Anybus® .NET

using TwinCAT 3 with EtherCAT

APPLICATION NOTE

SCM-1202-102 EN 1.0 ENGLISH

Connecting Devices™

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1 Preface

This document explains how to enable communication between an Anybus .NET Bridge and a Beckhoff PLC using TwinCAT 3 and EtherCAT.

More documentation and downloads can be found at www.anybus.com/support. For more info regarding TwinCAT 3, please visit the Beckhoff website.

1.1 Document History

Version	Date	Description
1.0	2018-05-22	First release

1.2 Document Conventions

Ordered lists are used for instructions that must be carried out in sequence:

1. First do this
2. Then do this

Unordered (bulleted) lists are used for:

- Itemized information
- Instructions that can be carried out in any order

...and for action-result type instructions:

► This action...

➡ leads to this result

Bold typeface indicates interactive parts such as connectors and switches on the hardware, or menus and buttons in a graphical user interface.

```
Monospaced text is used to indicate program code and other
kinds of data input/output such as configuration scripts.
```

This is a cross-reference within this document: *Document Conventions, p. 3*

This is an external link (URL): www.hms-networks.com

This is additional information which may facilitate installation and/or operation.

This instruction must be followed to avoid a risk of reduced functionality and/or damage to the equipment, or to avoid a network security risk.

Caution
This instruction must be followed to avoid a risk of personal injury.

WARNING
This instruction must be followed to avoid a risk of death or serious injury.

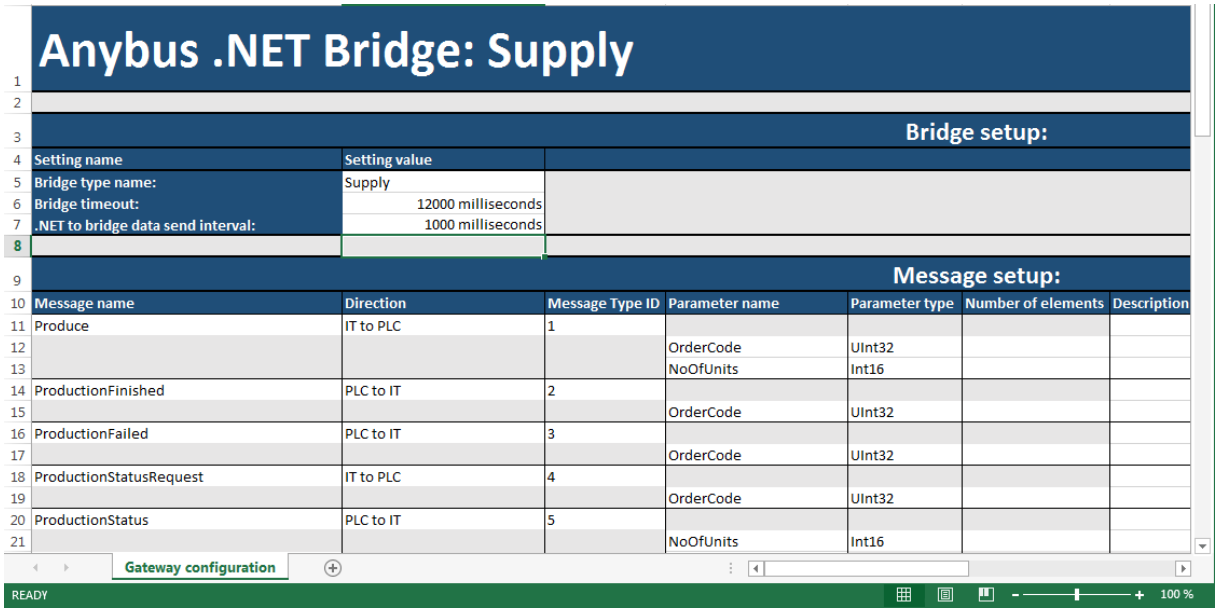
2 General

2.1 Prerequisites

- The PLC must already be set up in TwinCAT 3. Basic TwinCAT 3 knowledge is assumed in this application note.
- This application note assumes knowledge in how to configure the .NET Bridge using the Excel template. For in-depth information about this, watch the video called “Filling in the template”. This video is available on the product’s support page at www.anybus.com/support.
- Download the IPconfig tool from www.anybus.com/support. Install it on the computer.

2.2 Creating the Configuration Files

For this application note, we use the Excel template called “Supply.xlsx” found in the example project folder.



Anybus .NET Bridge: Supply

Bridge setup:

Setting name	Setting value
Bridge type name:	Supply
Bridge timeout:	12000 milliseconds
.NET to bridge data send interval:	1000 milliseconds

Message setup:

Message name	Direction	Message Type ID	Parameter name	Parameter type	Number of elements	Description
Produce	IT to PLC	1				
			OrderCode	UInt32		
			NoOfUnits	Int16		
ProductionFinished	PLC to IT	2				
			OrderCode	UInt32		
ProductionFailed	PLC to IT	3				
			OrderCode	UInt32		
ProductionStatusRequest	IT to PLC	4				
			OrderCode	UInt32		
ProductionStatus	PLC to IT	5				
			NoOfUnits	Int16		

Gateway configuration

READY 100 %

Generate the necessary configuration files using the Anybus .NET Bridge Generator, included in the Anybus .NET Bridge setup file.

1. Press Open Excel document... (1) to load Supply.xlsx into the generator.
2. Press Generate Zip... (2) to generate the configuration files.

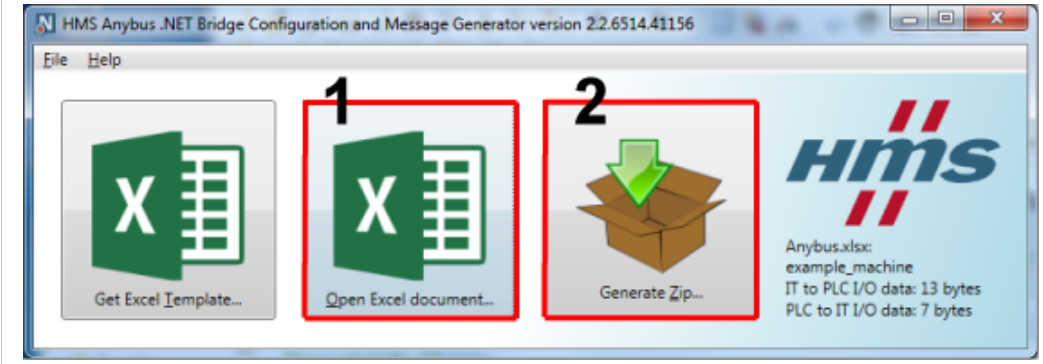


Fig. 1 HMS Anybus .NET Bridge Configuration and Message Generator

The generated zip file contains configuration files for all supported networks, as well as function blocks for most commonly used PLC environments (Siemens TIA Portal, Rockwell Studio 5000, Beckhoff TwinCAT 3).

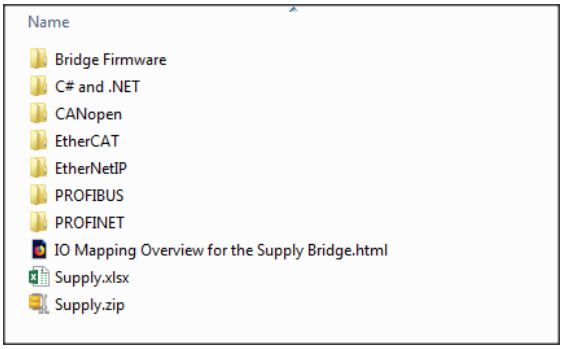


Fig. 2 Zip file contents

2.3 Set the IP Address on the .NET Bridge

To set the IP address of the Anybus .NET Bridge, on the IT side. Follow the steps below:

1. Start the IPconfig tool.
2. The IPconfig tool will automatically scan all available local networks for HMS devices. Detected devices will be listed in the main window. To refresh the list, click on **Scan**.
3. To change the IP settings for a device, double-click on the entry in the main window or right-click on it and select **Configuration**.
4. Enter static IP settings as required, or select DHCP if using dynamic IP addressing.

> **!** Do not enable DHCP if there is no DHCP server available on the network.

5. Click on **Set** to save the new settings. The device will reboot automatically.

2.4 Set Up the Generic Host Application (.NET Simulator)

In order to establish communication with the EtherCAT interface on the Anybus .NET Bridge, the IT side (the .NET application) must be up and running.

For this example, we use the Anybus .NET Bridge Generic Host application to simulate the .NET application.

After the IP address is set, start the Anybus .NET Generic Host application. Follow the steps below:

- Press “Open” and locate the Excel file, which in this case is “Supply.xlsx”. This will make the simulator tool use this configuration file for the simulation.
- Ensure that the IP address field contains the IP address to the .NET Bridge.
- Click “Connect and Initialize” to connect to the .NET Bridge. To verify this step, look in the right-most window. The bottom row should now state “Bridge status changed from Disconnected to Connected.”

3 TwinCAT 3 Configuration

This section describes how to configure the EtherCAT interface of the Anybus .NET Bridge in Beckhoff TwinCAT 3.

3.1 Adding the Anybus .NET Bridge

- To include the Anybus .NET Bridge in the EtherCAT network, an ESI file for the device must be inserted into the folder where the ESI files are stored. The ESI file can be found in the EtherCAT folder, located in the ZIP archive generated with the Anybus .NET Bridge Generator tool earlier.

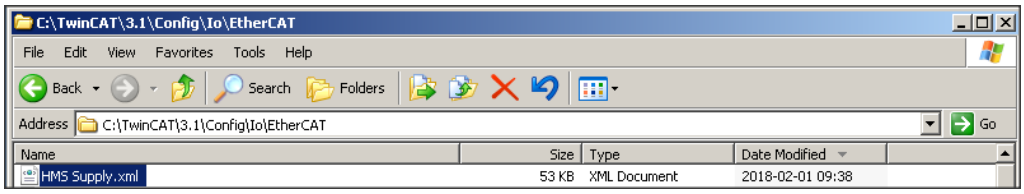


Fig. 3 Inserting the ESI file into the EtherCAT folder as above

- Scan the EtherCAT network to detect the Anybus .NET Bridge.

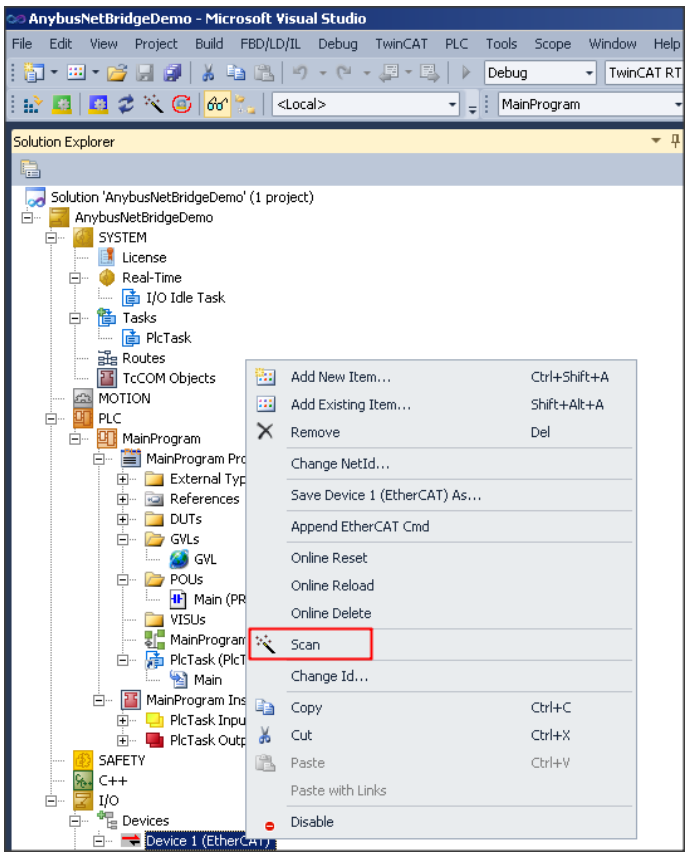


Fig. 4 Scan the EtherCAT network

- Open the Library Repository.

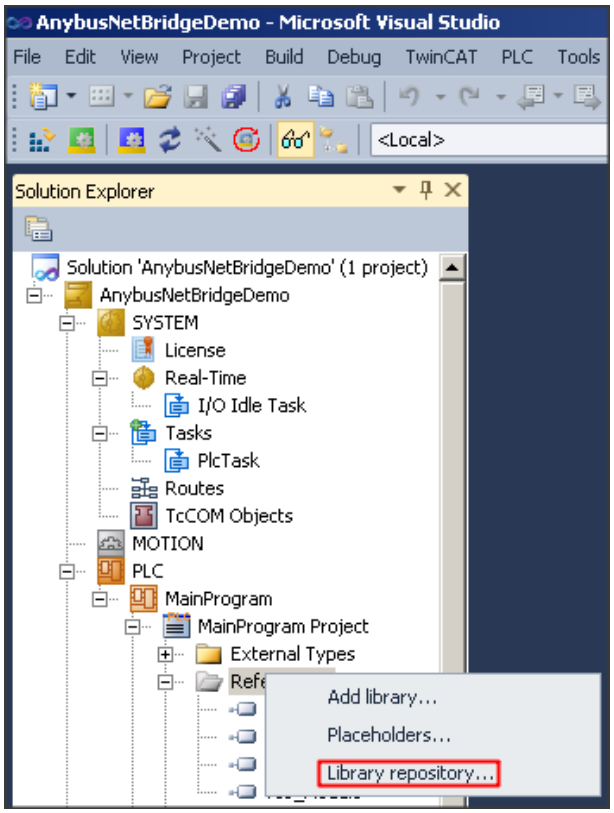


Fig. 5 Selecting the Library repository

- Install the Anybus .NET Bridge library to the Library Repository.

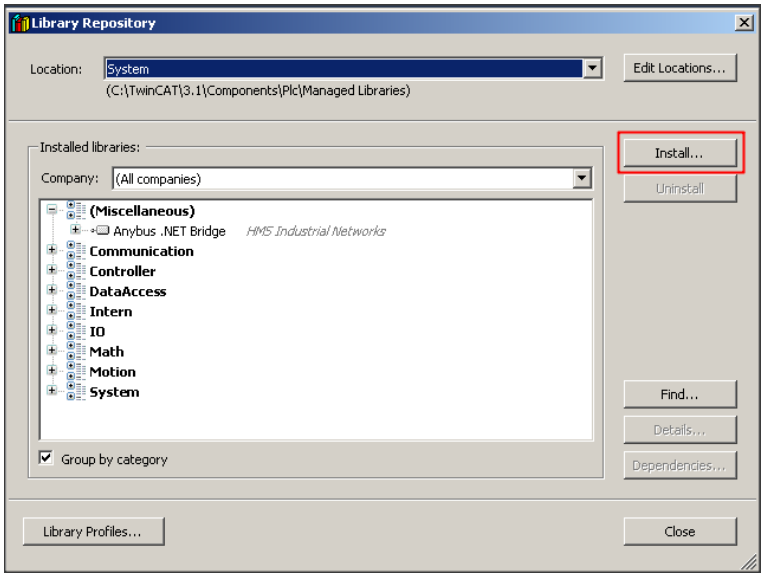


Fig. 6 The Library repository

- Add the Library from the repository to the PLC project.

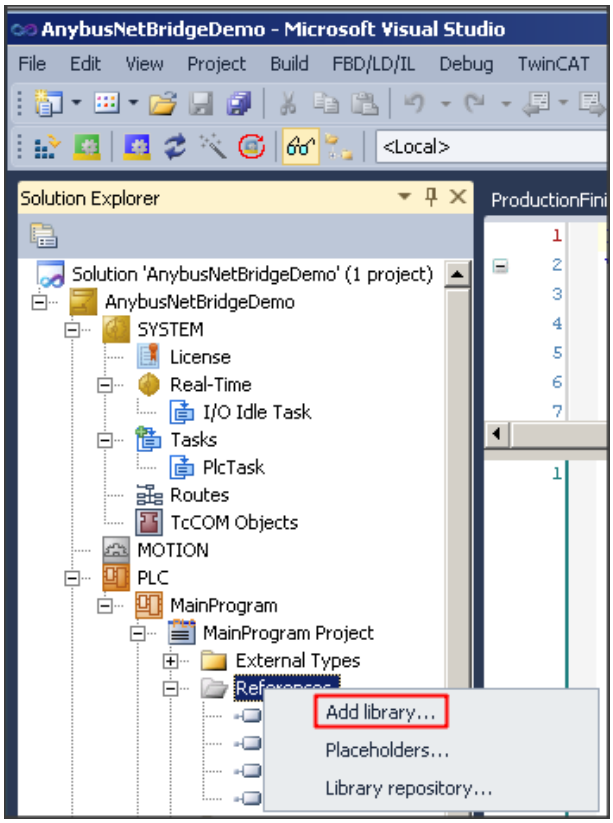


Fig. 7 Adding the library from the repository to the PLC project

- Make an instance of the AnybusNetBrComModule function block.
- The tags in the red box are global variable tags. The other tags are local memory tags in the PLC. For information regarding the function block pins, see the User Manual.

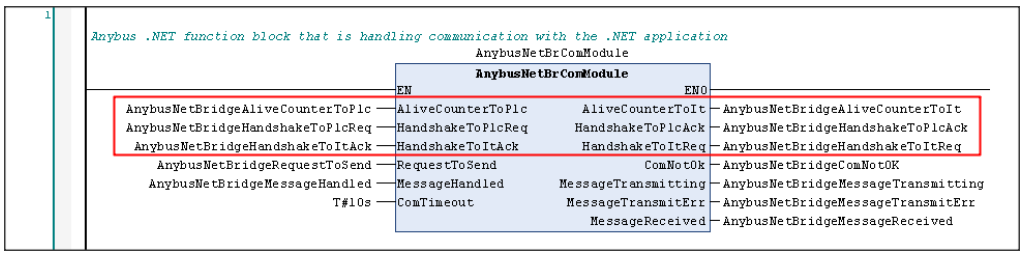


Fig. 8 The Anybus .NET function block

- Link the appropriate global variable tag to the corresponding PDO in the PDO mapping.

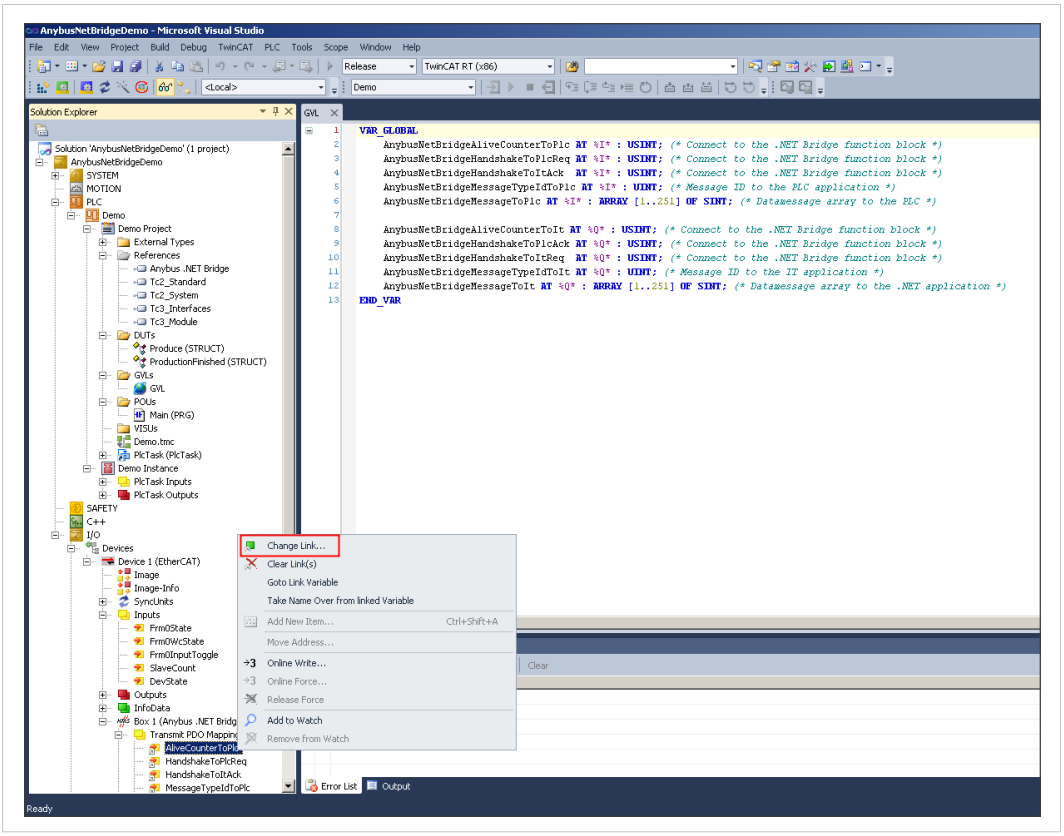


Fig. 9 Select Change Link

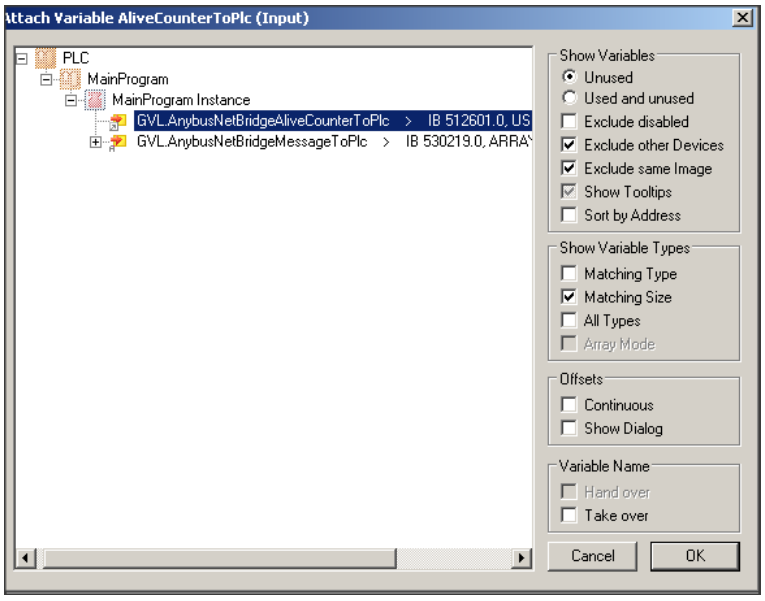


Fig. 10 Attach variables

3.2 Adding the PLC Code

First, we create structured data types that can hold the parameters that will be sent and received in the example. Make two STRUCTs (Produce and ProductionFinished) with names and data types corresponding to the messages in the Supply.xlsx spreadsheet.

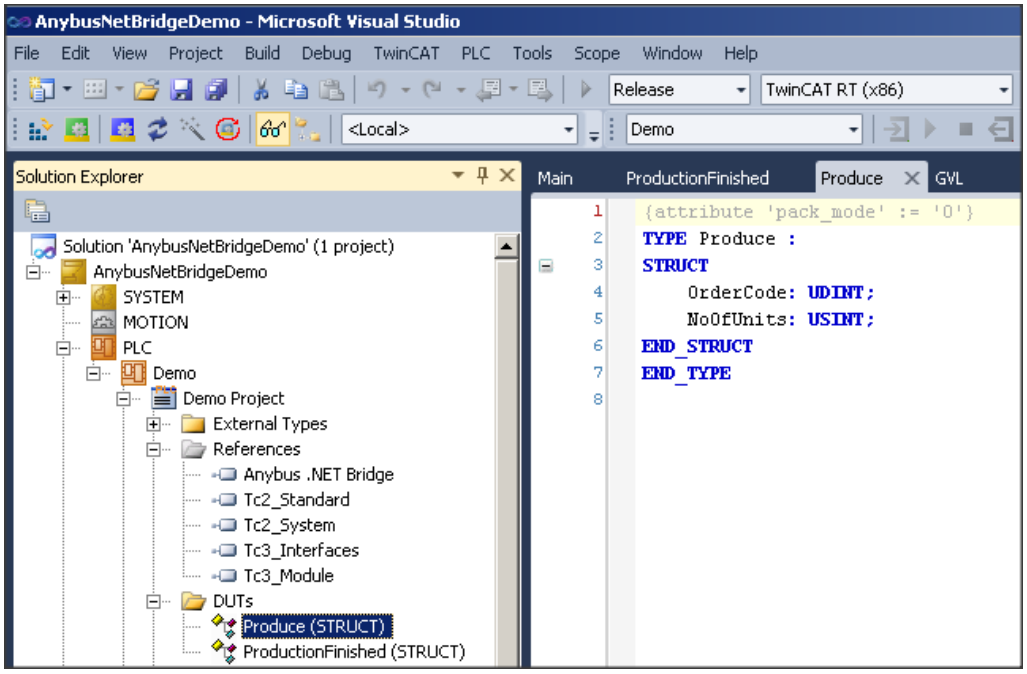


Fig. 11 The Produce STRUCT

Below is an example of ladder programming to receive and send messages between the PLC and the .NET simulator. In this example we simply copy a part of the incoming message to the outgoing message, which you typically would not do in a real application. For more information, see the “Anybus .NET Bridge - For the PLC Programmer” video available at www.anybus.com/support.

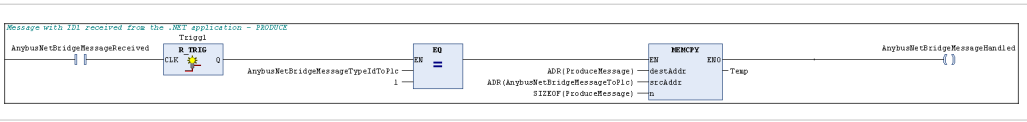


Fig. 12 The PLC receives a message from the .NET application

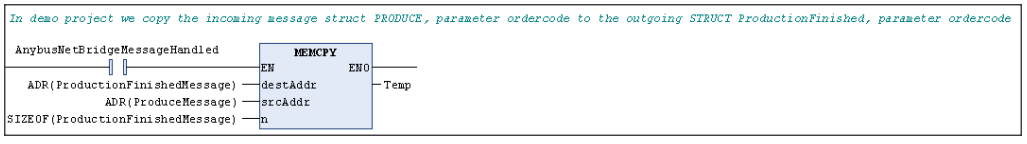


Fig. 13 The PLC application copies the order code parameter from the incoming message struct (PRODUCE) to the outgoing message struct (PRODUCTION FINISHED)

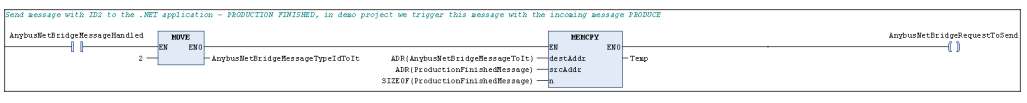


Fig. 14 The PLC sends a message to the .NET application

3.3 Starting the PLC Program

This will download the PLC program to the PLC.

Follow these steps to run the PLC program and start the communication.

- Create a executable program for the PLC. Choose **Build Solution**.

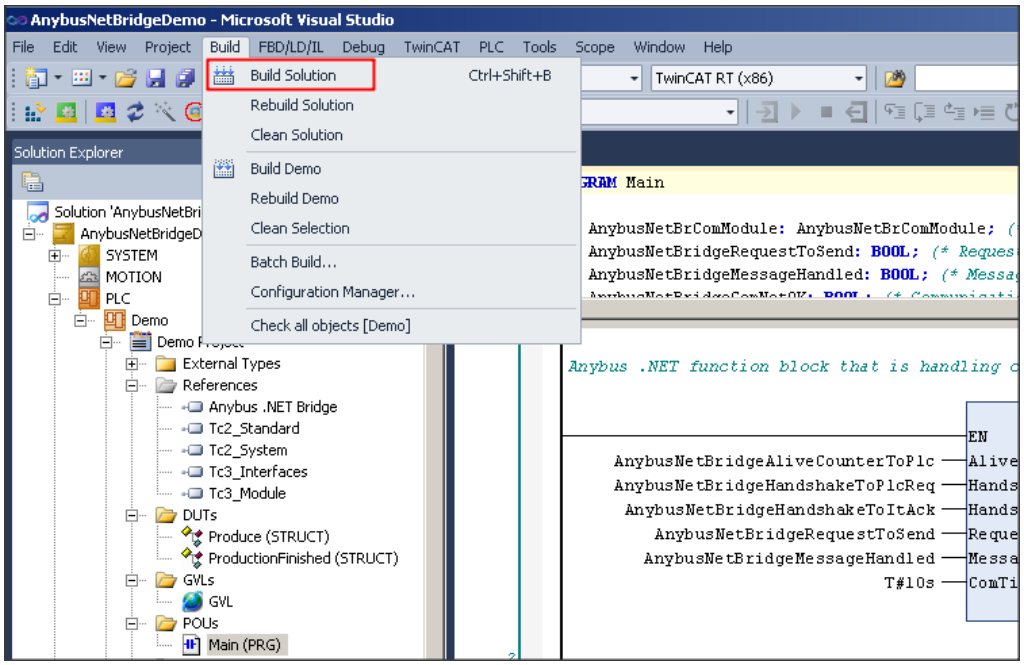


Fig. 15

- Select **Activate Configuration** to transfer the program to the PLC.

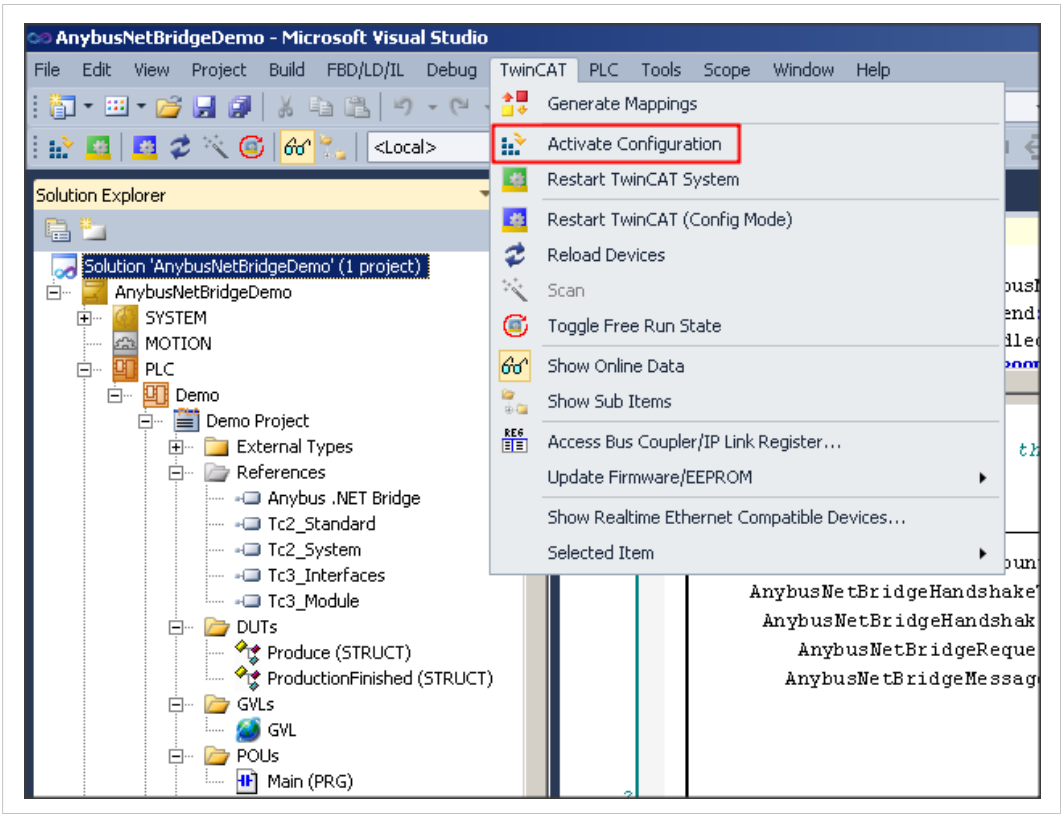


Fig. 16

- Run the program by clicking on the LOG IN icon, and then the RUN icon, marked by the red boxes.

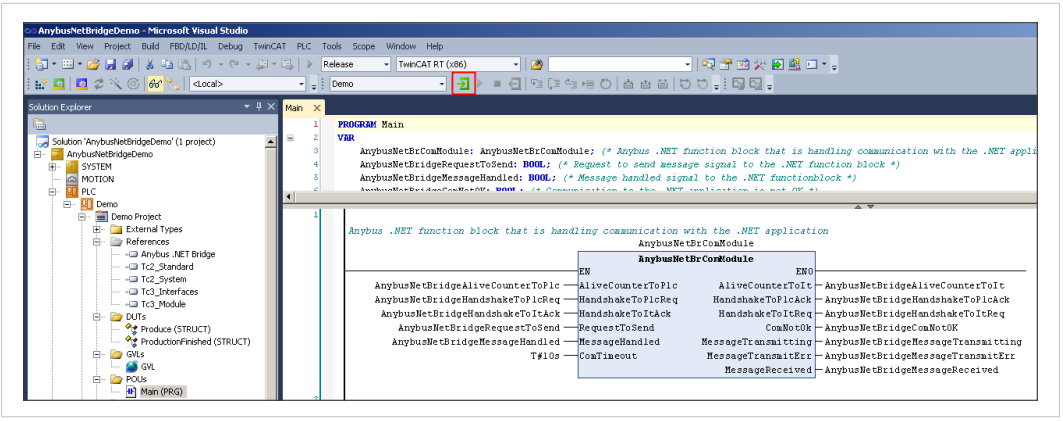


Fig. 17 The LOG IN icon

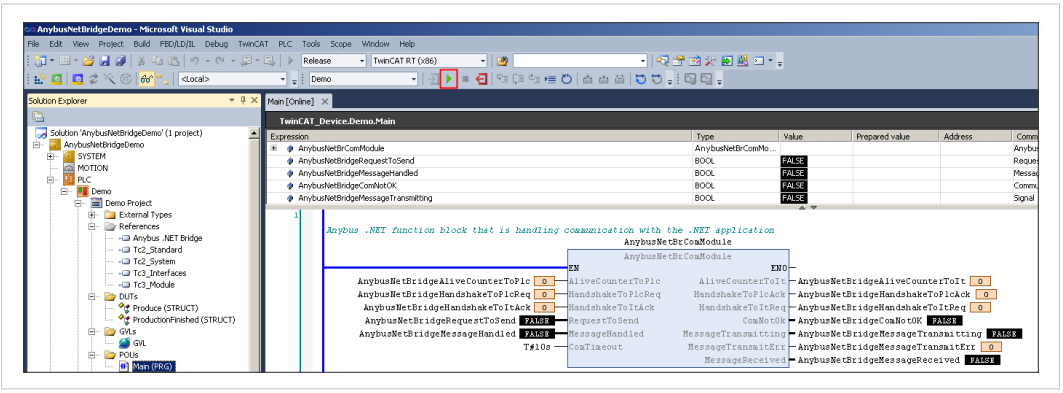


Fig. 18 The RUN icon

3.4 Verification

Verify that the application is running, by assuring that the AliveCounterToPlc pin on the function block is increasing.

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