have been configured. Tags not generated](#)

[Non-production exchange \(<Exchange ID>\) received from producer \(<producer IP>\)](#)

[Received exchange \(<Exchange ID>\) with an unsupported protocol version \(<protocol version received>\) from producer \(<producer IP>\)](#)

[The driver has not been properly configured to receive exchange \(<Exchange ID>\) from producer \(<producer IP>\)](#)

[The xml file contains an alias name which has illegal characters. Only alphanumeric and underscore characters are valid](#)

[Unable to bind consumer socket on '<device>'. \(Error Code = <error code>\)](#)

[Unable to bind producer socket required for multicasting on '<device>'. \(Error Code = <error code>\)](#)

[Unable to bind to adapter: '<adapter>'. Connect failed](#)

[Unable to create a producer socket on '<device>'. \(Error Code = <error code>\)](#)

[Unable to create a consumer socket on '<device>'. \(Error Code = <error code>\)](#)

[Unable to determine host name for producing node. \(Error Code = <error code>\)](#)

[Unable to get host address for producing node. \(Error Code = <error code>\)](#)

[Unable to join multicast group on '<IP address>'. \(Error Code = <error code>\)](#)

[Unable to read producer exchange \(<Exchange ID>\) configuration data on channel '<channel>'.](#)

[Terminating producer exchange](#)

[Unable to reuse consumer socket on '<device>'. \(Error Code = <error code>\)](#)
[Unable to set time to live for multicasted socket on '<device>'. \(Error Code = <error code>\)"](#)
[Winsock initialization failed \(OS Error = n\)](#)
[Winsock V1.1 or higher must be installed to use the GE Ethernet device driver](#)

Consumer exchange (<Exchange ID>) on channel '<channel>' contains an invalid signature from producer (<producer IP>)

Error Type:

Fatal

Possible Cause:

The producing node has sent an exchange which does not conform to the standards expected by the GE EGD Device Driver.

Solution:

Contact Technical Support.

Consumer exchange (<Exchange ID>) on channel '<channel>' is not receiving production data from producer (<producer IP>)

Error Type:

Serious

Possible Cause:

The producing node's producer exchange is configured with no range data.

Solution:

Make sure the producer exchange is configured properly.

Consumer exchange (<Exchange ID>) on channel '<channel>' is not receiving updates within the configured period (elapsed time <time>ms)

Error Type:

Warning

Possible Cause:

Depending on network configuration, it could be taking too long to receive an update from the producer, or a bad network cable could be slowing communications down.

Solution:

Increase the configured time period. Check the network connections to make sure they are functioning at the highest speed possible.

Consumer exchange (<Exchange ID>) on channel '<channel>' is receiving an unsynchronized timestamp from producer (<producer IP>)

Error Type:

Serious

Possible Cause:

The producing node has flagged the produced timestamp to be unsynchronized with the data.

Solution:

Consult the GE EGD PLC documentation.

Consumer exchange (<Exchange ID>) on channel '<channel>' is receiving out of date data from producer (<producer IP>)

Error Type:

Serious

Possible Cause:

The producing node has flagged the produced data as either old or invalid.

Solution:

Consult the GE EGD PLC documentation.

No exchanges have been configured. Tags not generated

Error Type:

Warning

Possible Cause:

No exchanges have been configured.

Solution:

Add one or more exchanges to the device.

Non-production exchange (<Exchange ID>) received from producer (<producer IP>)

Error Type:

Serious

Possible Cause:

The producing node is producing exchanges which are not valid.

Solution:

Call Technical Support.

Received exchange (<Exchange ID>) with an unsupported protocol version (<protocol version received>) from producer (<producer IP>)

Error Type:

Fatal

Possible Cause:

The GE EGD Device Driver does not support the protocol version number received from the producing node.

Solution:

Call Technical Support.

The driver has not been properly configured to receive exchange (<Exchange ID>) from producer (<producer IP>)

Error Type:

Serious

Possible Cause:

The consumer exchange configuration does not match the exchange received from the producing node, or the exchange is not configured.

Solution:

Make sure that the consumer exchange is properly configured.

The xml file contains an alias name which has illegal characters. Only alphanumeric and underscore characters are valid

Error Type:

Fatal

Possible Cause:

The project file has become corrupted.

Solution:

Try saving the project in .opf format, and then resave in .xml format.

Unable to bind consumer socket on '<device>'. (Error Code = <error code>)

Error Type:

Warning

Possible Cause:

The driver was unable to bind to the network adapter or IP Address specified.

Solution:

Try specifying a different network adapter and/or IP address.

Unable to bind producer socket required for multicasting on '<device>'. (Error Code = <error code>)

Error Type:

Warning

Possible Cause:

The driver was unable to bind to the network adapter specified.

Solution:

Try specifying a different network adapter and/or IP address.

Unable to bind to adapter: '<adapter>'. Connect failed

Error Type:

Fatal

Possible Cause:

The operating system could not find an unused port to use for communication with this device.

1. Network system failure, such as Winsock or network adapter failure.
2. Other applications have claimed all available ports (possible but unlikely).

Solution:

1. Reboot the computer and check the network adapter.
2. Check for applications that could be causing conflicts and then shut them down.

Unable to create a producer socket on '<device>'. (Error Code = <error code>)

Error Type:

Warning

Possible Cause:

The operating system could not find an unused port to use for communication with this device.

1. Network system failure, such as Winsock or network adapter failure.
2. Other applications have claimed all available ports (possible but unlikely).

Solution:

1. Reboot the computer and check the network adapter.
2. Check for applications that could be causing conflicts and then shut them down.

Unable to create a consumer socket on '<device>'. (Error Code = <error code>)

Error Type:

Warning

Possible Cause:

The operating system could not find an unused port to use for communication with this device.

1. Network system failure, such as Winsock or network adapter failure.
2. Other applications have claimed all available ports (possible but unlikely).

Solution:

1. Reboot the computer and check the network adapter.
2. Check for applications that could be causing conflicts and then shut them down.

Unable to determine host name for producing node. (Error Code = <error code>)

Error Type:

Warning

Possible Cause:

Network system failure or network adapter failure.

Solution:

Check to make sure that the network connection is working and active.

Unable to get host address for producing node. (Error Code = <error code>)

Error Type:

Warning

Possible Cause:

Network system failure or network adapter failure.

Solution:

Check to make sure that the network connection is working and active.

Unable to join multicast group on '<IP address>'. (Error Code = <error code>)

Error Type:

Warning

Possible Cause:

The operating system could not find an unused port to use for communication with this device.

1. Network system failure, such as Winsock or network adapter failure.
2. Other applications have claimed all available ports (possible but unlikely).

Solution:

1. Reboot the computer and check the network adapter.
2. Check for applications that could be causing conflicts and then shut them down.

Unable to read producer exchange (<Exchange ID>) configuration data on channel '<channel>'. Terminating producer exchange

Error Type:

Fatal

Possible Cause:

The system may be running low on memory.

Solution:

Make sure the system contains the amount memory required by the server.

Unable to reuse consumer socket on '<device>'. (Error Code = <error code>)

Error Type:

Warning

Possible Cause:

The operating system could not find an unused port to use for communication with this device.

1. Network system failure, such as Winsock or network adapter failure.
2. Other applications have claimed all available ports (possible but unlikely).

Solution:

1. Reboot the computer and check the network adapter.
2. Check for applications that could be causing conflicts and then shut them down.

Unable to set time to live for multicasted socket on '<device>'. (Error Code = <error code>)**Error Type:**

Warning

Possible Cause:

Network system failure or network adapter failure.

Solution:

Check to make sure that the network connection is working and active.

Winsock initialization failed (OS Error = n)**Error Type:**

Fatal

OS Error:	Indication	Possible Solution
10091	Indicates that the underlying network subsystem is not ready for network communication.	Wait a few seconds and restart the driver.
10067	Limit on the number of tasks supported by the Windows Sockets implementation has been reached.	Close one or more applications that may be using Winsock and restart the driver.

Winsock V1.1 or higher must be installed to use the GE Ethernet device driver**Error Type:**

Fatal

Possible Cause:

The version number of the Winsock DLL found on the system is less than 1.1.

Solution:

Upgrade Winsock to version 1.1 or higher.

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