

# Practices Guide

## ID-40 to Sysmac PLC via EIP

ID-40

Sysmac PLC



Network  
Connection  
Guide

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# 1 Related Documents

This document describes the Sysmac library and procedure for connecting the ID40 of Omron-Microscan to NJ- or NX-series Machine Automation Controller (hereinafter referred to as the Controller) via Ethernet/IP and provides the procedure for checking their connection.

It also contains the procedure for performing EtherNet/IP tag data link using the EtherNet/IP settings of the project file that is prepared beforehand.

To follow the procedure the next files are needed. Please refer to the next table:

Name	File Name	Version
Sysmac Studio Library project file (extension: slr)	OCR_library_v100.slr	Ver. 1.00

## 2 Related manuals

The table below lists the manuals related to this document.

To ensure system safety, make sure to always read and heed the information provided in all Safety Precautions, Precautions for Safe Use, and Precaution for Correct Use of manuals for each device which is used in the system.

Cat. No.	Model	Manual name
W500	NJ501-[] NJ301-[] NJ101-[]	NJ-series CPU Unit Hardware User's Manual
W535	NX701-[]	NX701- series CPU Unit Hardware User's Manual
W578	NX1P2-[]	NX1P2- series CPU Unit Hardware User's Manual
W593	NX102-[]	NX102- series CPU Unit Hardware User's Manual
W556	NY512-[]	NY-series Industrial Box PC Hardware User's Manual
W557	NY532-[]	NY-series Industrial Panel PC Hardware User's Manual
W501	NJ501-[] NJ301-[] NJ101-[] NX701-[] NX102-[] NX1P2-[]	NJ/NX-series CPU Unit Software User's Manual
W506	NJ501-[] NJ301-[] NJ101-[] NX701-[] NX102-[] NX1P2-[]	NJ/NX-series CPU Unit Built-in EtherNet/IP™ Port User's Manual
W563	NY5[]-[]	NY-series IPC Built-in EtherNet/IP™ Port User's Manual
W504	SYSMAC-SE2[]	Sysmac Studio Version 1 Operation Manual
84-9007234-02	ID-[]	MicroHAWK ID-20 / ID-30 / ID-40 / ID-45 User Manual

## 3 Precautions

- (1) When building an actual system, check the specifications of the component devices of the system, use within the ratings and specified performance, and implement safety measures such as safety circuits to minimize the possibility of an accident.
- (2) For safe use of the system, obtain the manuals of the component devices of the system and check the information in each manual, including Safety Precautions, Precautions for Safe Use.
- (3) It is the customer's responsibility to check all laws, regulations, and standards that the system must comply with.
- (4) All rights reserved. No part of this publication may be reproduced, stored in a retrieval system, or transmitted, in any form, or by any means, mechanical, electronic, photocopying, recording, or otherwise, without the prior written permission of OMRON.
- (5) The information in this guide is current as of April 2019.  
It is subject to change without notice because of product's update.

Special information in this document is classified as follows:



### **Precautions for Safe Use**

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Describes precautions on what to do and what not to do to ensure safe usage of the product.

---



### **Precautions for Correct Use**

---

Describes precautions on what to do and what not to do to ensure proper operation and performance.

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### **Additional Information**

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Additional information to read as required.

It contains helpful and reference information for the users.

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### **Copyrights and Trademarks**

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## 4 Ethernet/IP Settings

This section describes the specifications such as communication parameters and tag data link that are defined in this document.

Hereinafter, the Microscan device is referred as the “Destination Device” in some descriptions.

### 4.1 Ethernet/IP Communication Parameters

The communications parameter required connecting the Controller and the Destination Device via EtherNet/IP is given below.

- Set the IP addresses of the Controller and the Destination Device to be in the same range.

### 4.2 Data Types

The following data types are used for the library. All the following Data Types are defined under the **ID40\** Namespace.

#### 4.2.1 Small Input Assembly (Instance 100)

This is a small, lightweight input assembly. Designed to hold 64 bytes of information in the decode data tag with minimal read cycle and device data. Below is a table showing the memory allocation for the assembly.

Data type name	Data type	Destination device data
sID_EIPInput_100	STRUCT	-
USER_DEFINED_TAG_ECHO	ARRAY[0..31] OF BOOL	User Defined Echo signal (32 bits)
COMMAND_ECHO	ARRAY[0..31] OF BOOL	Command Echo signal (32 bits)
OUTPUT_CONTROL_ECHO	ARRAY[0..31] OF BOOL	Output Control Echo signal (32 bits)
READ_CYCLE_SEQUENCE_COUNTER	DWORD	Read Cycle Count
DECODE_DATA_LENGTH	DWORD	Decode Data Length
DECODE_DATA_STRING	ARRAY[0..63] OF BYTE	Data Result (ASCII)

##### 4.2.1.1 User Defined Tag Echo

These are a direct echo of the equivalent fields in the Output (Legacy) assembly (0xC6). They provide the PLC programmer with a method of verifying that the OUT data has been received by the MicroHAWK.

##### 4.2.1.2 Command Echo

These are a direct echo of the equivalent fields in the Output (Legacy) assembly (0xC6). They provide the PLC programmer with a method of verifying that the OUT data has been received by the MicroHAWK.

#### 4.2.1.3 Output Control Echo

These are a direct echo of the equivalent fields in the Output (Legacy) assembly (0xC6). They provide the PLC programmer with a method of verifying that the OUT data has been received by the MicroHAWK.

#### 4.2.1.4 Decode Length

The number of characters found in the decode string

#### 4.2.1.5 Decode Data

Outputted decode data from the unit with one difference. Preamble and postamble symbols are not added.

### 4.2.2 Output assembly “Legacy” (Instance 198)

The section describes the output assembly for the Ethernet/IP Communications for the MicroHAWK. All output commands will issue the targeted event in the unit and will be echoed in the input assembly when the unit has responded and issued the event successfully. All parameter changes made on the next read cycle.

Data type name	Data type	Destination device data
sID_EIOutput_198	STRUCT	-
USER_DEFINED_TAGS	ARRAY[0..31] OF BOOL	User Defined signal (32 bits)
COMMANDS	ARRAY[0..31] OF BOOL	Command signal (32 bits)
EXTERNAL_OUTPUT	ARRAY[0..31] OF BOOL	External Output signal (32 bits)

#### 4.2.2.1 User Defined Tags

This provides the PLC programmer a method of uniquely identifying multiple readers in the system. This field serves no functional purpose in the MicroHAWK. The value sent by the PLC for this field is echoed back to the input assemblies.

#### 4.2.2.2 Commands

The section describes the commands that can be outputted to the unit. The unit will respond to a successful acknowledgment and execution in the input assembly.

Bit field	Command
0	Trigger
1	New Master
2	Buffer Overflow
3-7	Reserved
8	Disable Scanning
9-15	Reserved
16	Clear Read Cycle Report and Counters

17	Unlatch Outputs
18-31	Reserved Outputs

#### 4.2.2.3 External Output

This sub section details the External Output bit field for the Output Assembly.

Bit field	Command
0	Out 1
1	Out 2
2	Out 3
3-31	Reserved

### 4.3 Decoded data from the ID barcode reader

Definition of the data type to access the response/output areas.

Data type name	Data type	Destination device data
sID_Decode_Data_Ary	STRUCT	-
Decode_Data	ARRAY[0..9] OF STRING[64]	Up to 10 Decode Data can be received from the ID[[]] device

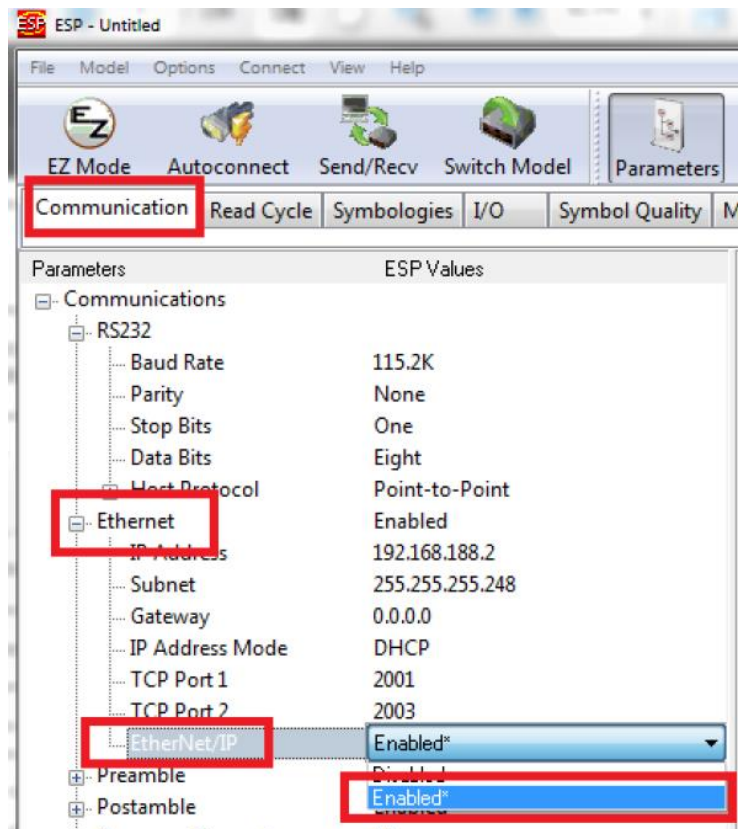


## 5 Set up ID-40

This section describes how to set up the communication protocol (on ESP and Weblink) and the trigger configuration on the ID-40 (only explained through Weblink).

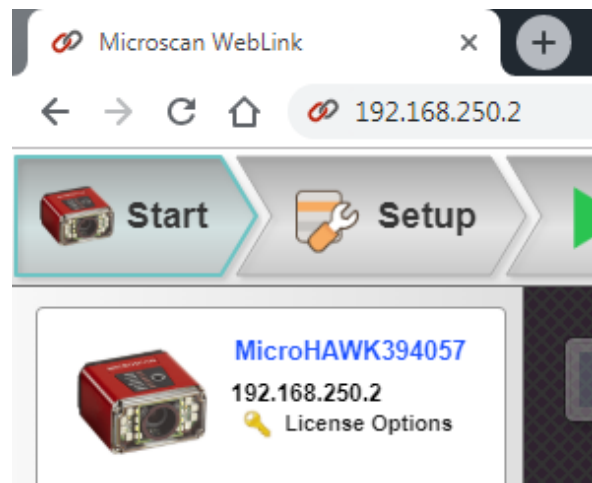
### 5.1 ESP

- 1 Go to the communications tab in ESP and under Ethernet there will be a node called EtherNet/IP. On the right, click the dropdown box and select **Enabled**



## 5.2 Weblink

- 1** Open a web browser and type the reader's IP address in the web browser's address bar

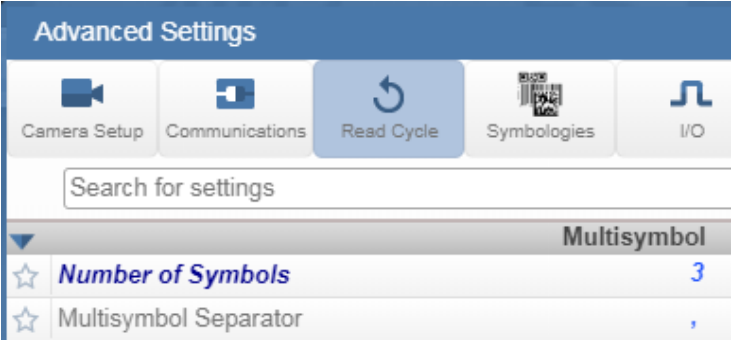
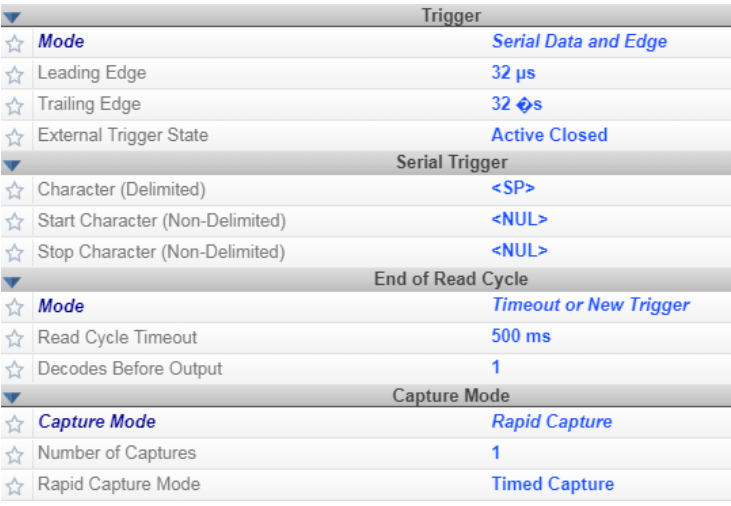

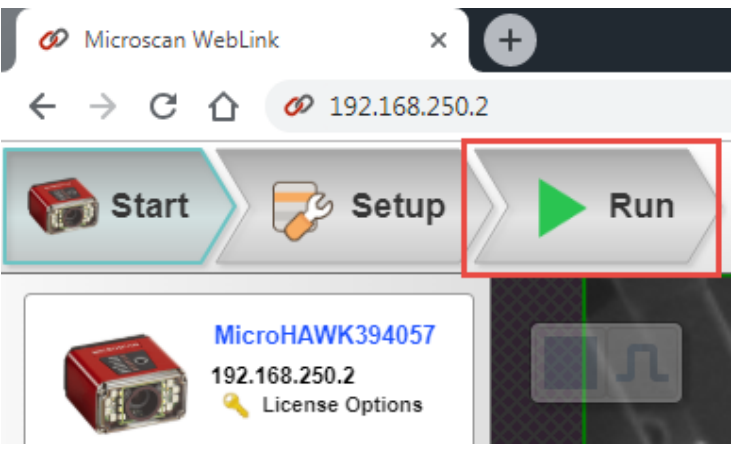


- 2** Click on the application setting button and **Advanced** for setting up the correct parameters



- 3** Click on **Communication** tab to edit the required parameters. Make sure the IP is in the desired range and the Industrial Protocol is set to EtherNet/IP. Also make sure that Byte Swapping is disabled (In this example the ID40 will have IP Address: 192.168.250.2) Click on Apply when the correct parameters are set

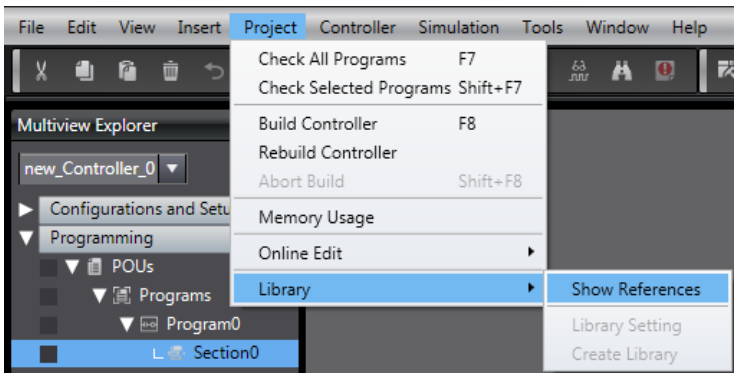
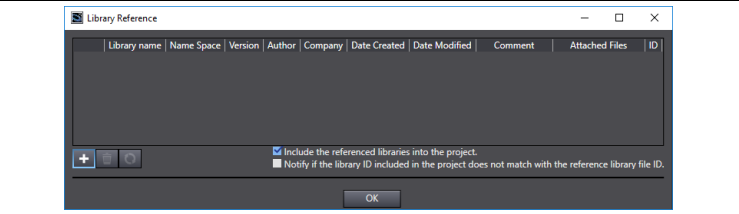
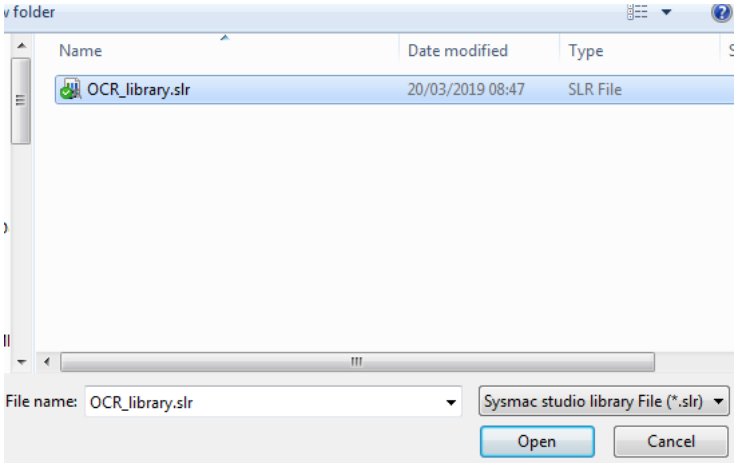
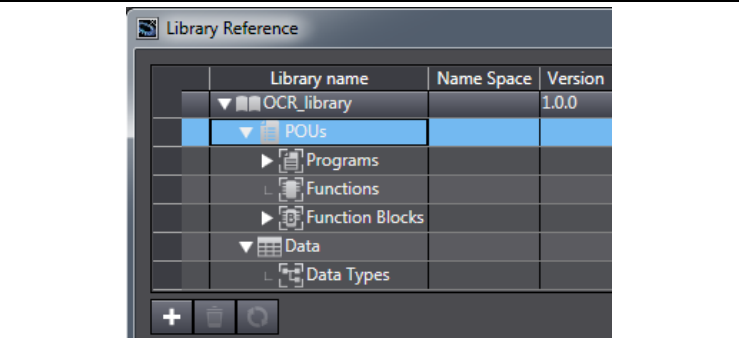
Advanced Settings	
Camera Setup	Communications
Read Cycle	Symbologies
I/O	Symbol Quality
Search for settings	
RS232 A	
Baud Rate	115.2K
Parity	None
Stop Bits	One
Data Bits	Eight
Ethernet	
Ethernet	Enabled
IP Address	192.168.250.2
Subnet	255.255.255.0
Gateway	10.4.5.200
IP Address Mode	Static
TCP Port 1	2001
TCP Port 2	2003
Search and Configure Mode	Enabled
EtherNet/IP	Enabled
Ethernet/IP Byte Swapping	Disabled
PROFINET	Disabled

<p><b>4</b> In the library described in this connection guide you will be able to receive up to 10 Number of Symbols (Barcodes). You can only use one of the following separators:</p> <p><b>Comma ‘,’</b>  <b>Tab ‘\$T’</b>  <b>Semicolon ‘;’</b>  <b>Space ‘ ’</b></p>	
<p><b>5</b> To select the trigger functionality, go to the Read Cycle and setup:</p> <p><b>Trigger</b>          Mode = Serial Data and Edge</p> <p><b>End of Read Cycle</b>          Mode = Timeout or New Trigger</p> <p><b>Capture Mode</b>          Capture Mode = Rapid Capture</p> <p>(Other setting can be set depending on customer application)</p>	
<p><b>6</b> After changing the settings, you need to <b>Save</b> all settings to the device's flash memory.</p>	
<p><b>7</b> Go to <b>Run</b> mode so the device is waiting for a new Trigger</p>	

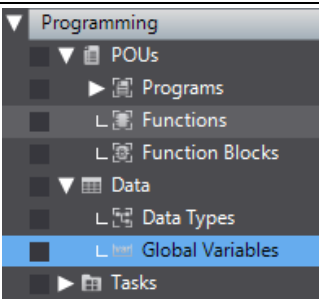
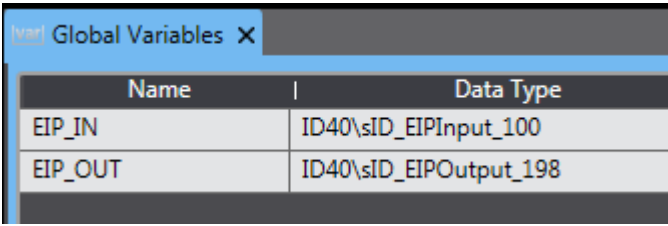
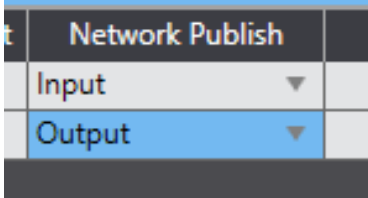
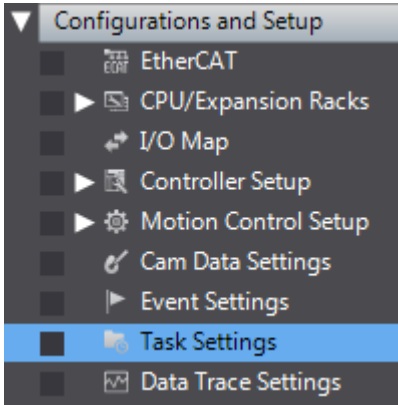
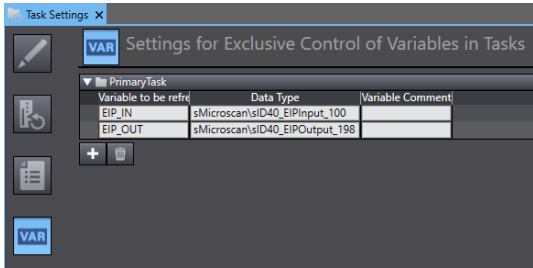
## 6 Set up Sysmac PLC

This section describes how to install the provided library on the Sysmac PLC.

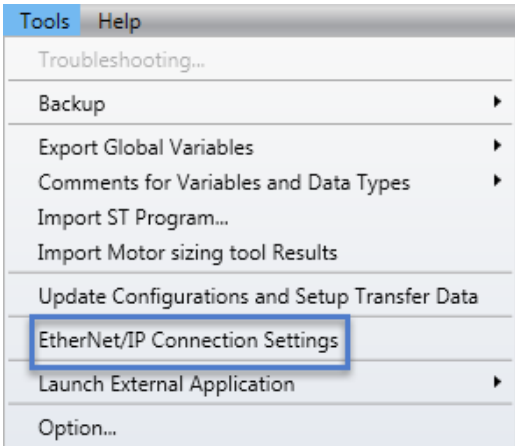
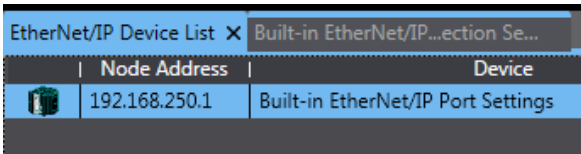
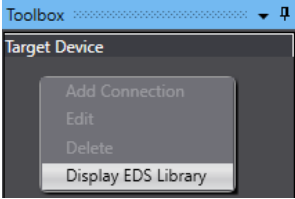
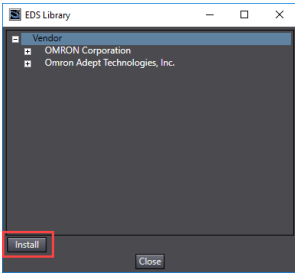
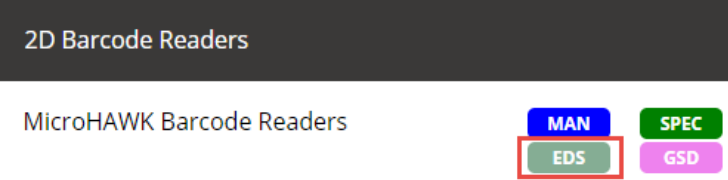
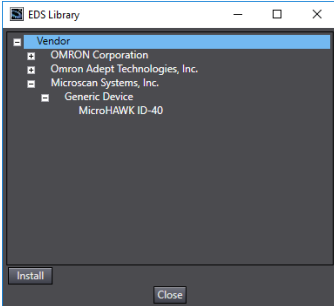
### 6.1 Install the library

<p><b>1</b> Open the <b>Show References</b> via Project - Library</p>																									
<p><b>2</b> Click on the cross on the down left corner</p>																									
<p><b>3</b> Select the library file and click <b>Open</b></p>																									
<p><b>4</b> Now the FB will be in the tool box when you are programming</p>	 <table border="1" data-bbox="831 1547 1321 1861"> <thead> <tr> <th>Library name</th> <th>Name Space</th> <th>Version</th> </tr> </thead> <tbody> <tr> <td>▼ OCR_library</td> <td></td> <td>1.0.0</td> </tr> <tr> <td>  ▼ POU</td> <td></td> <td></td> </tr> <tr> <td>    ▶ Programs</td> <td></td> <td></td> </tr> <tr> <td>    ▶ Functions</td> <td></td> <td></td> </tr> <tr> <td>    ▶ Function Blocks</td> <td></td> <td></td> </tr> <tr> <td>    ▼ Data</td> <td></td> <td></td> </tr> <tr> <td>      ▶ Data Types</td> <td></td> <td></td> </tr> </tbody> </table>	Library name	Name Space	Version	▼ OCR_library		1.0.0	▼ POU			▶ Programs			▶ Functions			▶ Function Blocks			▼ Data			▶ Data Types		
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▶ Data Types																									

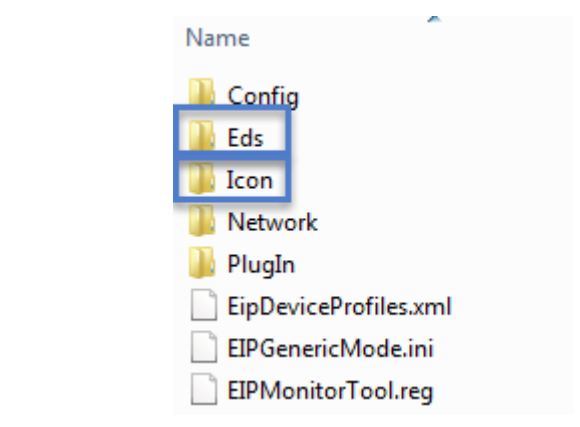
## 6.2 Setting the global variables

<p><b>1</b> When importing the library, you will get the structures premade for the ID40. Double click <b>Global Variables</b> under <b>Programming – Data</b> in the <b>Multiview Explorer</b></p>										
<p><b>2</b> Create two variables: one for the <b>Input</b> and one for the <b>Output</b> for the Tag data link. The Child namespace is <b>ID40\</b> Assign the Network Publish to Input/Output respectively</p>	 <table border="1" data-bbox="740 562 1410 786"> <thead> <tr> <th>Name</th> <th>Data Type</th> </tr> </thead> <tbody> <tr> <td>EIP_IN</td> <td>ID40\sID_EIPInput_100</td> </tr> <tr> <td>EIP_OUT</td> <td>ID40\sID_EIPOutput_198</td> </tr> </tbody> </table>  <table border="1" data-bbox="890 813 1259 1010"> <thead> <tr> <th>Network Publish</th> </tr> </thead> <tbody> <tr> <td>Input</td> </tr> <tr> <td>Output</td> </tr> </tbody> </table>	Name	Data Type	EIP_IN	ID40\sID_EIPInput_100	EIP_OUT	ID40\sID_EIPOutput_198	Network Publish	Input	Output
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EIP_IN	ID40\sID_EIPInput_100									
EIP_OUT	ID40\sID_EIPOutput_198									
Network Publish										
Input										
Output										
<p><b>3</b> Double click <b>Task Settings</b> under <b>Configurations and Setup</b> in the <b>Multiview Explorer</b></p>										
<p><b>4</b> Under <b>VAR</b> tab add the two recently created variables</p>	 <table border="1" data-bbox="807 1467 1342 1733"> <thead> <tr> <th>Variable to be referd</th> <th>Data Type</th> <th>Variable Comment</th> </tr> </thead> <tbody> <tr> <td>EIP_IN</td> <td>sMicroscan\sID40_EIPinput_100</td> <td></td> </tr> <tr> <td>EIP_OUT</td> <td>sMicroscan\sID40_EIPOutput_198</td> <td></td> </tr> </tbody> </table>	Variable to be referd	Data Type	Variable Comment	EIP_IN	sMicroscan\sID40_EIPinput_100		EIP_OUT	sMicroscan\sID40_EIPOutput_198	
Variable to be referd	Data Type	Variable Comment								
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EIP_OUT	sMicroscan\sID40_EIPOutput_198									

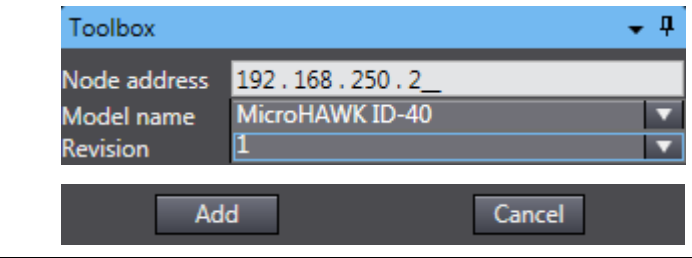
## 6.3 Setting Ethernet/IP settings

<p><b>1</b> Go to <b>Tools</b> and click on <b>EtherNet/IP connection settings</b>.</p>	
<p><b>2</b> Right click on the Controller Device EtherNet/IP were the ID40 will be connected and select <b>Edit</b>.</p>	
<p><b>3</b> On the <b>Toolbox</b> (on the right side) right click in the field and select <b>Display EDS Library</b>.</p>	
<p><b>4</b> Select the Install button on the down left corner.</p>	
<p><b>5</b> Then select your eds file that will be installed. Download latest version from <a href="#">official webpage</a></p>	
<p><b>6A</b> When installed you will see the device in the EDS Library.</p>	

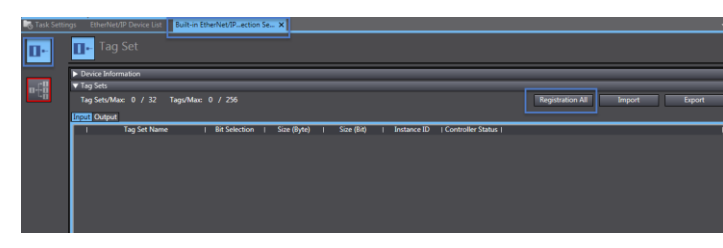
**6B** The EDS file can also be installed manually to Sysmac Studio by copying the EDS and ICON files to the installation directory:  
 C:\ProgramFiles(x86)\OMRON\Sysmac Studio\IODeviceProfiles\EipConnection



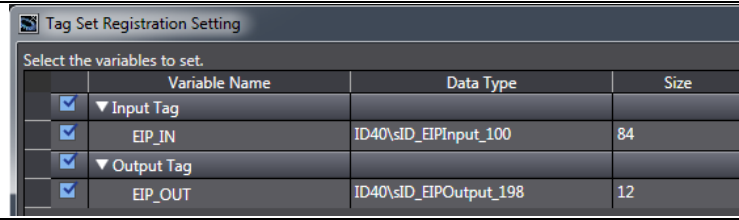
**7** On the **Toolbox** (on the right side) and click on the + sign to add a **Target Device**. Enter the proper **Node Address** and select **Model name** and **Revision**. Then click **Add** at the bottom



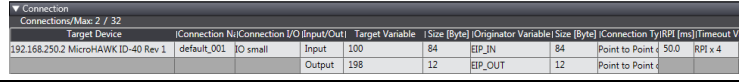
**8** In the **Built-in EtherNet/IP Port Settings - Connection Settings** it is possible to register the newly created variables. Click on **Registration All**



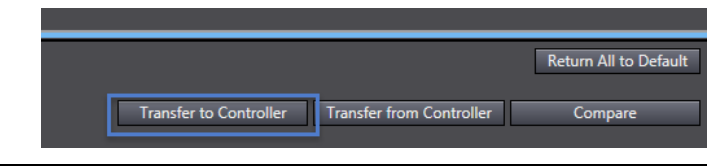
**9** Register the variables



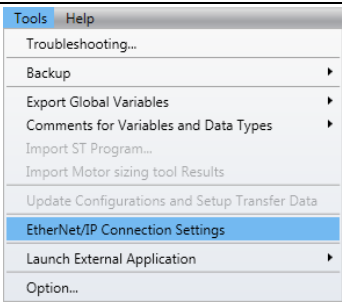
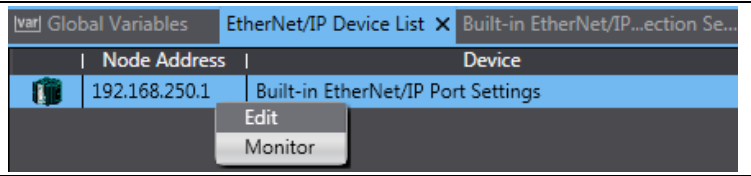
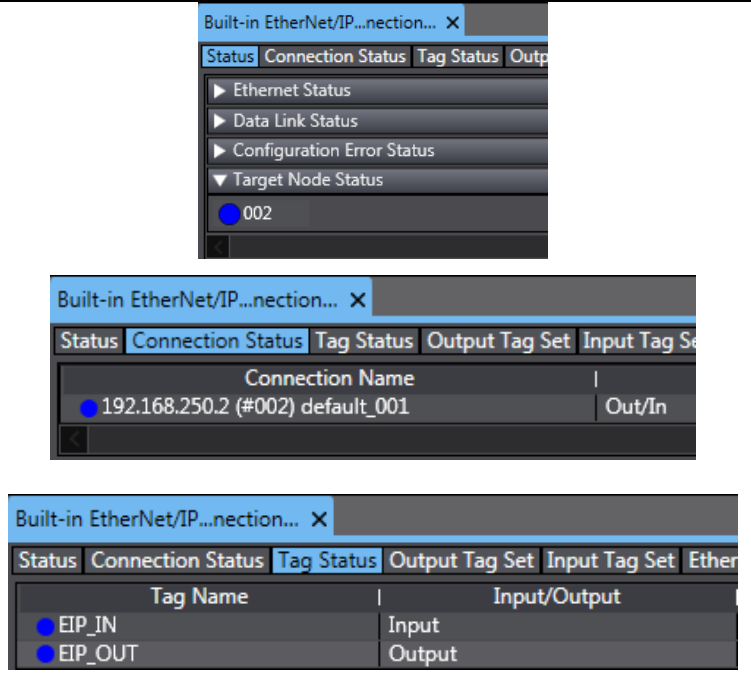
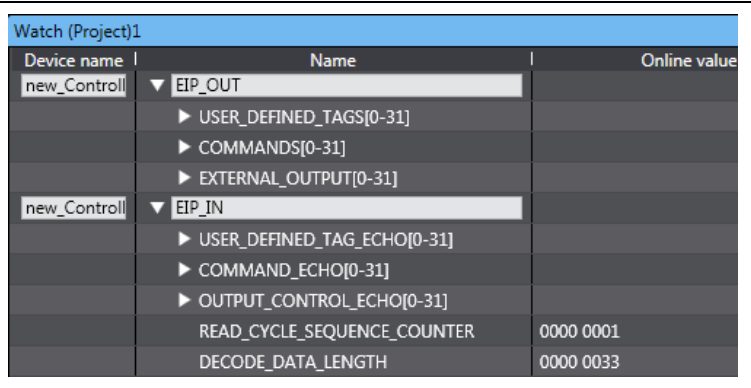
**10** Add the **Target Variable** and the **Originator Variable**



**11** Finally click on **Transfer to Controller**



## 6.4 Checking the Ethernet/IP Communication

<p><b>1</b> Go to the <b>EtherNet/IP Device List</b> under <b>Tools</b> menu</p>																										
<p><b>2</b> Right click on the Controller and select <b>Monitor</b></p>																										
<p><b>3</b> Make sure all is blue under <b>Status, Connection Status</b> and <b>Tag Status</b></p>																										
<p><b>4</b> You can also create a <b>Watch Tab Page</b> and monitor directly the signals if all above are blue</p>	 <table border="1"> <thead> <tr> <th>Device name</th> <th>Name</th> <th>Online value</th> </tr> </thead> <tbody> <tr> <td rowspan="4">new_Controll</td> <td>EIP_OUT</td> <td></td> </tr> <tr> <td>USER_DEFINED_TAGS[0-31]</td> <td></td> </tr> <tr> <td>COMMANDS[0-31]</td> <td></td> </tr> <tr> <td>EXTERNAL_OUTPUT[0-31]</td> <td></td> </tr> <tr> <td rowspan="6">new_Controll</td> <td>EIP_IN</td> <td></td> </tr> <tr> <td>USER_DEFINED_TAG_ECHO[0-31]</td> <td></td> </tr> <tr> <td>COMMAND_ECHO[0-31]</td> <td></td> </tr> <tr> <td>OUTPUT_CONTROL_ECHO[0-31]</td> <td></td> </tr> <tr> <td>READ_CYCLE_SEQUENCE_COUNTER</td> <td>0000 0001</td> </tr> <tr> <td>DECODE_DATA_LENGTH</td> <td>0000 0033</td> </tr> </tbody> </table>	Device name	Name	Online value	new_Controll	EIP_OUT		USER_DEFINED_TAGS[0-31]		COMMANDS[0-31]		EXTERNAL_OUTPUT[0-31]		new_Controll	EIP_IN		USER_DEFINED_TAG_ECHO[0-31]		COMMAND_ECHO[0-31]		OUTPUT_CONTROL_ECHO[0-31]		READ_CYCLE_SEQUENCE_COUNTER	0000 0001	DECODE_DATA_LENGTH	0000 0033
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## 7 Function Block description

In this section the Function Block to interface the ID40 will be described.

### 7.1 General information

Library name	OCR_library.slr	
Library version	V1.00	
<b>Basic function</b>	This function block is created to make it easy to read and write data to Microscan ID barcode readers. It uses the variables that are created for the EtherNet/IP communication and maps it inside the function block to make it easier for the user.	
Symbol		
FB Name	OCR_ID40_IO_Small	
FB Version	V1.00	
Time Chart		

## 7.2 Input Variables

Variable name	Name	Data type	Description
Enable	Enable	BOOL	1 (ON): FB started. 0 (OFF): FB not started.
Trigger	Trigger	BOOL	↑ : Sends a trigger to the ID40 barcode reader
Separator	Separator	_eDELIMITER	Set the specific separator between the multiple incoming data. _SEMICOLON (Default) _TAB _COMMA _SPACE
TimeOut	Time Out	TIME	Set a time between the Trigger command and the Command ECHO. (Default 3s)
ClearData	Clear Data	BOOL	0: Do nothing. 1: Clears the Read Cycle Sequence Counter in the ID40 barcode reader

## 7.3 Input/Output Variables

Variable name	Name	Data type	Description
EIPIN100	Small Input Assembly ID100	ID40\sID_EIPInput_100	Input data from the ID40 barcode reader
EIPOUT198	Output Assembly ID198	ID40\sID_EIPOutput_198	Output data to the ID40 barcode reader

## 7.4 Output Variables

Variable name	Name	Data type	Description
ENO	Enable output	BOOL	1 (ON): FB processed normally. 0 (OFF): FB not processed or ended in an error.
Busy	Busy	BOOL	1 (ON): FB processing. 0 (OFF): FB not processed or ended in an error.
Decode_Data	Decode Data	sID_Decode_Data_Ary	Up to 10 Decode Data can be received from the ID[] device
TimeOutError	Time Out Error	BOOL	0: No error 1: If the ECHO is not returned within the set Time of the TimeOut input an error will activate.

## 8 Revision History

Revision Code	Date	Revised Content
V1.00	April 2019	Original production
V1.01	May 2019	Adding Network Publish