
Application Note #1226: **GP-Pro EX to Phoenix I/O via EtherNet/IP Implicit Messaging**

Introduction

The Pro-face HMI family, along with GP-Pro EX development software, supports a wide range of communication protocols including ODVA Ethernet/IP. The Pro-face GP-Pro EX ODVA EtherNet/IP Explicit Messaging device driver (v1.14.04 and later) supports both Explicit and Implicit messaging.

EtherNet/IP defines three device classes based on network communication capabilities: Messaging Class, Adapter Class and Scanner Class. Each class supports a basic set of communications services, but may provide other optional services too.

- Explicit messaging connections are point-to-point general purpose transactions that can be used to reach any network-accessible items within a device. Explicit messaging uses TCP/IP services to transport messages. Examples of Messaging Class devices are Rockwell Micrologix PLCs, some legacy PLCs, and many operator interface and diagnostic applications.
- Adapter class products are targets of real-time I/O data connection requests from Scanner Class products. They receive Explicit message requests from all other classes of products. Examples are VF drives and Phoenix contact In Line I/O.
- Scanner Class devices are the originators of I/O data connection requests to Adapter Class products. These devices can also be originators of Explicit connection requests to or from other classes of products. Examples of Scanner class products are ControlLogix PLCs and the Pro-face GP-Pro EX ODVA EtherNet/IP Explicit Messaging device driver (v1.14.04 and later).

A single GP-Pro EX application can include a mixture of Explicit, Custom Explicit, and Implicit I/O messaging to the same device. The scope of this application note is to look at a basic Implicit I/O connection to Phoenix Contact I/O. For your convenience two completed sample projects are provided. In your application you may choose to exchange additional data with the Phoenix Contact I/O using Implicit and/or Explicit messaging.

Materials Needed to Run the Demo Project

- 1.) Proface GP-Pro EX Screen and Logic Editing software v4.02 or higher
- 2.) Pro-face GP-Pro EX ODVA EtherNet/IP Explicit Messaging device driver (v1.14.04 and later)
- 3.) Proface AGP3300 or other Ethernet Enabled Pro-face Display or Win GP
- 4.) IL EIP BK DI8 DO4 Phoenix Contact EtherNet/IP bus coupler.
- 5.) IL ATP GN Phoenix Contact End Plate
- 6.) A BootP/DHCP server utility such as the Rockwell Automation DHCP/BOOTP Utility.

Optional items to run sample project with analog "APNT1226_Phoenix_Implicit_analog.prx" :

- 1.) IB IL AI 2/SF-ME 2-point 0-10VDC Analog Input Module
- 2.) IB IL AO 2/U/BP-ME 2-point Analog Output Module

Optional resources:

Phoenix Application Note 8468: AH EN ETHERNET/IP + RS LOGIX at:

<https://www.phoenixcontact.com/online/portal/us?uri=pxc-oc-itemdetail:pid=2897758&library=usen&tab=5>

The project "APNT1226_Phoenix_Implicit_analog.prx" is the same hardware configuration as Phoenix Application Note 8468.

Rockwell Automation DHCP/BOOTP Utility to configure the bus coupler IP Address:

<http://www.ab.com/linked/networks/ethernet/bootp.html>

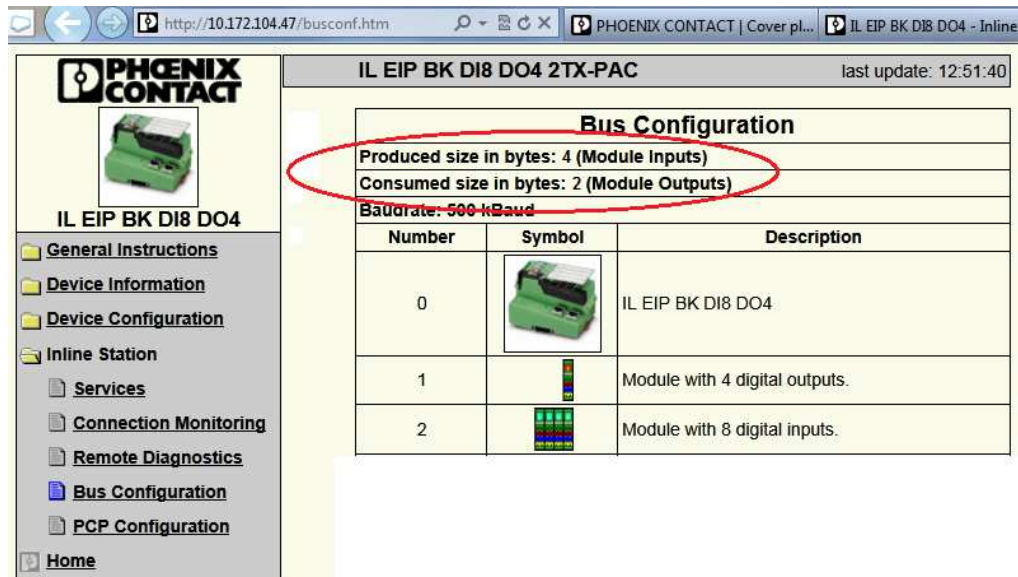
Configure the Phoenix EtherNet/IP Bus Coupler

GP-Pro EX projects require that connected devices have a fixed IP address. The Phoenix Contact bus controller is shipped with BootP enabled and the IP address unassigned. Assign the bus controller an IP address with a BootP/DHCP server utility such as the Rockwell Automation DHCP/BOOTP Utility.

Next open Internet Explorer and enter the IP address of the bus coupler in the URL address field to access the bus coupler built-in web page. Select Device Configuration, then click on IP Configuration. Change the BootP requests setting to "Disable". Enter the password and click [APPLY]. (the default password is "private")

The screenshot shows a web browser window with the URL <http://10.172.104.47/ipconfig.htm>. The page title is "PHOENIX CONTACT | Cover pl..." and the browser tab is "IL EIP BK DI8 DO4 - Inline". The main content area is titled "IL EIP BK DI8 DO4 2TX-PAC" with a "last update: 12:42:02" timestamp. On the left is a navigation menu with the following items: "General Instructions", "Device Information", "Device Configuration" (selected), "IP Configuration" (selected), "System Identification", "Software Update", "Change Password", "Inline Station", and "Home". The main content area displays the "IP Configuration" settings. It includes fields for "IP Address" (10.172.104.47), "Subnet Mask" (255.255.255.192), and "Default-Gateway" (10.172.104.1). Below these fields is a note: "Please enter IP Address, Subnet Mask and Gateway Address in dotted decimal notation (e.g., 172.16.16.230). The changes will take effect after the reboot of the IL EIP BK DI8 DO4." There is an "Enter Password" field and a "Reboot" button. The "BootP Requests" section shows two radio buttons: "Enable" and "Disable" (selected). Below this is a warning: "Before disabling automatic BootP setting, be sure to record the current IP address. You will need the current IP address if you want to re-enable BootP setting of the IP address. If you forget the IP address, the only way is to delete the whole configuration with the Reset-Button during power up." At the bottom, there is another "Enter Password" field and an "Apply" button. A red circle highlights the "BootP Requests" section.

When the bus coupler is powered up, it automatically addresses the I/O modules of the node. From the web page menu select "Inline Station" then "Bus Configuration". This window displays the current bus configuration and the Produced and Consumed Sizes. Keep these values for later steps.



Input Process Image

- Word 0 – IL BK Status
- Word 1 - On board DI8 and padding

Output Process Image

- Word 0 - On board DO4 and padding

To demonstrate the sample project you might wish to connect some of the I/O outputs to I/O inputs.

Using the Sample GP-Pro EX Project

The sample projects are ready for you to use. Depending on your Pro-face display model and your network a few minor modifications may be needed.

1. To change the display model open GP-Pro EX and go to Project > System Settings > Display. Click on Change Display and select your display Series and Model. Click change.
2. To enter the IP address of the Phoenix Contact bus coupler in GP-Pro EX go to Project > System Settings > Device/PLC Click on the button with a PLC icon on it. Enter the bus coupler address.
3. On the Pro-face display in the off-line mode set an IP address for the display within the same sub-net range as the Phoenix Contact bus coupler.

Note: The sample projects will work with as well other models of Phoenix Contact EtherNet/IP bus couplers and in Line I/O if the digital input and output counts are no more than 8 points each.

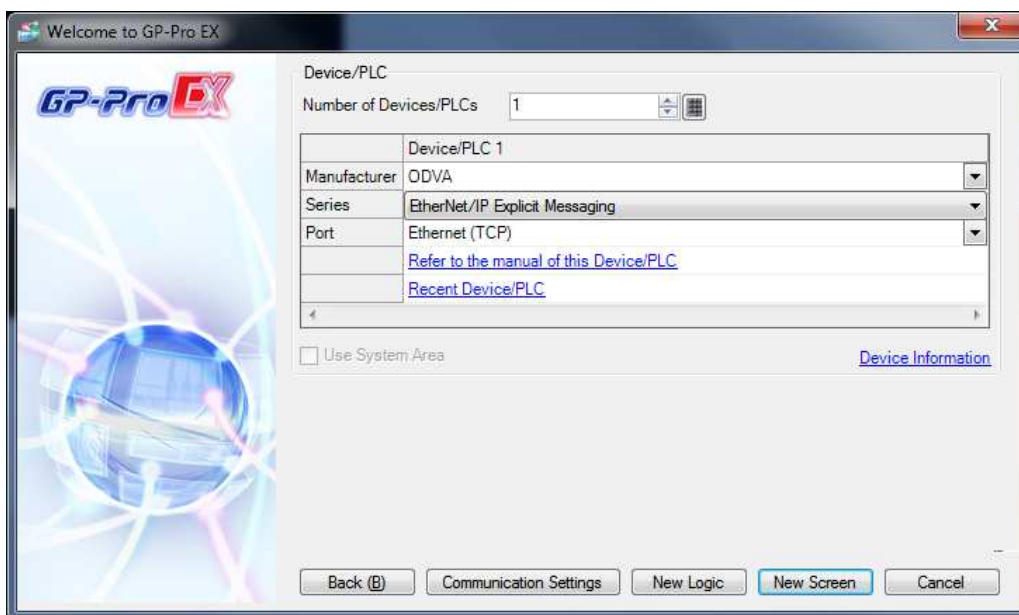
Download the project to the Pro-face display. Connect a Pro-face HMI and the bus coupler with an Ethernet cable.

EtherNet/IP Configuration in GP-Pro EX

When creating a project in GP-Pro EX, follow these steps to configure communications to a Phoenix bus coupler via Implicit messaging.

Note: The Implicit messaging feature requires GP-Pro EX v4.02 or later and ODVA EtherNet/IP Explicit Messaging device driver v1.14.04 and later.

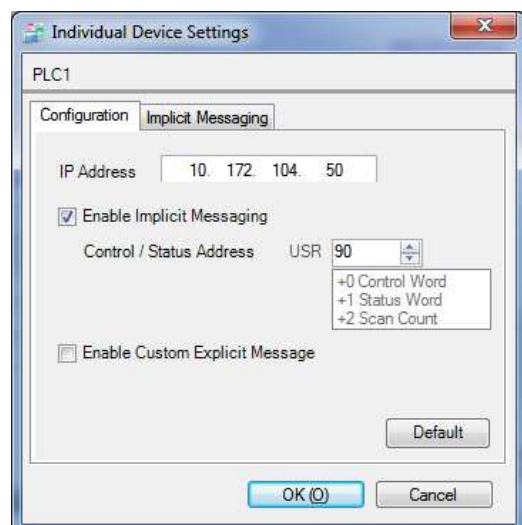
1. When beginning a new project file select the Display Series and model. On the Device/PLC screen select ODVA. For the Series select “EtherNet/IP Explicit Messaging”.



2. Go to the “Device/PLC” tab
3. In the “Device Specific Settings” section click on the button with the PLC image on it. The dialog box should look like the image below.
4. Enter the IP Address of the Phoenix Ethernet bus coupler.

Implicit Messaging Configuration

5. Check the “Enable Implicit Messaging” dialog box. *Note: If this selection is missing please upgrade your ODVA PLC/Device driver.*
6. The GP-Pro EX ODVA EtherNet/IP driver needs a small array of 3 words allocated in USR memory for Control/Status. For the sample project we used USR90.

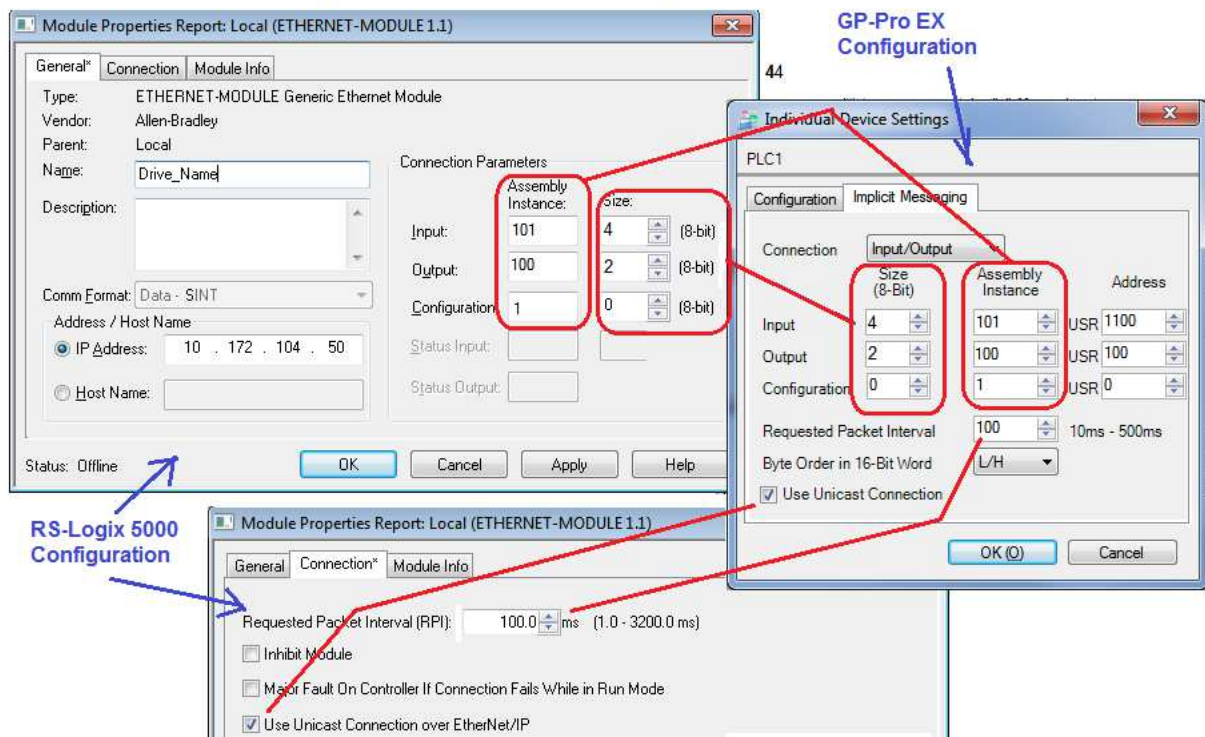


Tip: We do not recommend using the default address USR0 anywhere in a completed project.

- Click on the "Implicit Messaging" tab. To obtain entries for this tab refer to the device manufacturers' instructions for configuring their device as an implicit generic I/O device. (see illustration below) Phoenix provides this information in Application Note 8468: AH EN ETHERNET/IP + RS LOGIX at:
<https://www.phoenixcontact.com/online/portal/us?uri=pxc-oc-itemdetail:pid=2897758&library=usen&tab=5>

Note: If the manufacturer offers instructions for configuring their device as a generic device in a ControlLogix class PLC the settings in GP-Pro EX will be very much the same.

Similarity Between RS-Logix Generic Ethernet Module Configuration and GP-Pro EX Configuration



- Enter the bus coupler Input, Output, and Configuration Size and Assembly Instance information. The Produced (Input) and Consumed (Output) Sizes are obtained from the Phoenix bus coupler web page. The correct Assembly Instance setting for each item is required even if the Size is 0. The sample project "APNT1226_Phoenix_Implicit.prx" I/O configuration is:

	Size (8-bit)	Assembly Instance
Input	4	101
Output	2	100
Configuration	0	1

9. Choose and enter the Addresses in GP-Pro EX where the I/O data exchanged with the Phoenix bus coupler will be located. For the sample project we chose USR1100 - USR1102 for Input data and USR 100 – USR 102 for output data. These addresses are used by GP-Pro EX to access the device I/O.

Start Implicit Messaging

Implicit messaging does not automatically start in the Pro-face display. In logic or scripting first set the appropriate initial values for the device outputs. Then start Implicit messaging. Set bit 0 of the first word of the Implicit messaging Control/Status Address to run Implicit Messaging. In the sample project the bit is USR9000. (USR90 bit 00).

Note: System variable [PLC1]#H_ScanOffControl turns on and off the entire device driver which is enabled by default. It is a different function than the Implicit Messaging Control Word.

Create the screens

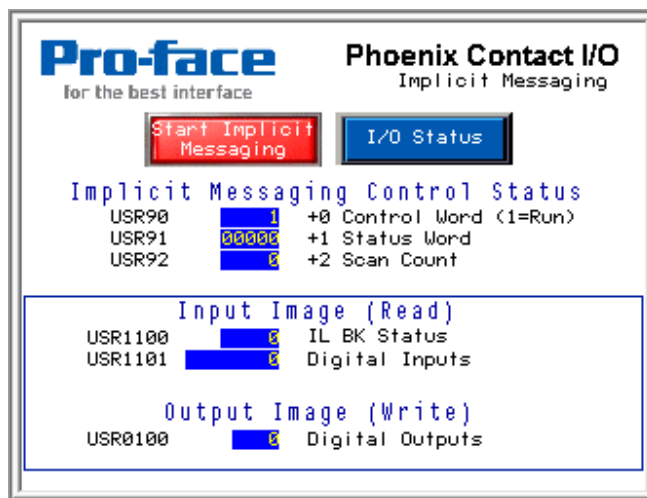
Only a simple script or logic rung is required to start Implicit Messaging in the Pro-face display. Logic or scripting in GP-Pro EX is not required for basic operation of the Phoenix I/O. Simply create the buttons and data displays you need for your project and download it to your Pro-face display.

About the Sample Project Screens

Two sample projects are included with this application note for your convenience. The screen shots below are from the project "APNT1226_Phoenix_Implicit.prx ". The second project demonstrates the changes in configuration when and analog input and analog output are added.

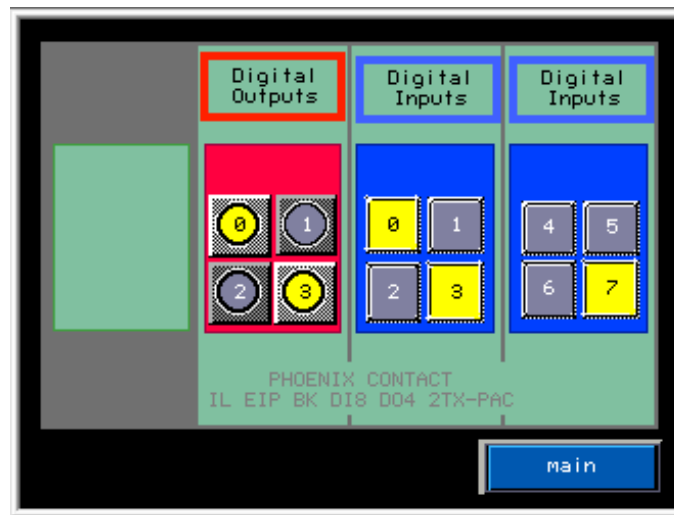
Screen B1; Main Panel

The first screen displays the Implicit Messaging control/status words and all data exchanged with the Phoenix bus coupler and I/O. On power up the data displays will all be zero and Implicit Messaging will be inactive. Press the red button to start Implicit I/O messaging.



Screen B2: I/O Status

Demonstrates I/O operation using EtherNet/IP Implicit I/O Messaging.



For more information on Pro-face and our full line of HMI, Operator Interface and Industrial PC products please visit our web site at www.profaceamerica.com.

For technical support email: support@profaceamerica.com or call: 800.289.9266.

© 2014 Pro-face America. Specifications may change without notice. Pro-face is a registered trademark of Digital Corporation. Other brand or product names are the property of their respective owners.