



Connection Guide

IF2030/ENETIP

Interface module



1 General

This document describes how to connect IF2030/ENETIP with an *Allen-Bradley PLC*. IF2030/ENETIP is an interface module to enable integration of Micro-Epsilon sensors (controller) equipped with either an RS422 or RS485 interface with EtherNet/IP networks, including Rockwell Automation PLC environments. This guide refers to *Studio 5000 Automation Engineering & Design Environment™ (V30.00.00)*, mainly *Logix Designer®*. Other versions may differ in the design of the graphical user interface and their range of features.

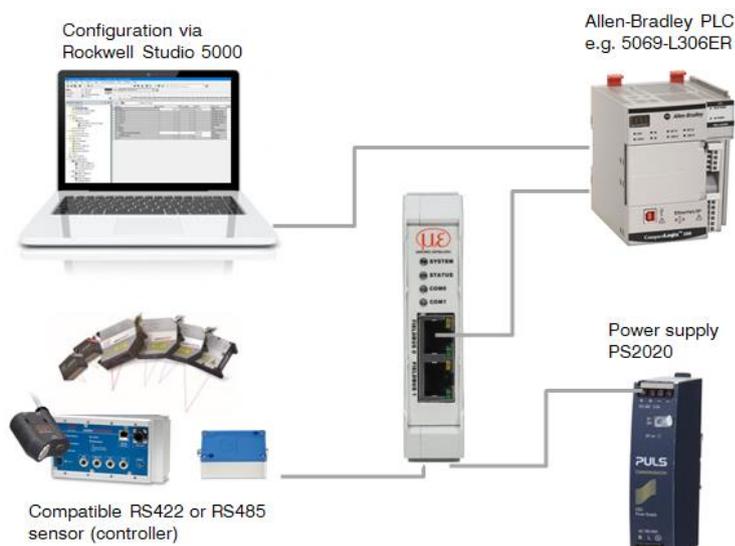


2 System design

Please prepare the following equipment to connect an IF2030/ENETIP-compatible sensor (controller) with an Allen-Bradley PLC environment:

- Allen-Bradley Logix controller
- Micro-Epsilon sensor (controller) with RS422 or RS485 interface, incl. corresponding connection cable
- IF2030/ENETIP interface module, incl. EDS file (download from the Micro-Epsilon website or data storage device included in the scope of supply)
- Computer with installed Rockwell software (*Studio 5000*)
- 2x Ethernet cables
- Power supply PS2020 (optional)

The ► **Operating Instructions** contain information on the connectable Micro-Epsilon sensors (controllers), relevant IF2030/ENETIP interfaces, and details including the conversion for the output of distance values. The schematic below shows you how to connect the previously mentioned components in order to project the PLC.



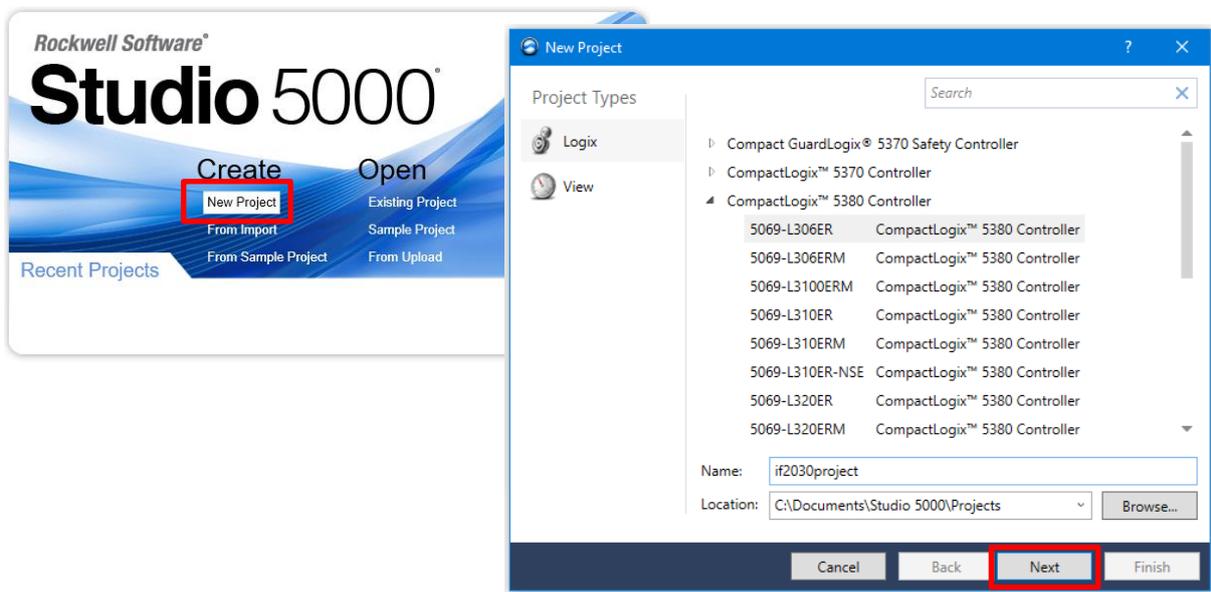
3 Basic settings and configuration

3.1 Importing IF2030/ENETIP into the software

1. Establish communication with your PLC. Make sure the latter is properly connected to your computer and running. Launch the *Studio 5000* software. Therefore, either double-click the corresponding Desktop icon or call up the software tool via the Start Menu of your operating system.

2. Click **New Project** under the **Create** section at the top left of the displayed Splash Screen. The **New Project** pop-up appears showing a list of possible controllers (CompactLogix, GuardLogix, ControlLogix etc.). Select the CPU series you are using (in this example “5069-L306ER”) in this device list. Enter a project name, browse to your desired project location, and confirm by clicking the **Next** button.

Note: The specified name also signifies your PLC in the project (cf. labeling of first folder in the **Controller Organizer** window).



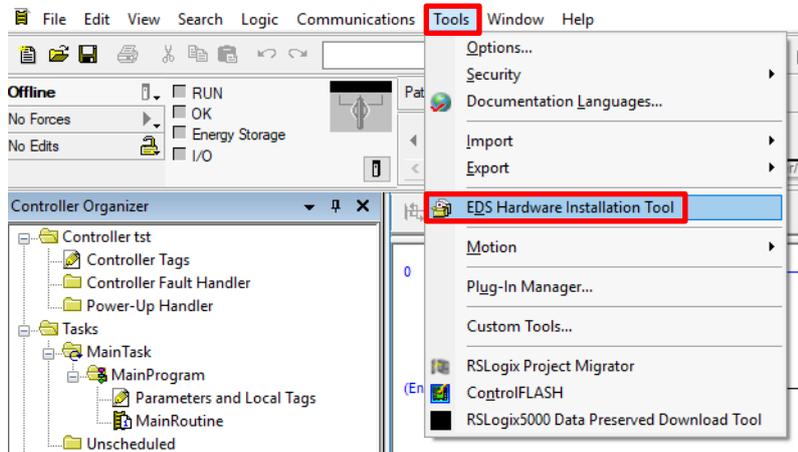
3. Now you can choose a **Revision** of firmware and software (if you have multiple installations). You may also define a **Security Authority**. Depending on your controller, there might be further setting options (**Chassis Type**, **Slot**, etc.).

Unless otherwise indicated, simply leave everything at the defaults and click the **Finish** button. You end up in the main view of *Logix Designer*®.

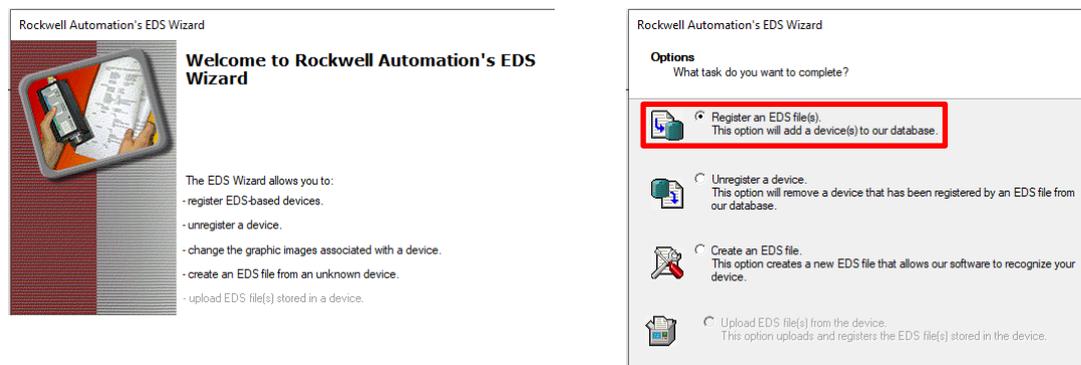
Note: The *Logix Designer*[®] (previously RSLogix™ 5000) is the first component in the Studio 5000 environment. It is the product used to program Logix controllers for discrete, drive-based process, batch, axes motion, and safety solutions.

4. To start the import procedure of the IF2030/ENETIP's EDS file, navigate to **Tools** in the Main Menu and click **EDS Hardware Installation Tool**.

Note: An Electronic Data Sheet (EDS) is an ASCII text file describing the features of the EtherNet/IP device concerned and is used by software tools for configuration purposes. It contains, among other things, identity information to allow a tool to recognize a unit.

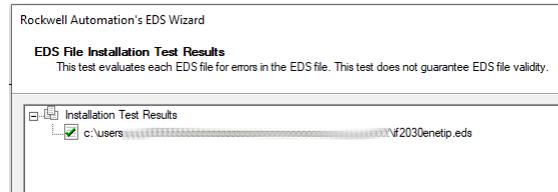
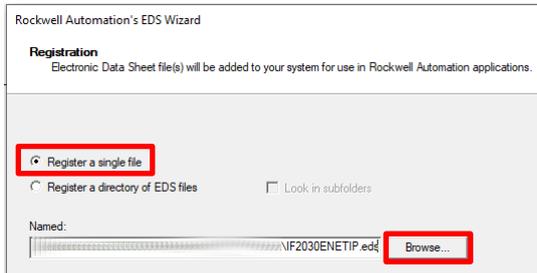


5. Rockwell Automation's *EDS Wizard* is started. Click the **Next** button and follow the single steps in the registration dialog. Select the option **Register an EDS file(s)** and click the **Next** button again.

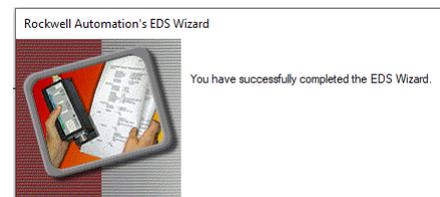
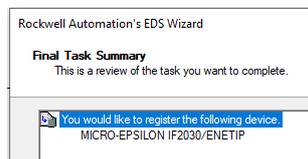
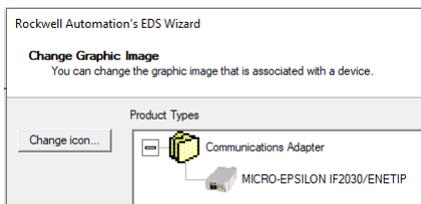


6. Choose **Register a single file**, click the **Browse** button, and select the path for the file **"IF2030ENETIP.eds"** in the open **Dialog** box. Confirm by clicking the **Next** button. The wizard tests the file prior to the installation. Trigger this step by another click on **Next**.

Connection Guide IF2030/ENETIP



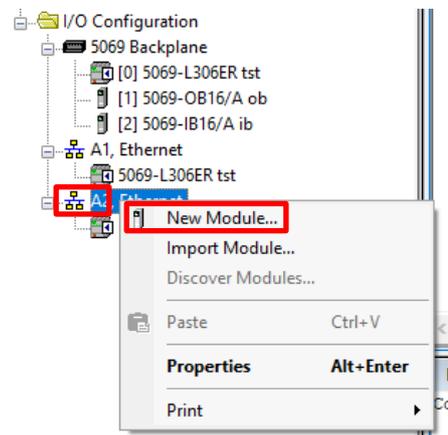
7. Now it will be possible to assign images to the nodes, but this is negligible. Click the **Next** button to continue and end the installation. The EDS Wizard closes with a click on the **Finish** button.



3.2 Configuring the IF2030/ENETIP module

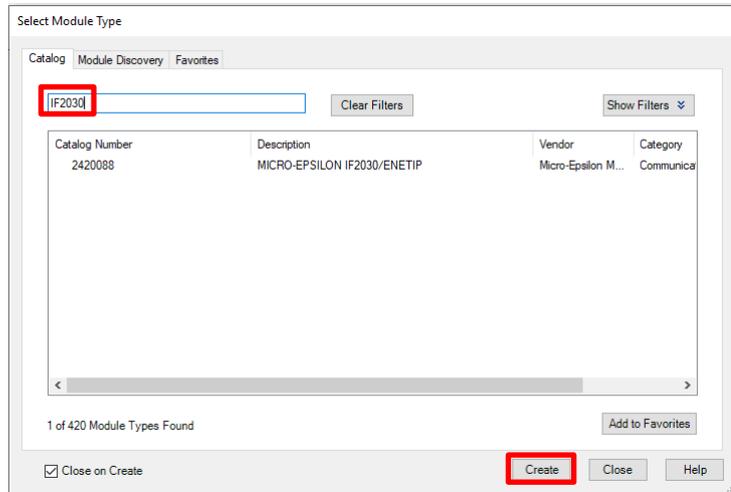
8. After successful registration, IF2030/ENETIP can be used in the PLC project. Switch to the **Controller Organizer** window on the left side of the screen. Right-click the Ethernet symbol to access a **Shortcut** menu and select **New Module**.

Note: Alternatively you can follow the path **File** → **New Component** → **Module** in the **Main Menu** to add a new device to the **EtherNet/IP** network.



9. The Select Module Type window is opened. Search for “IF2030” in the Filter Field and select the interface module from the Catalog Number list. After that, click the Create button.

Note: Of course you can also scroll through the entire list or use filters (via the Show/Hide Filters button).

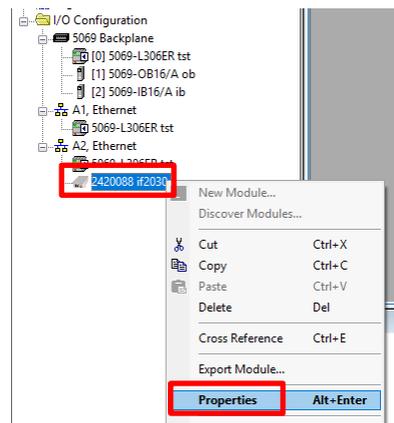


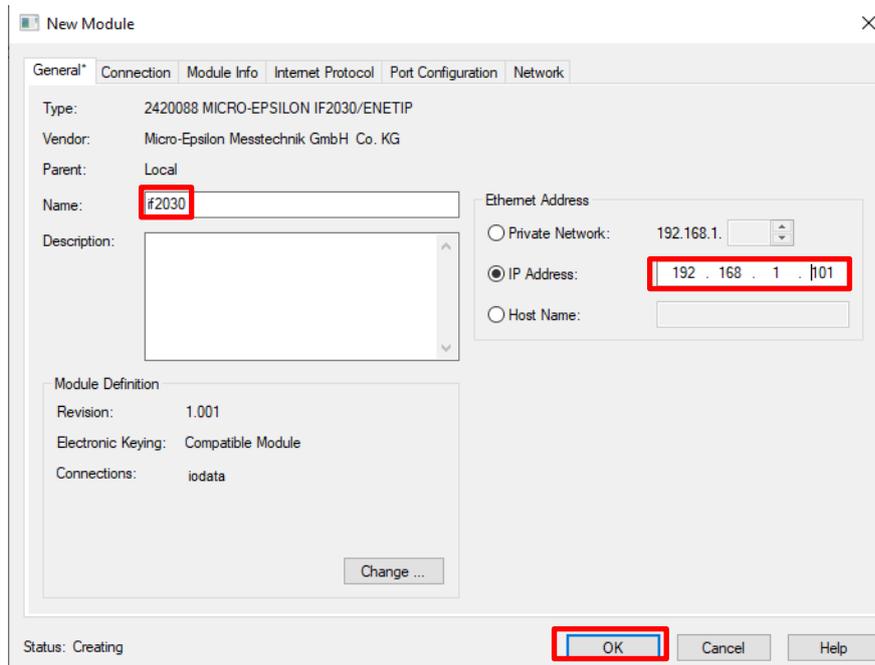
If IF2030/ENETIP does not appear in the list of registered devices, either its EDS file is not registered or the installation failed.

10. When the Module Properties window does not open automatically, you can do so by right-clicking IF2030/ENETIP in the Controller Organizer window and selecting the Properties item or simply double-clicking the interface module.

Insert a name for the interface module and set its IP address (cf. ► **Section 4**). Follow the dialog to complete the device configuration.

Note: You can click the Change button if there is any change you would like to make. For general purposes however, there is no need to change the parameters from the imported EDS file which can be used directly for connection.





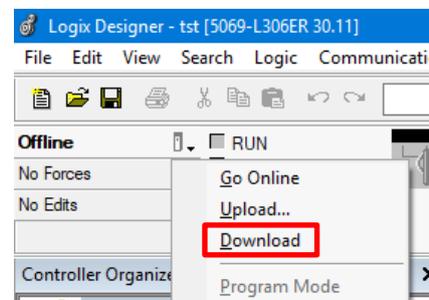
11. Save the project. Either use the File menu or the  symbol button in the Standard Toolbar for this purpose.

3.3 Loading the configuration into the PLC

12. The PLC must finally execute the project. First of all, the project has to be downloaded to your processor. In case you have several units available, extend the drop-down menu with a click in the Main Menu on Communications and choose Who Active. Pick the processor that should execute your project in the displayed Who Active window.

Trigger the download process, e.g. via:

- Who Active window and Download button
- Communications in the Main Menu and Download item
-  symbol button in the Online Toolbar and Download item



You will be asked to verify the download. Click Download to proceed.

Note: Several message boxes may appear depending on your configuration, especially when the current content of the PLC (program and data) is overwritten. The software guides

you through the download process. It is therefore important to follow the directions and prompts. For instance, it might be necessary to switch the PLC's mode from running to programming in order to interrupt the current program and overwrite it with a new one. Online editing and downloads are not possible in the `Run` mode!

13. After the project is downloaded, it can be placed online and executed in the processor. The final message you will see is whether you wish to go online. Confirm this by clicking the `Yes` button.

The `Online` state is indicated in green in the `Online` Toolbar. Now the processor scans and updates IO according to your project, so that *Logix Designer*[®] displays the CPU's program and data information.

4 IP address / BOOTP default configuration

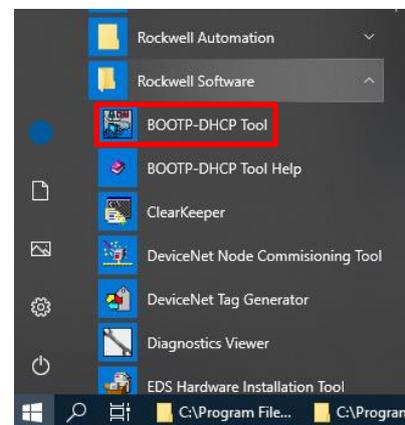
A BOOTP default configuration is mandatory within a Rockwell PLC network. This means that your IF2030/ENETIP requires an operational IP address!

There are different ways to define a network IP address. This guide describes the path you must take using the *BOOTP-DHCP Tool* (recommendation: from version v3.03.00) which is part of the Rockwell software package. This standalone server assigns an IP address to Ethernet devices. Setting additional Transport Control Protocol (TCP) parameters is also possible.

Note: To operate an EtherNet/IP network, you must define an IP address, subnet mask, and gateway. However, if you use DNS addressing or refer to the IF2030/ENETIP by a host name in the message (MSG) commands, you must also define the host and domain name as well as the addresses of the primary and secondary DNS servers.

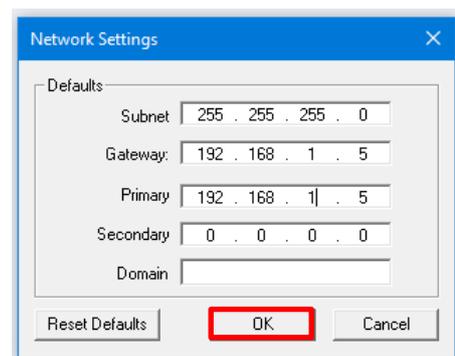
1. Ensure that you have the hardware (MAC) address of IF2030/ENETIP. The workstation that you use to set the IP address should only have one connection to the EtherNet/IP network on which the interface module resides.

2. Start the *BOOTP-DHCP Tool*. Most likely you will find it in the Start Menu under Programs → Rockwell Software → BOOTP-DHCP Tool. You may be asked to select the network interface if you are using several network cards.



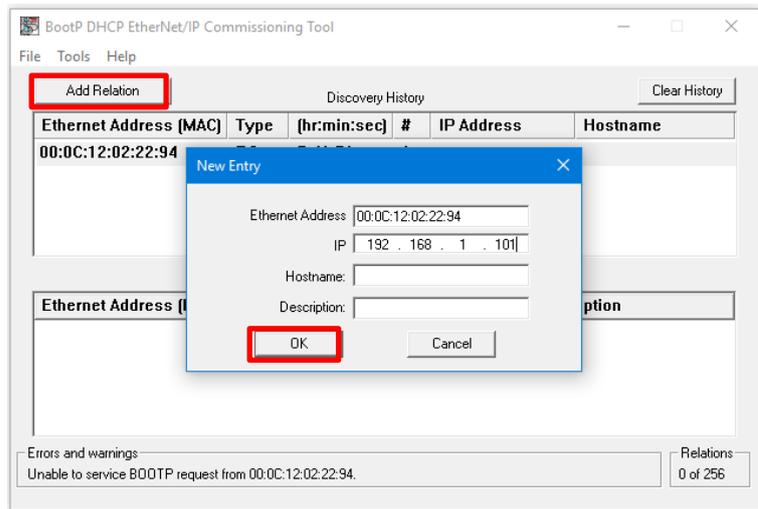
3. If you are using this tool for the first time, you must specify the network settings. Therefore go to Tools → Network Settings. Enter your network parameters and confirm with a click on the OK button.

Typical standard parameters are shown in the screenshot alongside.



In the background, IF2030/ENETIP will either broadcast its MAC address or a message requesting the BOOTP or DHCP server to respond with an IP address.

4. The Request History window is displayed with the MAC addresses of all devices that issue BOOTP or DHCP requests. Select IF2030/ENETIP and click the Add Relation button or double-click the device. The New Entry dialog box appears.

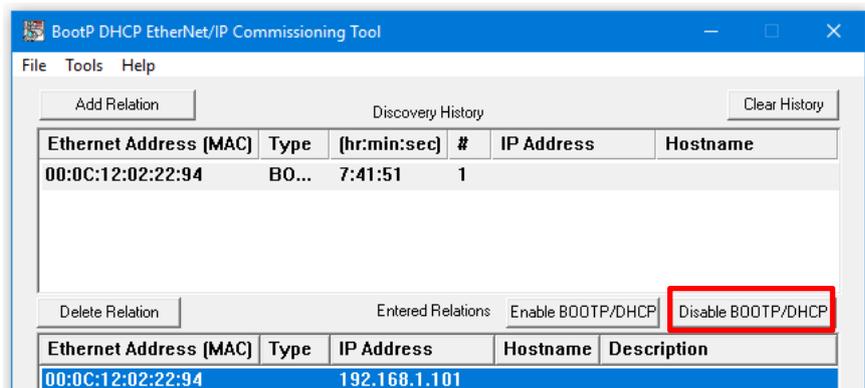


5. Enter the IP Address. Hostname and Description are optional. Click the OK button to confirm your data and establish a relation between MAC and IP address.

Hint: You can see whether your assignment was successful in the IP Address column.

6. To assign this configuration on the device, wait for IF2030/ENETIP to appear in the Relation List panel. The latter happens when the interface card sends its next request, as the server then responds with the configured IP address.

Now disable the BOOTP utility in IF2030/ENETIP. Select the interface module in the Relation List panel and click the Disable BOOTP/DHCP button in the middle right of the dialog box, so that the current IP configuration is not cleared on future power cycles. This way, a static IP is generated.

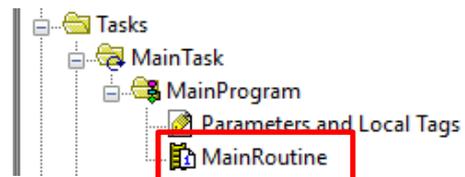


The device now uses the assigned configuration and does not issue BOOTP or DHCP requests after power is cycled on the controller. Close the dialog box to continue with your project configuration.

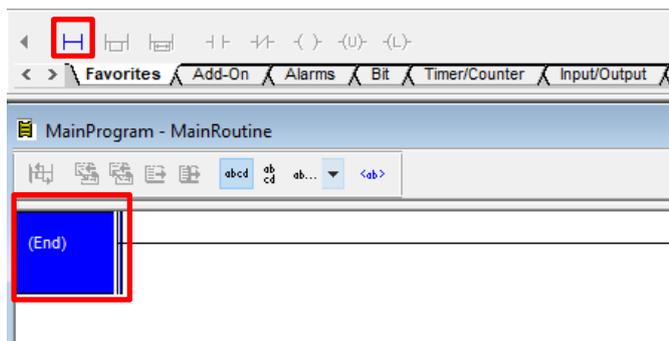
5 Accessing input and output data

There are multiple different ways to configure the communication between IF2030/ENETIP and the Allen-Bradley PLCs. This section focusses on the so-called message (MSG) instructions.

1. Go to the Controller Organizer and double-click the “MainRoutine” which is normally found under Task → MainTask → MainProgram. This opens the empty routine in the Main Window.

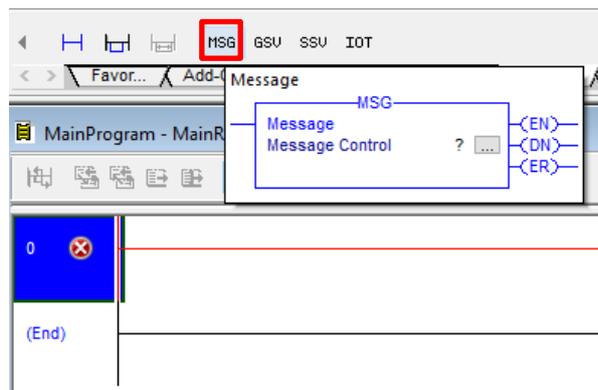


2. Insert a new rung. Therefore, either double-click the (End) entry or click / drag-and-drop the H symbol button in the Language Element Toolbar grouped under the Bit tab.



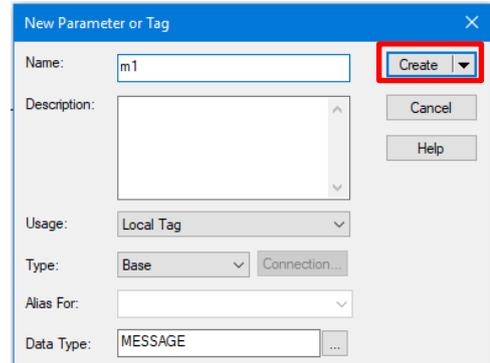
Note: The red color of rung 0 and the circled “x” only indicate that this rung is still incomplete. The software automatically verifies your rungs to support you in programming.

3. Add a new message instruction to the newly created rung. This language element is located in the Input/Output group. Click the MSG symbol button and drag it to rung 0.



Hint: A green dot indicates the position where you place your element.

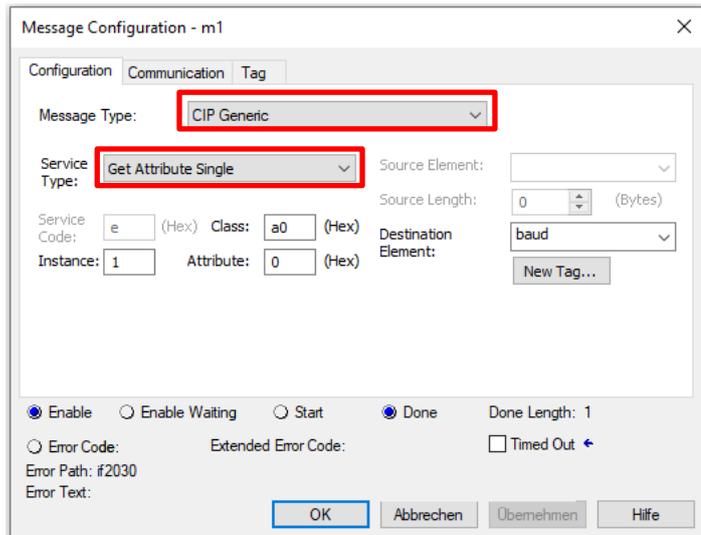
4. Double-click on the “?” of the new MSG element that might be highlighted in blue when currently selected. Type in the desired name (“m1” in our example).



This results in an undefined tag. To define it, right-click the tag and select New ‘m1’. The New Parameter or Tag window appears with the adopted name “m1” and an already predefined MESSAGE data type. Click Create to confirm and store the tag in the local tag database.

Note: Of course, you can right-click the “?” directly and select New Tag. Specify the attributes for the tag according to your purposes.

5. To configure the message instruction, click the [...] symbol button to the right of the tag’s name. The Message Configuration window appears.



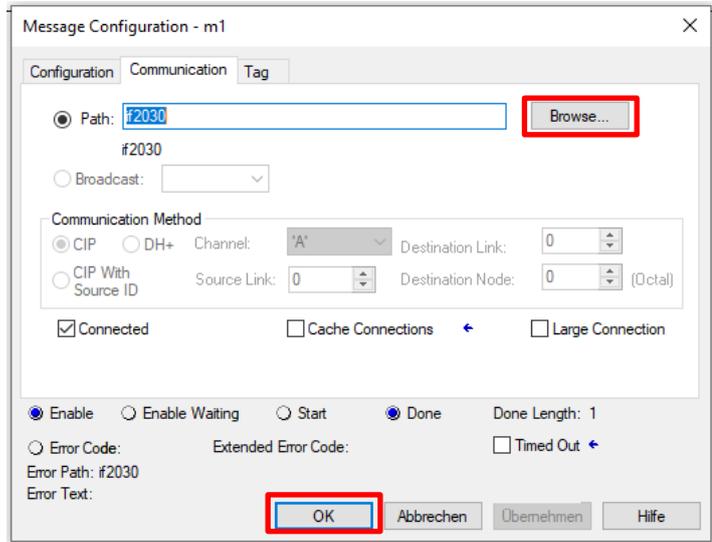
Select CIP Generic as message type from the drop-down list. In this example, data should be read from IF2030/ENETIP, so choose Get Attribute Single as service type.

Note: CIP Generic distinguishes two service codes:

- Get Attribute Single reads a specified block of data from IF2030/ENETIP and places the data in the tag indicated as Destination Element parameter.
- Set Attribute Single writes from a tag in the PLC to a block of data in the interface module. The Source Element parameter indicates which tag to use as data source. This time, it is necessary to specify the Source Length parameter as the size in bytes of the data to be transferred.

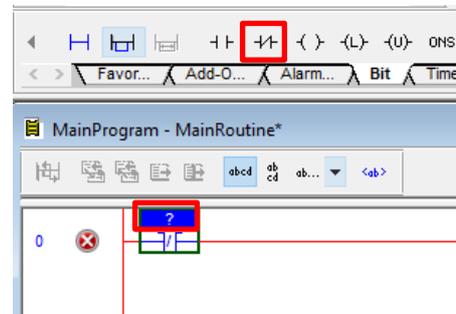
If not already done in advance, create the “baud” tag. Enter the name for the Destination Element, click New Tag, and proceed as described in ► Step 4 except with the difference that DINT should be chosen as data type.

6. Finally, specify the device that is sending data. Switch to the Communication tab and click the Browse button. This opens the Message Path Browser window where you select IF2030/ENETIP out of the I/O device listing. Confirm twice by clicking the OK buttons to come back to the main view showing your routine.



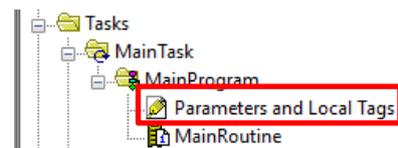
Note: The MSG instruction only runs once when the rung is true. If you want it to continually run, logic that resets the rung repeatedly is required. A simple way is to use the enable bit (EN) of the message element.

For this purpose, insert an Examine Off (XIO) element in your rung in front of the MSG element by clicking the  symbol button. You find it in the Bit group of the Language Element Toolbar. Double-click the “?” of this new element and define the name as “m1.EN”. This will repeatedly reset the rung so that the instruction will continually execute.



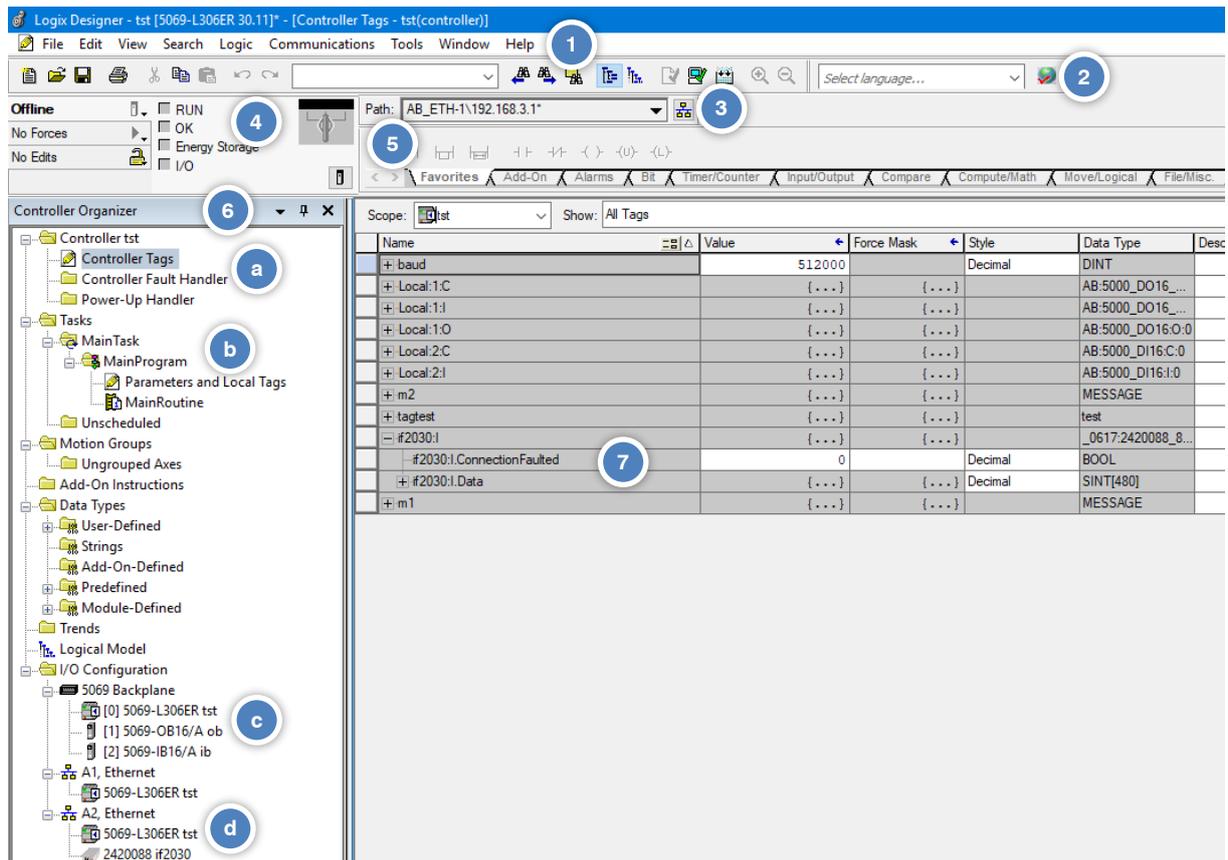
7. Regardless of whether you decided to run the instruction once or continuously, you have to transfer this new project configuration to your PLC. Hereto follow the instruction in **► Section 3.3.**

To view the values sent from IF2030/ENETIP to the PLC, open the tag set of your main program. For this, double-click Parameters and Local Tags in your Controller Organizer tree structure. This displays the program’s defined (local) tags in the Main Window. Switch to the Monitor Tags tab in the lower left corner of the window and expand the “baud” tag with a click on the  symbol in front of it.



6 Appendix – Logix Designer®

The screenshot below illustrates the main view of *Logix Designer*®. This guide refers to some of its elements where selected areas are explicitly highlighted.



1. Main Menu

Located across the top of the window it includes features resembling many Windows-based products, but also software-specific ones. Moreover it allows modifying the software's appearance.

2. Standard Toolbar

First toolbar appearing at the top of the screen with standard Windows functionalities.

3. Path Toolbar

This provides a reference to the communications path (set once a user goes online) used by a project. It is needed to configure communication between a personal computer and the controller. The path simply defines the route to send a project to the correct controller.

4. Online Toolbar / Controller Faceplate

This allows users to go online, upload, download, enable forces, or check for online edits. It enables status monitoring of the controller and its activities through color codes (e.g. modes, states, or faults). The latter mimic the LEDs on your controller. The symbol button in the bottom right takes you directly to the controller properties window.

5. Language Element Toolbar / Ladder Common Logic Toolbar

This provides access to the instruction set which is additionally grouped according to functions (via different tabs).

6. Controller Organizer

Organized like Windows Explorer, this graphical representation of the controller file's contents gives users access to different sections of a project, especially the tag databases and the programs which are executed by the controller. A *tag*, in general, is a name or more precisely a text-based memory address. Keep in mind that these objects (folders / tree items) change depending on the specific application.

a. Controller with controller-scoped tags

Global variables whose data can be used by every task or program within the controller application. A double-click on the first folder brings the user to the controller properties.

b. Tasks

Contains *tasks* (continuous, periodic) the controller will be executing. Each task has one or more *programs* (scheduled, unscheduled) and they will include *routines* containing the executable code of a program. Most likely, the code is specified in Ladder Logic, but there are other languages too. In other words: this section contains everything that allows you to run certain programs.

c. Backplane modules

Whereas the *chassis* physically holds the modules which allow the system to interface field devices and connects them, the *backplane* is the part of the chassis that sends the signals between the modules. It operates as a mini network, similar to the control bus. The chassis has *slots* referring to the available spaces which are labeled starting from 0.

d. Ethernet ports

7. Main Window showing IF2030/ENETIP input data

On the one hand it shows the programming environment for the language being used. So, routines can be displayed for monitoring or editing. On the other hand (as in the screenshot) the tag database is shown and can be edited. Take care of the data scope when you are monitoring or editing your tags (cf. scope attribute at the top left of the window with selection box).



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