Application manual
EtherNet/IP Scanner/Adapter
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Overview of this manual

About this manual
This manual describes the following options and contains instructions on how to configure them in an OmniCore system.

- EtherNet/IP Scanner, option number 3024-1
- EtherNet/IP Adapter, option number 3024-2

Usage
This manual should be used during installation and configuration of the EtherNet/IP Scanner/Adapter and upgrading of the option EtherNet/IP Scanner/Adapter.

Who should read this manual?
This manual is intended for

- Personnel responsible for installations and configurations of industrial network hardware/software
- Personnel responsible for I/O system configuration
- System integrators

Prerequisites
The reader should have the required knowledge of

- Mechanical installation work
- Electrical installation work
- System parameters and how to configure them
- RobotStudio

References
Document references

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<td>Operating manual - RobotStudio</td>
<td>3HAC032104-001</td>
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<td>Operating manual - OmniCore</td>
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<td>Product manual - OmniCore C30</td>
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<td>Technical reference manual - RAPID Instructions, Functions and Data types</td>
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<td>Application manual - DeviceNet Master/Slave</td>
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<td>Application manual - Controller software OmniCore</td>
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Overview of this manual

Continued

Other references

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<th>Reference</th>
<th>Description</th>
</tr>
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<tbody>
<tr>
<td><a href="http://www.odva.org">www.odva.org</a></td>
<td>The web site of ODVA (Open DeviceNet Vendor Association).</td>
</tr>
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</table>

Revisions

<table>
<thead>
<tr>
<th>Revision</th>
<th>Description</th>
</tr>
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<tr>
<td>A</td>
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</tr>
<tr>
<td>B</td>
<td>Released with RobotWare 7.0.1.</td>
</tr>
<tr>
<td></td>
<td>• Cfg name removed from entire manual.</td>
</tr>
<tr>
<td></td>
<td>• Information regarding Connection Timeout Multiplier added in section Output RPI on page 72 and Input RPI on page 73.</td>
</tr>
<tr>
<td>C</td>
<td>Released with RobotWare 7.1.</td>
</tr>
<tr>
<td></td>
<td>• Added NOTE regarding IP addresses in section Creating and configuring the internal scanner on page 28.</td>
</tr>
<tr>
<td>D</td>
<td>Released with RobotWare 7.2.</td>
</tr>
<tr>
<td></td>
<td>• Local I/O replaced by Scalable I/O in relevant places.</td>
</tr>
<tr>
<td></td>
<td>• Information concerning default gateway field removed from section Frequently asked questions on page 87.</td>
</tr>
<tr>
<td></td>
<td>• Minor corrections in section &quot;Connections on the main computer&quot;.</td>
</tr>
<tr>
<td>E</td>
<td>Released with RobotWare 7.7.</td>
</tr>
<tr>
<td></td>
<td>• Section &quot;Network connections on OmniCore&quot; removed.</td>
</tr>
<tr>
<td></td>
<td>• Section References on page 7 updated with references to the OmniCore Product Manuals.</td>
</tr>
<tr>
<td></td>
<td>• Number of maximum EtherNet IP devices updated in section Information about the internal scanner on page 21.</td>
</tr>
<tr>
<td></td>
<td>• Updated the section Recommended working procedure on page 23.</td>
</tr>
<tr>
<td></td>
<td>• Minor corrections in EtherNet/IP for OmniCore on page 16.</td>
</tr>
<tr>
<td></td>
<td>• Information about selection of interface ports added in EtherNet/IP for OmniCore on page 16, Configuring the internal adapter device on page 25 and Recommended working procedure on page 27.</td>
</tr>
</tbody>
</table>
Product documentation

Categories for user documentation from ABB Robotics

The user documentation from ABB Robotics is divided into a number of categories. This listing is based on the type of information in the documents, regardless of whether the products are standard or optional.

Tip

All documents can be found via myABB Business Portal, www.abb.com/myABB.

Product manuals

Manipulators, controllers, DressPack/SpotPack, and most other hardware is delivered with a Product manual that generally contains:

- Safety information.
- Installation and commissioning (descriptions of mechanical installation or electrical connections).
- Maintenance (descriptions of all required preventive maintenance procedures including intervals and expected life time of parts).
- Repair (descriptions of all recommended repair procedures including spare parts).
- Calibration.
- Decommissioning.
- Reference information (safety standards, unit conversions, screw joints, lists of tools).
- Spare parts list with corresponding figures (or references to separate spare parts lists).
- References to circuit diagrams.

Technical reference manuals

The technical reference manuals describe reference information for robotics products, for example lubrication, the RAPID language, and system parameters.

Application manuals

Specific applications (for example software or hardware options) are described in Application manuals. An application manual can describe one or several applications.

An application manual generally contains information about:

- The purpose of the application (what it does and when it is useful).
- What is included (for example cables, I/O boards, RAPID instructions, system parameters, software).
- How to install included or required hardware.
- How to use the application.
- Examples of how to use the application.

Continues on next page
Operating manuals

The operating manuals describe hands-on handling of the products. The manuals are aimed at those having first-hand operational contact with the product, that is production cell operators, programmers, and troubleshooters.
Safety

Safety regulations

Before beginning mechanical and/or electrical installations, ensure you are familiar with the safety information in the product manuals for the robot.

The integrator of the robot system is responsible for the safety of the robot system.
Network security

This product is designed to be connected to and to communicate information and data via a network interface. It is your sole responsibility to provide, and continuously ensure, a secure connection between the product and to your network or any other network (as the case may be).

You shall establish and maintain any appropriate measures (such as, but not limited to, the installation of firewalls, application of authentication measures, encryption of data, installation of anti-virus programs, etc) to protect the product, the network, its system and the interface against any kind of security breaches, unauthorized access, interference, intrusion, leakage and/or theft of data or information. ABB Ltd and its entities are not liable for damage and/or loss related to such security breaches, any unauthorized access, interference, intrusion, leakage and/or theft of data or information.
## Terminology

### Terms

<table>
<thead>
<tr>
<th>Term</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Adapter</td>
<td>I/O device that is controlled by a scanner in an Ethernet network. Previously, ABB documentation used the term <em>slave</em>.</td>
</tr>
<tr>
<td>CIP</td>
<td>Common Industrial Protocol. Protocol that DeviceNet and EtherNet/IP are based on.</td>
</tr>
<tr>
<td>Client</td>
<td>See Scanner. Some documents use the term <em>client</em>, whereas the ABB documentation use the term <em>Scanner</em> for EtherNet/IP industrial network.</td>
</tr>
<tr>
<td>EDS</td>
<td>Electronic Data Sheet. EDS files contain the configuration details relevant to CIP devices.</td>
</tr>
<tr>
<td>Explicit Messages</td>
<td>An explicit message is a request or response oriented communication with other devices. These messages are mostly configuration data.</td>
</tr>
<tr>
<td>External adapter</td>
<td>Describes an EtherNet/IP adapter on the EtherNet/IP network connected to the OmniCore controller (not the robot controller acting as EtherNet/IP adapter).</td>
</tr>
<tr>
<td>External scanner</td>
<td>Describes an EtherNet/IP scanner on the EtherNet/IP network connected to the OmniCore controller (not the robot controller acting as EtherNet/IP scanner).</td>
</tr>
<tr>
<td>Implicit Messages</td>
<td>Implicit messages are exchanged between I/O connections. No messaging protocol is contained within the message data as with Explicit messaging. Implicit messages can be point to point (unicast) or multicast and are used to transmit application specific I/O data.</td>
</tr>
<tr>
<td>Internal adapter</td>
<td>Describes when the robot controller acts as an EtherNet/IP adapter on the EtherNet/IP network.</td>
</tr>
<tr>
<td>Internal scanner</td>
<td>Describes when the robot controller acts as an EtherNet/IP scanner on the EtherNet/IP network.</td>
</tr>
<tr>
<td>LAN</td>
<td>Connector for Local Area Network.</td>
</tr>
<tr>
<td>M12</td>
<td>Ethernet contact with IP67 classification.</td>
</tr>
<tr>
<td>Master</td>
<td>See term <em>Scanner</em>.</td>
</tr>
<tr>
<td>ODVA</td>
<td>Open DeviceNet Vendor Association. Organization for networks built on CIP, for example DeviceNet and EtherNet/IP.</td>
</tr>
<tr>
<td>RJ45</td>
<td>Standard Ethernet contact.</td>
</tr>
<tr>
<td>Scanner</td>
<td>Controls other I/O devices (adapters) in an Ethernet network. Previously, ABB documentation used the term <em>Master</em>.</td>
</tr>
<tr>
<td>Server</td>
<td>See term <em>Adapter</em>. Some documents use the term <em>server</em>, whereas the ABB documentation use the term <em>adapter</em> for EtherNet/IP industrial network.</td>
</tr>
</tbody>
</table>

*Continues on next page*
<table>
<thead>
<tr>
<th>Term</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Slave</td>
<td>See term <em>Adapter</em>.</td>
</tr>
<tr>
<td>WAN</td>
<td>Port for Wide Area Network.</td>
</tr>
</tbody>
</table>
1 Introduction

1.1 What is EtherNet/IP?

**General**

EtherNet/IP is a communications link to connect industrial devices. The EtherNet/IP (EtherNet Industrial Protocol) is managed by ODVA (Open DeviceNet Vendors Association). It is a well established industrial Ethernet communication system with good real-time capabilities. EtherNet/IP extends commercial off-the-shelf Ethernet to the CIP (Common Industrial Protocol)—the same upper-layer protocol and object model found in DeviceNet and ControlNet. CIP allows EtherNet/IP and DeviceNet system integrators and users to apply the same objects and profiles for plug-and-play interoperability among devices from multiple vendors and in multiple sub-nets. Combined, DeviceNet, ControlNet and EtherNet/IP promote transparency from sensors to the enterprise software.

**Examples of applications**

Here are some examples of EtherNet/IP applications:

- Peer-to-peer data exchange where an EtherNet/IP product can produce and consume messages
- Scanner/adapter operation defined as a proper subset of peer-to-peer
- An EtherNet/IP product can function as a client or server, or both

**Standardization**

EtherNet/IP is standardized according to the International standard IEC 61158 and EtherNet/IP devices are certified by ODVA for interoperability and conformance.

**Data**

The following table specifies a number of EtherNet/IP data.

<table>
<thead>
<tr>
<th>Network type</th>
<th>Ethernet based Control Level network with CIP application protocol</th>
</tr>
</thead>
<tbody>
<tr>
<td>Installation</td>
<td>Standard Off the Shelf (COTS) Ethernet cables and connectors.</td>
</tr>
<tr>
<td></td>
<td>10/100/1000 Mbit/s TX Ethernet cable or fibre optics.</td>
</tr>
<tr>
<td></td>
<td>RJ45, M12 or fibre optic connectors.</td>
</tr>
<tr>
<td>Speed</td>
<td>10, 100, 1000 Mbit/s</td>
</tr>
</tbody>
</table>

**EDS file**

The configuration process is based on EDS files (Electronic Data Sheet) which are required for each EtherNet/IP device. EDS files are provided by the device manufacturers. It contains electronic descriptions of all relevant communication parameters and objects of the EtherNet/IP device.
1 Introduction

1.2 EtherNet/IP for OmniCore

1.2 EtherNet/IP for OmniCore

General

The EtherNet/IP network is running on the OmniCore main computer and does not require any additional hardware.

Options

With option 3024-1 EtherNet/IP Scanner, the OmniCore controller can act as a scanner on the EtherNet/IP network.

With option 3024-2 EtherNet/IP Adapter, the OmniCore controller can act as an adapter.

Note

In this manual, the 3024-2 EtherNet/IP Adapter is referred to as internal device.

Specification overview

<table>
<thead>
<tr>
<th>Item</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Industrial Network type</td>
<td>EtherNet/IP</td>
</tr>
<tr>
<td>Conform to</td>
<td>EtherNet/IP protocol conformance test A-9</td>
</tr>
<tr>
<td>Data rate</td>
<td>10/100 Mbit</td>
</tr>
<tr>
<td>Connection type</td>
<td>Cyclic</td>
</tr>
<tr>
<td>Connection size</td>
<td>Maximum 509 input bytes and 505 output bytes</td>
</tr>
<tr>
<td>Transport Class</td>
<td>Class 1 I/O implicit</td>
</tr>
</tbody>
</table>

Interface ports

The EtherNet/IP scanner and adapter can be used on both the Public Network (WAN) and the I/O Network (LAN). See Configuring the internal adapter device on page 25 for information about how to select interface port for the adapter.

Note

No manual port selection is needed for the scanner, as the scanner automatically detects to which interface the device is connected.
2 Hardware overview

2.1 Ethernet switches

Prerequisites

It is recommended that switches used in the I/O network support Quality of Service (QoS).
I/O devices mark their packets with a priority value. The priority value is used in order to get better I/O data throughput and shorter delays on the network.
Switches and routers are then able to differentiate the I/O device’s critical from the other non-critical traffic. To do this, the switches and routers must support Quality of Service.
2 Hardware overview

2.2 I/O devices

2.2 I/O devices

Limitations

It is possible to connect any type of EtherNet/IP compliant I/O device on the EtherNet/IP network. All I/O devices should comply with the EtherNet/IP standard and be conformance tested by ODVA. I/O devices may be mounted inside the OmniCore controller.
3 Software overview

3.1 Information about the adapter device

General

To use the EtherNet/IP adapter device, the OmniCore controller must be installed with the option 3024-2 EtherNet/IP Adapter.

The EtherNet/IP adapter device can be used to:

- connect a PLC to the OmniCore controller.
- connect the OmniCore controller to another OmniCore controller which acts as a scanner.

Industrial Network

When the robot system is installed with the 3024-2 EtherNet/IP Adapter option, a predefined industrial network with the name EtherNetIP is created at system startup.

Predefined internal adapter device

When the robot system is installed with the 3024-2 EtherNet/IP Adapter option, a predefined internal adapter device with the name EN_Internal_Device is created at system startup. This internal device is used to define the internal adapter device in the OmniCore controller, which will enable a PLC to connect to the OmniCore controller. There can be only one internal adapter device defined in the OmniCore controller.

I/O device

The input and output map starts at bit 0.

EDS file

An Electronic Data Sheet file, EDS file, is available for the internal adapter device, matching the configuration of the predefined EtherNet/IP Internal Adapter Device EN_Internal_Device.

The EDS file, Omnicore.eds, for the adapter device can be obtained from the RobotStudio or the OmniCore controller.

- In the RobotWare installation folder in RobotStudio:
  ...\DistributionPackages\ABB.RobotWare-x.x.x-xxx\RobotPackages\RobotControl_x.x.xxx\utility\service\EDS\n
- On the OmniCore Controller:
  ...\RobotWare\RobotControl_x.x.xxx\utility\service\EDS\n
Note

Navigate to the RobotWare installation folder from the RobotStudio Add-Ins tab, by right-clicking on the installed RobotWare version in the Add-Ins browser and selecting Open Package Folder.

Continues on next page
3 Software overview

3.1 Information about the adapter device

Continued

Template I/O configuration file

A template I/O configuration file is available for the internal adapter device. The file contains preconfigured names for all available inputs and outputs. The file can be loaded to the controller, using RobotStudio or the FlexPendant, to facilitate and speed up the configuration.

The I/O template configuration file, `EN_Internal_Device.cfg`, can be obtained from the RobotStudio or the OmniCore controller.

- **In the RobotWare installation folder in RobotStudio:** ...
  `RobotPackages\RobotWare_RPK_<version>\utility\service\ioconfig\EtherNetIP`

- **On the OmniCore Controller:** `<SystemName>\PRODUCTS\RobotWare_xx.xx.xxxx\utility\service\ioconfig\EtherNetIP`

**Note**

Navigate to the RobotWare installation folder from the RobotStudio Add-Ins tab, by right-clicking on the installed RobotWare version in the Add-Ins browser and selecting Open Package Folder.

Assembly

The internal adapter device has the following Assembly values.

<table>
<thead>
<tr>
<th>Assembly</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Output</td>
<td>112</td>
</tr>
<tr>
<td>Input</td>
<td>100</td>
</tr>
<tr>
<td>Configuration</td>
<td>0</td>
</tr>
</tbody>
</table>

Behavior

Cyclic I/O connection is supported and the size of the I/O connection is defined by the predefined EtherNet/IP Internal Adapter Device, `EN_Internal_Device`.

**Note**

If the EtherNet/IP adapter device loses connection with its scanner, the configured input signals are cleared (reset to zero). The output signals are kept and are possible to change.

When the connection is re-established, the EtherNet/IP adapter device updates the input and output signals.
3.2 Information about the internal scanner

General

To use the EtherNet/IP internal scanner, the OmniCore controller must be installed with the option 3024-1 EtherNet/IP Scanner.

The EtherNet/IP internal scanner can be used to:

- connect EtherNet/IP I/O devices to the OmniCore controller.
- connect the OmniCore controller to another OmniCore controller which acts as an adapter.

Industrial Network

When the robot system is installed with the EtherNet/IP Scanner/Adapter option, a predefined industrial network EtherNet/IP is created at system startup.

Device Templates

There are predefined device templates available for the internal scanner. These device templates can be used when defining a new I/O device by using the Configuration Editor in RobotStudio or FlexPendant, see Creating and configuring the internal scanner on page 28. Examples of present device templates are:

- **ABB EtherNet/IP Adapter Device** is used on the scanner side when connecting to another OmniCore EtherNet/IP adapter.
- **ABB Scalable I/O Device: 16DO/16DI (base version)**
- **ABB Scalable I/O Device + Digital: 16DO/16DI + 16DO/16DI**
- **ABB Scalable I/O Device + Analog: 16DO/16DI + 4DO/4DI**
- **ABB Scalable I/O Device + Relay: 16DO/16DI + 8DO/8DI**

Apart from the existing device templates listed above, you can create device templates to define a new I/O device. For more information, refer Using EDS files to create device templates on page 31.

Number of allowed I/O devices

A maximum number of 50 user defined I/O devices can be defined in the OmniCore system, for more information see Device Type of I/O System section in Technical reference manual - System parameters.

The following are counted as user defined I/O devices:

- All EtherNet/IP adapter devices connected to the OmniCore EtherNet/IP scanner.
- Simulated EtherNet/IP I/O devices.

**Note**

The internal adapter device is not counted as a user defined I/O device.

It is possible to use ABB I/O devices or I/O devices from other vendors. Only the EtherNet/IP Scanner/Adapter option is required to run I/O devices from other vendors.

Continues on next page
The values of input and output Assembly are used by the EtherNet/IP scanner to locate the input and output data in the I/O device. The Assembly values for different I/O devices are available in the EDS file and in the User Manual. We recommend you to refer the User Manual for the Assembly values of the I/O device.

Connecting two OmniCore systems

When connecting two OmniCore systems, the internal adapter should be seen and configured as any other ordinary device from the other OmniCore system, which is acting as a scanner. See Communication between two OmniCore controllers on page 41.

The following picture illustrates how to use the predefined internal device (EN_Internal_Device) and the device template ABB EtherNet/IP Adapter Device (EN_Device).
4 Installing and configuring the internal adapter device

4.1 Recommended working procedure

General

This section describes the recommended working procedure when installing and configuring the EtherNet/IP adapter device. The working procedure helps to understand the dependencies between the different steps.

When the OmniCore controller is connected to an external scanner, the OmniCore controller acts as an ordinary adapter device on the EtherNet/IP network.

Note

The option 3024-2 EtherNet/IP Adapter is needed for EtherNet/IP adapter device configuration.

Basic steps

Use this procedure to install and configure an EtherNet/IP adapter device.

<table>
<thead>
<tr>
<th>Action</th>
<th>See</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Configure the network firewall on the controller. Configuration is done in RobotStudio under Configuration/Communication/Firewall Manager where pre-configured Network Services can be enabled or disabled. For example, enable the Public Network or the I/O Network. <em>Operating manual - RobotStudio and Operating manual - Integrator’s guide OmniCore</em></td>
</tr>
<tr>
<td>2</td>
<td>Define the IP settings for the network used on the Public or I/O Network. These are defined in Network Settings in RobotStudio or on the FlexPendant. <em>Operating manual - RobotStudio and Operating manual - Integrator’s guide OmniCore</em></td>
</tr>
<tr>
<td>3</td>
<td>Use RobotStudio to configure the EtherNet/IP network settings. <em>Configuring the EtherNet/IP network settings on page 24</em></td>
</tr>
<tr>
<td>4</td>
<td>Configure the internal adapter device in the OmniCore controller using RobotStudio or the FlexPendant. For example, set the connection sizes. <em>Configuring the internal adapter device on page 25</em></td>
</tr>
</tbody>
</table>
4.2 Configuring the EtherNet/IP network settings

General

The following procedure describes how to change the EtherNet/IP network settings using RobotStudio.

Industrial Network configuration

Use this procedure to configure the EtherNet/IP network settings in the OmniCore controller, using RobotStudio.

1 Start RobotStudio and connect to the OmniCore controller. Request write access.
2 Open the Configuration Editor and select I/O System.
   For more information about the parameters, see System parameters on page 43.
3 In the Type list, click EtherNet/IP Network and edit the parameter EtherNetIP.

Enter the following parameter values:
   • Identification Label, user defined.

Click OK.
4 Restart the controller or continue with the next step of the configuration.

Configuring the internal adapter device on page 25
4.3 Configuring the internal adapter device

Internal adapter device configuration

Use this procedure to configure the internal adapter device in the OmniCore controller, using RobotStudio.

1. Start RobotStudio and connect to the OmniCore controller. Request write access.
2. Open the Configuration Editor and select I/O System.
   For more information about the parameters, see System parameters on page 43.
3. In the Type list, click EtherNet/IP Internal Device, right-click in the workspace on the EN_Internal_Device item and select New EtherNet/IP Internal Device.

   ![Image of Configuration Editor]

   Edit the following parameter values, if applicable:
   - Connected to Industrial Network, shall be EtherNetIP.
   - Interface, select WAN (Public Network) or LAN (I/O Network).
   - Identification Label, user defined.
   - If the size needs to be changed, change the default values for Connection Input Size and Connection Output Size to the desired size.

   Note
   This step is optional.

   Click OK.
4. In the Type list click Signal.
   Add I/O signals for the internal adapter device.
5. Restart the controller.
This page is intentionally left blank
5 Installing and configuring the internal scanner

5.1 Recommended working procedure

General

This section describes the recommended working procedure when installing and configuring the EtherNet/IP internal scanner.

Basic steps

Use this procedure to install and configure an EtherNet/IP scanner.

<table>
<thead>
<tr>
<th>Action</th>
<th>See</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Use RobotStudio to configure the topic Communication.</td>
<td>Technical reference manual - System parameters</td>
</tr>
<tr>
<td>2. Use RobotStudio to configure the EtherNet/IP network settings.</td>
<td>Configuring the EtherNet/IP network settings on page 24</td>
</tr>
<tr>
<td>3. Set the IP address on the external device.</td>
<td>User Manual from the vendor of the external device.</td>
</tr>
<tr>
<td>Note: No manual port selection is needed for the scanner, as the scanner automatically detects if the device is connected to the Public Network (WAN) or the I/O Network (LAN).</td>
<td></td>
</tr>
<tr>
<td>4. Configure the I/O devices connected to the EtherNet/IP industrial network using RobotStudio or FlexPendant.</td>
<td>Creating and configuring the internal scanner on page 28</td>
</tr>
</tbody>
</table>

Additional configuration

<table>
<thead>
<tr>
<th>Action</th>
<th>See</th>
</tr>
</thead>
<tbody>
<tr>
<td>Creating device templates by using EDS files</td>
<td>Using EDS files to create device templates on page 31.</td>
</tr>
<tr>
<td>Configuring QuickConnect functionality.</td>
<td>QuickConnect on page 62.</td>
</tr>
<tr>
<td>Setting up communication between two OmniCore controllers.</td>
<td>Communication between two OmniCore controllers on page 41.</td>
</tr>
</tbody>
</table>
5 Installing and configuring the internal scanner

5.2 Creating and configuring the internal scanner

Internal scanner configuration

Use this procedure to configure the EtherNet/IP scanner in the OmniCore controller, using the Configuration Editor in RobotStudio.

1. Start RobotStudio and connect to the OmniCore controller. Request write access.
2. Click Configuration Editor and select I/O System.
3. In the Type list, click EtherNet/IP Network and then right-click in the workspace on the EtherNet/IP item and select Edit EtherNet/IP Network. For more information about the parameters, see System parameters on page 43.
4. Enter the parameter values for the EtherNet/IP network.

![Image of Configuration Editor]

Click OK.

5. In the Type list, click EtherNet/IP Device and then right-click in the workspace and select New EtherNet/IP Device.
The dialog for creation of new I/O devices is displayed:

Complete the following mandatory fields for the new I/O device:

- **Use values from template**, select the *ABB Scalable I/O Device* option.

**Note**

Use values from template drop-down list shows the existing templates and templates created by using EDS file (See *Using EDS files to create device templates on page 31*).

- **Connected to Industrial Network**, shall be *EtherNet/IP*.
- **Identification Label**, user defined.
5 Installing and configuring the internal scanner

5.2 Creating and configuring the internal scanner

Continued

- **Address**, enter the IP address that has been defined for the device.

  **Note**

  It is not recommended using leading zeros in dot-decimal notation of IP addresses. The numbers may wrongly be interpreted as octal numbers. Different behaviors on virtual and real controllers may be experienced.

If necessary, continue editing the optional fields:

- Change the size in **Input Size** and **Output size**, as desired.

Click OK.

7 In the **Type** list, right-click on **Signal** and select **New Signal** or right-click on an existing signal and select **Edit Signal**.

8 Add I/O signals for the new I/O device by entering the device name in field **Assigned to Device**:

![Instance Editor]

xx1900001115

Click OK.

9 Restart the OmniCore controller to connect to the configured device.
5.2.1 Using EDS files to create device templates

Procedure

It is possible to create device templates from the EDS files. A device template is created for each valid connection found in the Connection Manager section in the EDS file.

Use this procedure to create device templates by using EDS files.

<table>
<thead>
<tr>
<th>Action</th>
<th>Note</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Start RobotStudio and connect to the OmniCore controller. Request write access. To proceed with the steps, the system should be in manual mode.</td>
<td></td>
</tr>
<tr>
<td>2. Click File Transfer and locate the folder EDS in HOME directory. Select the required EDS file and click the Right Arrow button to transfer the files. Note Transfer the EDS files for the devices involved in the EtherNet/IP network</td>
<td></td>
</tr>
<tr>
<td>3. Click I/O System to expand the folder. Select EtherNetIP and right-click in the workspace and select Scan EDS file(s) • Files are parsed. • Click Yes to continue with the device templates creation. • Click Ok to continue with report generation in the event log. Note The EDS reader does not check if the file is syntactically correct. It is important that the device created from the device template is inspected manually.</td>
<td></td>
</tr>
<tr>
<td>4. The device templates are created and available as options in Use values from template while creating a new I/O device.</td>
<td></td>
</tr>
</tbody>
</table>
5 Installing and configuring the internal scanner

5.3 Explicit messaging services

5.3.1 Information

General

It is possible to configure I/O devices through explicit messaging services. This could be done either at startup by defining the EtherNet/IP command to the configured device, or at runtime from RAPID through the Fieldbus Command Interface (FCI).

**Note**

For information about which explicit messaging services are available for a specific I/O device and how to set the parameters, refer to the supplier documentation of the I/O device and the Common Industrial Protocol (CIP) Specification, see References on page 7.

EtherNet/IP command system parameters

The EtherNet/IP specific system parameters in the EtherNet/IP Command type are:

- Path (Path), see Path on page 79.
- Service (Service), see Service on page 80.
- Download Order (-OrderNr), see Technical reference manual - System parameters.

**Note**

For more information, see Technical reference manual - System parameters.

The Path parameter

Following is a short description of the syntax used in the Path parameter.

"Path length, 20 Class 24 Instance 30 Attribute, Data type, Data type length"

The following table provides a description of the parameters used in the syntax:

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Path length</td>
<td>The byte count for the &quot;20 64 24 01 30 05&quot; string. This is an optional parameter.</td>
</tr>
<tr>
<td>Class</td>
<td>The EtherNet/IP class number.</td>
</tr>
<tr>
<td>Instance</td>
<td>The instance number of the class.</td>
</tr>
<tr>
<td>Attribute</td>
<td>The attribute of the specified instance.</td>
</tr>
<tr>
<td>Data type</td>
<td>The data format of the attribute.</td>
</tr>
<tr>
<td>Data type length</td>
<td>The length in bytes of the specified Data type. The highest allowed value is 0x20 (32 bytes). This parameter is ignored, but is accepted if entered.</td>
</tr>
</tbody>
</table>
The following table provides a list of the allowed data types for the parameter **Data type**:

<table>
<thead>
<tr>
<th>Data Type</th>
<th>Value</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>CIP_EXPL_BOOL</td>
<td>C1</td>
<td>Logical Boolean with values TRUE and FALSE</td>
</tr>
<tr>
<td>CIP_EXPL_SINT</td>
<td>C2</td>
<td>Signed 8-bit integer value</td>
</tr>
<tr>
<td>CIP_EXPL_INT</td>
<td>C3</td>
<td>Signed 16-bit integer value</td>
</tr>
<tr>
<td>CIP_EXPL_USINT</td>
<td>C6</td>
<td>Unsigned 8-bit integer value</td>
</tr>
<tr>
<td>CIP_EXPL_UINT</td>
<td>C7</td>
<td>Unsigned 16-bit integer value</td>
</tr>
<tr>
<td>CIP_EXPL_UDINT</td>
<td>C8</td>
<td>Unsigned 32-bit integer value</td>
</tr>
<tr>
<td>CIP_EXPL_REAL</td>
<td>CA</td>
<td>32-bit floating point value</td>
</tr>
<tr>
<td>CIP_EXPL_STRING</td>
<td>D0</td>
<td>Character string (1 byte per character)</td>
</tr>
<tr>
<td>CIP_EXPL_BYTE</td>
<td>D1</td>
<td>Bit string - 8-bits</td>
</tr>
<tr>
<td>CIP_EXPL_WORD</td>
<td>D2</td>
<td>Bit string - 16-bits</td>
</tr>
<tr>
<td>CIP_EXPL_DWORD</td>
<td>D3</td>
<td>Bit string - 32-bits</td>
</tr>
<tr>
<td>CIP_EXPL_SHORT_STRING</td>
<td>DA</td>
<td>Character string (1 byte per character, 1 byte length indicator)</td>
</tr>
</tbody>
</table>

The following table provides a list of what delimiter to use for the parameter **Value**, if the data is an array:

<table>
<thead>
<tr>
<th>Data Type</th>
<th>Delimiter</th>
<th>Example</th>
</tr>
</thead>
<tbody>
<tr>
<td>CIP_EXPL_BOOL</td>
<td></td>
<td>&quot;123 125 2 44&quot; An array of 5 elements. The Data Type specifies the type of each element.</td>
</tr>
<tr>
<td>CIP_EXPL_SINT</td>
<td></td>
<td>&quot;Hello;This;Is;My;Name&quot; An array of 5 elements of string type.</td>
</tr>
<tr>
<td>CIP_EXPL_INT</td>
<td></td>
<td>The values are delimited by space.</td>
</tr>
<tr>
<td>CIP_EXPL_USINT</td>
<td></td>
<td>The values are delimited by space.</td>
</tr>
<tr>
<td>CIP_EXPL_UINT</td>
<td></td>
<td>The values are delimited by space.</td>
</tr>
<tr>
<td>CIP_EXPL_UDINT</td>
<td></td>
<td>The values are delimited by space.</td>
</tr>
<tr>
<td>CIP_EXPL_REAL</td>
<td></td>
<td>The values are delimited by space.</td>
</tr>
<tr>
<td>CIP_EXPL_BYTE</td>
<td></td>
<td>The values are delimited by space.</td>
</tr>
<tr>
<td>CIP_EXPL_WORD</td>
<td></td>
<td>The values are delimited by space.</td>
</tr>
<tr>
<td>CIP_EXPL_DWORD</td>
<td></td>
<td>The values are delimited by space.</td>
</tr>
<tr>
<td>CIP_EXPL_SHORT_STRING</td>
<td></td>
<td>The values are delimited by space.</td>
</tr>
<tr>
<td>CIP_EXPL_SHORT_STRING</td>
<td></td>
<td>The values are delimited by space.</td>
</tr>
</tbody>
</table>

The **Service** parameter

The **Service** parameter describes what type of operation that should be performed against the specified **Path** parameter.

Following are the allowed values for **Service**:

<table>
<thead>
<tr>
<th>Operation</th>
<th>Value</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Set Attribute Single</td>
<td>16</td>
<td>Set the value specified in parameter <strong>Value</strong> of the <strong>EtherNet/IP Command</strong>.</td>
</tr>
<tr>
<td>Reset</td>
<td>5</td>
<td>Performs a reset of the specified device.</td>
</tr>
</tbody>
</table>
The Download Order parameter

The Download Order parameter is used to specify in what order the commands are sent to the I/O device.

If an EtherNet/IP Command is rejected by the I/O device, the EtherNet/IP scanner will generate an event message with the error code returned by the I/O device.
5.3.2 EtherNet/IP command at startup

**Information**

It is possible to configure EtherNet/IP Commands that will be sent to a device at startup:

<table>
<thead>
<tr>
<th>EtherNet/IP command at startup</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>EtherNet/IP Command</td>
<td>This is specific to the I/O device and will only be sent to the assigned I/O device.</td>
</tr>
</tbody>
</table>

**Example using EtherNet/IP Command**

Following is a configuration example from RobotStudio that sends four EtherNet/IP commands at startup to I/O device, EN_Device. There are four different specific commands that are sent to the device to perform specific operations on it. The example shows how to use the *Path* and *Service* parameters.

![Screenshot](xx1300000349)

Note

If a class, instance, or attribute below 0x10 is specified, it is important to include a "0" before the value. For example, the value 8 is written as 08 in the *Path* string.
5 Installing and configuring the internal scanner

5.3.3 EtherNet/IP command via RAPID

5.3.3 EtherNet/IP command via RAPID

Information

For more information about the RAPID instructions, see Technical reference manual - RAPID Instructions, Functions and Data types.

Example

In this example, data packed as a rawbytes variable is read from an EtherNet/IP I/O device.

PROC get_quickconnect_value()
    VAR iodev dev;
    VAR rawbytes rawdata_out;
    VAR rawbytes rawdata_in;
    VAR num input_int;
    VAR byte return_status;
    VAR byte return_errcodecnt;
    VAR num return_errcode;
    VAR byte value;

! Empty contents of rawdata_out and rawdata_in
ClearRawBytes rawdata_out;
ClearRawBytes rawdata_in;

! Add Fieldbus command header to rawdata_out with service
   "GET_ATTRIBUTE_SINGLE" and path to QuickConnect attribute
   on I/O unit.
PackDNHeader "0E", "6,20 F5 24 01 30 0C", rawdata_out;

! Open FCI device
Open "/FCI1:" \File:="TheUnit", dev \Bin;

! Write the contents of rawdata_out to dev
WriteRawBytes dev, rawdata_out \NoOfBytes :=
    RawBytesLen(rawdata_out);

! Read the answer from dev
ReadRawBytes dev, rawdata_in;

! Close FCI device
Close dev;

! Unpack rawdata_in to the variable return_status
UnpackRawBytes rawdata_in, 1, return_status \Hex1;

! The first byte is always the general status byte. 0 means
   success, see the CIP standard error codes.
IF return_status = 0 THEN
    TPWrite "Status OK from device. Status code:"
    \Num:=return_status;
    ! Unpack the read data value that follows the status byte.

Continues on next page
UnpackRawBytes rawdata_in, 2, value \Hex1;
TPWrite "Read value: " 
\Num:=value;
ELSE
! If the general status was not ok there is extended error
   information that can be retrieved. First byte, after the
   general status byte, tells how many extended error words
   can be found.
UnpackRawBytes rawdata_in, 2, return_errcodecnt \Hex1;
! Unpack the number of extended status words. In this example
   only the first one is unpacked.
UnpackRawBytes rawdata_in, 3, return_errcode \IntX := UINT;
TPWrite "Error code from device: " \Num:=return_status;
TPWrite "Additional error code count from device:"
   "\Num:=return_errcodecnt;
TPWrite "Additional error code from device:
   "\Num:=return_errcode;
ENDIF
ENDPROC
The QuickConnect functionality provides the connection between the EtherNet/IP scanner and the device to quickly disconnect and reconnect to the Ethernet network, both mechanically and logically. With the QuickConnect functionality activated, the device will be connected and operational by the EtherNet/IP Scanner under 500 ms.

Requirements

A QuickConnect system requires an electrical lock signal that indicates, when power has been applied to the QuickConnect devices. This signal must be implemented by the system builder and is used to start the QuickConnect sequence.

Additional system component requirements:

- Managed network switch(es)
- QuickConnect device(s):
  A QuickConnect device has QuickConnect functionality disabled as default. This functionality must be activated for proper function.
  It can be done using:
  - Configuration data via the configuration Assembly (see Configuration Assembly on page 68)
  - Third party tool before connecting the module to OmniCore controller Ethernet/IP scanner
  - EtherNet/IP command. See Enabling device for QuickConnect operation on page 39.

Note

When connecting QuickConnect devices, it is essential that network switches allow gratuitous ARP to exist on the network. Gratuitous ARP is issued by QuickConnect devices during startup to inform other network devices that they are ready to join the network.

Note

While using QuickConnect, make sure to turn off autonegotiation on the link that is disconnected. For example, in the connector on the switch (or in the connector for the OmniCore controller) and in the connector on the I/O device.

An error message appears if trying to activate or deactivate the QuickConnect functionality on an I/O device that does not support QuickConnect.

Sequence

1. The OmniCore controller deactivates current connections to QuickConnect devices, and the robot arm physically disengages the current tool.
2. The robot arm physically attaches to the new QuickConnect devices.
3 The new QuickConnect devices power up.
4 The OmniCore controller acknowledges a successful attachment to a new tool via an electrical lock signal.
5 Upon receiving the electrical lock signal, the OmniCore controller waits a specific time\(^1\) for the QuickConnect devices to power up before activating the devices.
\(^1\) The QuickConnect time can be found in the EDS file for the QuickConnect device.

**Enabling device for QuickConnect operation**

This instruction describes how to enable a device for QuickConnect through RobotStudio.

**Note**

Before enabling the device through RobotStudio, read the supplier manual for the specific device and follow those instructions. Only continue with the procedures in RobotStudio if necessary.

**Setting the QuickConnect attribute using EtherNetIP command**

1. Start RobotStudio and connect to the OmniCore controller. Request write access.
2. Open the Configuration Editor and select I/O System.
3. In the Type list, right-click on the EtherNet/IP Command item and select New EtherNet/IP Command.
4. In the editor, select the QuickConnect\([\text{TM}]\) Enable/Disable template in field Use values from template:

![Image of Instance Editor with QuickConnect\([\text{TM}]\) Enable/Disable template]

Complete the following fields that are not automatically completed by the template:

- Device

*Continues on next page*
5 Installing and configuring the internal scanner

5.4 QuickConnect

Continued

- Download Order
  Click OK.

5 Restart the controller.
5.5 Communication between two OmniCore controllers

**General**

When two OmniCore controllers are connected to each other through EtherNet/IP, one of them must be acting as an adapter device and the other one must be acting as a scanner.

**Note**

It is possible to configure both the scanner and an adapter device in the same OmniCore controller.

**Illustration**

The following figure illustrates communication between two OmniCore controllers.

**Limitations**

The address specified in the *Industrial Network* cannot be the same on the two controllers since they shall be interconnected.
Configuring the scanner/adapter controllers

The following procedures describe the configuration of a hardware setup like the one illustrated in section *Illustration on page 41*.

<table>
<thead>
<tr>
<th>Action</th>
<th>Info/Note</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Configure the EtherNet/IP industrial network address for both the OmniCore controllers. See <em>Technical reference manual - System parameters</em>.</td>
<td><strong>Note</strong> Be sure to use different EtherNet/IP addresses for the two OmniCore controllers to avoid duplicated addresses on the interconnected network.</td>
</tr>
<tr>
<td>2. Configure the EtherNet/IP adapter device according to the configuration procedure for the EtherNet/IP internal adapter device. See <em>Configuring the internal adapter device on page 25</em>.</td>
<td></td>
</tr>
<tr>
<td>3. Configure the EtherNet/IP scanner to connect to the EtherNet/IP internal adapter device. See <em>Creating and configuring the internal scanner on page 28</em>.</td>
<td><strong>Note</strong> Use ABB EtherNet/IP Adapter Device template when configuring the EtherNet/IP scanner to connect to the EtherNet/IP Adapter.</td>
</tr>
<tr>
<td>4. Configure signals on the created device.</td>
<td></td>
</tr>
<tr>
<td>5. Physically interconnect the two OmniCore controllers.</td>
<td></td>
</tr>
<tr>
<td>6. Restart the adapter controller.</td>
<td></td>
</tr>
<tr>
<td>7. Restart the scanner controller.</td>
<td>The scanner will now connect to the internal adapter controller.</td>
</tr>
<tr>
<td>8. Now it is possible to set output signals on one controller.</td>
<td>The output signals shall appear as inputs on the other controller.</td>
</tr>
</tbody>
</table>
6 System parameters

6.1 Introduction

About the system parameters

There are both EtherNet/IP specific parameters and more general parameters. This chapter describes all EtherNet/IP specific system parameters. The parameters are divided into the type they belong to. For information about other parameters, see Technical reference manual - System parameters.
6 System parameters

6.1.1 EtherNet/IP system parameters

**Type EtherNet I/P Network**

These parameters belong to the type *Type EtherNet I/P Network* in the topic *I/O System*.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>For more information, see ...</th>
</tr>
</thead>
<tbody>
<tr>
<td>Name</td>
<td>Name on page 47</td>
</tr>
<tr>
<td>Identification Label</td>
<td>Identification Label on page 48</td>
</tr>
<tr>
<td>Simulated</td>
<td>Simulated on page 49</td>
</tr>
</tbody>
</table>

**EtherNet/IP Device**

These parameters belong to the type *EtherNet/IP Device* in the topic *I/O System*. In the manual, the parameters are listed under *Device* as each industrial network shall use its own configuration, for example EtherNet/IP Device and DeviceNet Device.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>For more information, see ...</th>
</tr>
</thead>
<tbody>
<tr>
<td>Name</td>
<td>Name on page 50</td>
</tr>
<tr>
<td>Connected to Industrial Network</td>
<td>Connected to Industrial Network on page 51</td>
</tr>
<tr>
<td>State when System Startup</td>
<td>State when System Startup on page 52</td>
</tr>
<tr>
<td>Trust Level</td>
<td>Trust Level on page 53</td>
</tr>
<tr>
<td>Simulated</td>
<td>Simulated on page 54</td>
</tr>
<tr>
<td>Vendor Name</td>
<td>Vendor Name on page 55</td>
</tr>
<tr>
<td>Product Name</td>
<td>Product Name on page 56</td>
</tr>
<tr>
<td>Identification Label</td>
<td>Identification Label on page 57</td>
</tr>
<tr>
<td>Address</td>
<td>Address on page 58</td>
</tr>
<tr>
<td>Vendor ID</td>
<td>Vendor ID on page 59</td>
</tr>
<tr>
<td>Device Type</td>
<td>Device Type on page 60</td>
</tr>
<tr>
<td>Product Code</td>
<td>Product Code on page 61</td>
</tr>
<tr>
<td>Output Assembly</td>
<td>Output Assembly on page 64</td>
</tr>
<tr>
<td>Input Assembly</td>
<td>Input Assembly on page 65</td>
</tr>
<tr>
<td>Output Size</td>
<td>Output Size on page 67</td>
</tr>
<tr>
<td>Input Size</td>
<td>Input Size on page 66</td>
</tr>
<tr>
<td>Configuration Assembly</td>
<td>Configuration Assembly on page 68</td>
</tr>
<tr>
<td>Ownership</td>
<td>Ownership on page 69</td>
</tr>
<tr>
<td>Input Connection Type</td>
<td>Input Connection Type on page 70</td>
</tr>
<tr>
<td>Connection Priority</td>
<td>Connection Priority on page 71</td>
</tr>
<tr>
<td>Output RPI</td>
<td>Output RPI on page 72</td>
</tr>
<tr>
<td>Input RPI</td>
<td>Input RPI on page 73</td>
</tr>
</tbody>
</table>

Continues on next page
6 System parameters

6.1.1 EtherNet/IP system parameters

<table>
<thead>
<tr>
<th>Parameter</th>
<th>For more information, see ...</th>
</tr>
</thead>
<tbody>
<tr>
<td>Connection Timeout Multiplier</td>
<td>Connection Timeout Multiplier on page 74</td>
</tr>
</tbody>
</table>

**EtherNet/IP Command**

These parameters belong to the type *EtherNet/IP Command* in the topic *I/O System*.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>For more information, see ...</th>
</tr>
</thead>
<tbody>
<tr>
<td>Name</td>
<td>Name on page 75</td>
</tr>
<tr>
<td>Device</td>
<td>Device on page 76</td>
</tr>
<tr>
<td>Identification Label</td>
<td>Identification Label on page 77</td>
</tr>
<tr>
<td>Download Order</td>
<td>Download Order on page 78</td>
</tr>
<tr>
<td>Path</td>
<td>Path on page 79</td>
</tr>
<tr>
<td>Service</td>
<td>Service on page 80</td>
</tr>
<tr>
<td>Value</td>
<td>Value on page 81</td>
</tr>
</tbody>
</table>

**EtherNet/IP Internal Device**

<table>
<thead>
<tr>
<th>Parameter</th>
<th>For more information, see ...</th>
</tr>
</thead>
<tbody>
<tr>
<td>Name</td>
<td>Name on page 82</td>
</tr>
<tr>
<td>Connected to Industrial Network</td>
<td>Connected to Industrial Network on page 83</td>
</tr>
<tr>
<td>Identification Label</td>
<td>Identification Label on page 84</td>
</tr>
<tr>
<td>Connection Input Size</td>
<td>Connection Input Size on page 85</td>
</tr>
<tr>
<td>Connection Output Size</td>
<td>Connection Output Size on page 86</td>
</tr>
</tbody>
</table>
6 System parameters

6.2 Type Ethernet/IP Network

6.2.1 The EtherNet/IP Network type

Overview
This section describes the type *EtherNet/IP Network*, which belongs to the topic *I/O System*. Each parameter of the type is described in a separate information topic in this section.

Type description
The type *EtherNet/IP Network* is a logical representation of a EtherNet/IP network in the robot controller.

Usage
The network configuration defines the specific parameters that will determine the behavior for the industrial network, like communication speed, address, connection, etc. The industrial network is used when defining the I/O devices and other objects in the I/O system.

Limitations
The EtherNet/IP option must be installed.

Related information
*Application manual - EtherNet/IP Scanner/Adapter.*
6.2.2 Name

Parent
Name belongs to the type EtherNet/IP Network, in the topic I/O System.

Description
The parameter Name specifies the name of the industrial network.

Usage
The name of the network is used as a reference to the specific network when configuring the I/O devices on the industrial network.

Default value
The default value is specified by the specific industrial network option.

Allowed values
A string of maximum 32 characters. The following name is allowed:
- EtherNetIP
6 System parameters

6.2.3 Identification Label

6.2.3 Identification Label

Parent

*Identification Label* belongs to the type *EtherNet/IP Network*, in the topic *I/O System*.

Description

*Identification Label* provides a way to identify the industrial network physically.

Usage

Using *Identification Label* is optional. It provides a label to identify the physical industrial network or hardware communication interface (connection port) that this network configuration is representing.

Default value

The default value is an empty string.

Allowed values

A string with maximum 80 characters.
6.2.4 Simulated

**Parent**

_Simulated_ belongs to the type _EtherNet/IP Network_, in the topic _I/O System_.

**Description**

The parameter _Simulated_ specifies that the industrial network and all I/O devices connected to it should be treated as simulated.

**Default value**

The default value is No.

**Allowed values**

Yes
No
### 6 System parameters

#### 6.3 Type Ethernet/IP Device

##### 6.3.1 Name

<table>
<thead>
<tr>
<th>Parent</th>
<th>Name belongs to the type <em>EtherNet/IP Device</em>, in the topic <em>I/O System</em>.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Description</td>
<td>The parameter <em>Name</em> specifies the name of the industrial network.</td>
</tr>
<tr>
<td>Usage</td>
<td>The name of the network is used as a reference to the specific network when configuring the I/O devices on the industrial network.</td>
</tr>
<tr>
<td>Default value</td>
<td>The default value is specified by the specific industrial network option.</td>
</tr>
<tr>
<td>Allowed values</td>
<td>A string of maximum 32 characters.</td>
</tr>
</tbody>
</table>
6.3.2 Connected to Industrial Network

Parent

Connected to Industrial Network belongs to the type EtherNet/IP Device, in the topic I/O System.

Description

The parameter Connected to Industrial Network specifies which industrial network this I/O device is physically connected to.

Default value

The default value is an empty string.

Allowed values

A string with maximum 32 characters.

The string must follow the RAPID rules described in Technical reference manual - RAPID Overview.

The name must be unique among all named objects in the I/O system configuration.

Note

Names differing only in upper and lower case are considered to be equal.
6 System parameters

6.3.3 State when System Startup

RobotWare - OS

6.3.3 State when System Startup

Parent

State when System Startup belongs to the type EtherNet/IP Device, in the topic I/O System.

Description

The parameter State when System Startup defines which logical state the I/O device shall have after startup of the robot system.

Usage

The parameter State when System Startup value defines the logical state that the robot system shall try to set for the I/O device when system startup. The available options are:

• Establish communication (Activated)
• Don't establish communication (Deactivated)
• Restore the previously stored logical state for the I/O device at system shutdown (Last State)

Default value

The default value is Activated.

Allowed values

Activated
Deactivated
Last State
6.3.4 Trust Level

**Parent**

Trust Level belongs to the type EtherNet/IP Device, in the topic I/O System.

**Description**

The parameter Trust Level defines the behavior for I/O devices at different execution situations in the robot controller.

The Trust Level only affects physical devices controlled by an industrial network master in the robot controller. An internal slave device is not controlled by an industrial network master in the robot controller and is therefore not affected by the Trust Level setting.

**Usage**

This parameter is used to specify the I/O device behavior as per the user requirements at different error situations in the robot controller.

**Default value**

The default value is DefaultTrustLevel.

**Allowed values**

A string corresponding to the name of a defined Device Trust Level type.

A string with maximum 32 characters.

The string must follow the RAPID rules described in Technical reference manual - RAPID Overview.

The name must be unique among all named objects in the I/O system configuration.

**Note**

Names differing only in upper and lower case are considered to be equal.
6 System parameters

6.3.5 Simulated

6.3.5 Simulated

Parent

*Simulated* belongs to the type *EtherNet/IP Device*, in the topic *I/O System*.

Description

The parameter *Simulated* specifies that the industrial network and all I/O devices connected to it should be treated as simulated.

Default value

The default value is No.

Allowed values

- Yes
- No
6.3.6 Vendor Name

**Parent**

*Vendor Name* belongs to the type *EtherNet/IP Device*, in the topic *I/O System*.

**Description**

The parameter *Vendor Name* specifies the name of the I/O device vendor.

**Usage**

This parameter is optional and only used as information.

**Allowed values**

A string with maximum 80 characters.
6 System parameters

6.3.7 Product Name

Product Name belongs to the type EtherNet/IP Device, in the topic I/O System.

Description

The parameter Product Name specifies the product name for this I/O device according to industrial network type standard.

Usage

This parameter is optional and only used as information.

Allowed values

A string with maximum 80 characters.
### 6.3.8 Identification Label

**Parent**

Identification Label belongs to the type *EtherNet/IP Device*, in the topic *I/O System*.

**Description**

Identification Label provides a way to identify the industrial network physically.

**Usage**

Using Identification Label is optional. It provides a label to identify the physical industrial network or hardware communication interface (connection port) that this network configuration is representing.

**Default value**

The default value is an empty string.

**Allowed values**

A string with maximum 80 characters.
6 System parameters

6.3.9 Address

6.3.9 Address

Parent

Address belongs to the type Device, in the topic I/O System.

Description

The parameter Address specifies the address of the I/O device on the network.

Usage

Address specifies the address that the I/O device uses on the network, to which the scanner should set up a connection.

Prerequisites

The option 3024-1 EtherNet/IP Scanner must be installed.

Default value

Empty

Allowed values

The value can be between 0.0.0.0 - 255.255.255.255.

There are limitations for the values set by the vendor of the device. However, it is dependent on the selected network. The selected network is determined by the network address and subnet mask.
6.3.10 Vendor ID

**Parent**

Vendor ID belongs to the type Device, in the topic I/O System.

**Description**

Vendor ID is used as an identification of the I/O device to secure communication to the correct type of device.

**Usage**

This parameter is used as an identification of the I/O device to secure communication to the correct device.

The value of Vendor ID can be found in the Electronic Data Sheet (EDS) for the device (called VendCode in EDS file) in DeviceNet network, or by using a predefined device template in DeviceNet network.

**Prerequisites**

The option 3024-1 EtherNet/IP Scanner or 3024-2 EtherNet/IP Adapter must be installed.

**Default value**

The default value is 0.

**Allowed values**

Allowed values are the integers 0-65535.

**Additional information**

The I/O device vendor number is assigned by Open DeviceNet Vendor Associations (ODVA) to the vendor of the specific I/O device.
6 System parameters

6.3.11 Device Type

6.3.11 Device Type

Parent

Device Type belongs to the type Device, in the topic I/O System.

Description

The parameter Device Type specifies the device type of this I/O device as defined by the Open DeviceNet Vendor Association.

Usage

This parameter is used as an identification of the I/O device to secure communication to the correct device.

The value of this parameter can be found in the Electronic Data Sheet (EDS) for the device (called ProdType in EDS file) in DeviceNet network, or by using a predefined device template in DeviceNet network.

Prerequisites

The option 3024-1 EtherNet/IP Scanner or 3024-2 EtherNet/IP Adapter must be installed.

Default value

The default value is 0.

Allowed values

Allowed values are the integers 0-65535.
6.3.12 Product Code

Parent

*Product Code* belongs to the type *Device*, in the topic *I/O System*.

Description

*Product Code* is used as an identification of the I/O device to secure communication to the correct I/O device.

Usage

This parameter is used as an identification of the I/O device to secure communication to the correct device.

The value of *Product Code* can be found in Electronic Data Sheet (EDS) for the device (called ProdCode in EDS file) in DeviceNet network, or by using a predefined device template in DeviceNet network.

Prerequisites

The option *3024-1 EtherNet/IP Scanner* or *3024-2 EtherNet/IP Adapter* must be installed.

Default value

Default value is 0.

Allowed values

Allowed values are the integers 0-65535.

Additional information

The device product code is defined by the vendor of the device and shall be unique for the actual product type.
6 System parameters

6.3.13 QuickConnect

QuickConnect belongs to the type Device, in the topic I/O System.

Description

The QuickConnect functionality provides the connection between the EtherNet/IP Scanner and the I/O device to quickly disconnect and reconnect, both mechanically and logically, to the Ethernet network. When the QuickConnect functionality is activated, the device is connected and operational by the EtherNet/IP Scanner, under 500 ms.

Usage

The parameter QuickConnect specifies if the QuickConnect attribute shall be set or not set on the I/O device.

There are three different alternatives:

1. Not Used: QuickConnect will not be used and the EtherNet/IP Scanner will not care about the QuickConnect attribute on the I/O device.
2. Activated: The EtherNet/IP Scanner will try to activate the QuickConnect attribute on the I/O device.
3. Deactivated: The EtherNet/IP Scanner will try to deactivate the QuickConnect attribute on the I/O device.

Note

While using QuickConnect, make sure to turn off autonegotiation on the link that is disconnected. For example, in the connector on the switch (or in the connector for the OmniCore controller) and in the connector on the I/O device.

An error message appears if trying to activate or deactivate the QuickConnect functionality on an I/O device that does not support QuickConnect.

Note

If Configuration Data is used to activate or deactivate the QuickConnect parameter in a device, set the QuickConnect to Not Used. Based on priority, the Configuration Data parameter overrides the QuickConnect parameter.

Prerequisites

The option 3024-1 EtherNet/IP Scanner must be installed.

Default value

Not Used

Allowed values

Not Used
Activated

Continues on next page
Deactivated
### 6.3.14 Output Assembly

**Parent**

*Output Assembly* belongs to the type *Device*, in the topic *I/O System*.

**Description**

*Output Assembly* specifies where the output data for an I/O device is located. The output assembly is vendor specific and can be found in the electronic data sheet (EDS) file.

**Prerequisites**

The option *3024-1 EtherNet/IP Scanner* must be installed.

**Default value**

The default value is 0.

**Allowed values**

Integer between 0 and 65535.
6.3.15 Input Assembly

Parent

*Input Assembly* belongs to the type *Device*, in the topic *I/O System*.

Description

*Input Assembly* specifies where the input data for an I/O device is located. The input assembly is vendor specific and can be found in the electronic data sheet (EDS) file.

Prerequisites

The option 3024-1 *EtherNet/IP Scanner* must be installed.

Default value

The default value is 0.

Allowed values

Integer between 0 and 65535.
6.3.16 Input Size

**Parent**

*Input Size* belongs to the type *Device*, in the topic *I/O System*.

**Description**

*Input Size* defines the input data size in bytes for an I/O device.

**Note**

When working with the internal adapter device, the *Input Size* is the *Output Size* from the scanner point of view.

**Usage**

*Input Size* is an EtherNet/IP specific parameter.

**Prerequisites**

The option 3024-1 EtherNet/IP Scanner must be installed.

**Limitations**

A limitation is the maximum device size for the *Device*.

**Default value**

The default value is 8 bytes (64 signal bits).

**Allowed values**

Allowed values are the integers 0-509 (0-4072 signal bits), specifying the data size in bytes.

**Note**

When working with the internal adapter device, the allowed values are 0-505 (0-4040 signal bits), specifying the data size in bytes.
6.3.17 Output Size

**Parent**

*Output Size* belongs to the type *Device*, in the topic *I/O System*.

**Description**

*Output Size* defines the output data size in bytes for an I/O device.

**Note**

When working with the internal adapter device, the *Output Size* is the *Input Size* from the scanner point of view.

**Usage**

*Output Size* is an EtherNet/IP specific parameter.

**Prerequisites**

The option *3024-1 EtherNet/IP Scanner* must be installed.

**Limitations**

A limitation is the maximum device size for the *Device*.

**Default value**

The default value is 8 bytes (64 signal bits).

**Allowed values**

Allowed values are the integers 0-505 (0-4040 signal bits), specifying the data size in bytes.

**Note**

When working with the internal adapter device, the allowed values are 0-509 (0-4072 signal bits), specifying the data size in bytes.
## 6 System parameters
### 6.3.18 Configuration Assembly

<table>
<thead>
<tr>
<th><strong>Parent</strong></th>
<th><em>Configuration Assembly</em> belongs to the type <em>Device</em>, in the topic <em>I/O System</em>.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Description</strong></td>
<td>The <em>Configuration Assembly</em> parameter specifies where the configuration data for a device is located.</td>
</tr>
<tr>
<td><strong>Usage</strong></td>
<td><em>Configuration Assembly</em> is optional and is used if an I/O device needs some extra configuration parameters. The <em>Configuration Assembly</em> parameter is vendor specific and can be found in the electronic data sheet (EDS) file.</td>
</tr>
<tr>
<td><strong>Prerequisites</strong></td>
<td>The option <em>3024-1 EtherNet/IP Scanner</em> must be installed.</td>
</tr>
<tr>
<td><strong>Default value</strong></td>
<td>The default value is 0 (means that this parameter is ignored).</td>
</tr>
<tr>
<td><strong>Allowed values</strong></td>
<td>Integer between 0 and 65535.</td>
</tr>
</tbody>
</table>
6.3.19 Ownership

Parent

Ownership belongs to the type Device, in the topic I/O System.

Description

The Ownership parameter specifies how the I/O connection shall act between the scanner and the I/O device. There are three different types of Ownership:

- **Exclusive Owner**: An I/O connection where the data of an I/O device can be controlled only by one scanner.
- **Input Only**: An I/O connection where only the scanner can receive input data from an I/O device. There is no output data.
- **Listen Only**: An I/O connection where only the scanner can receive input data from an I/O device. This type of Ownership can only be attached to an connection of type; Exclusive Owner or Input Only. If this underlying connection closes, then the connection with Ownership of type; Listen Only will also be closed. There is no output data.

Note

Some EtherNet/IP devices might not support the Input Only connection.

Prerequisites

The option 3024-1 EtherNet/IP Scanner must be installed.

Default value

The default value is Exclusive Owner.

Allowed values

Exclusive Owner, Input Only, or Listen Only.
6.3.20 Input Connection Type

**Parent**

Input Connection Type belongs to the type Device, in the topic I/O System.

**Description**

The Input Connection Type parameter specifies how I/O data is sent from the I/O device to the scanner. There are two different connection types:

- **Point-to-point (Unicast):** A connection where the data is sent from one point to another point. In this case there is just one sender and one receiver.
- **Multicast:** A connection where the data is sent from one or more points to a set of other points. In this case there is one sender and multiple receivers.

**Note**

Some EtherNet/IP I/O devices might not support Point-to-point as input connection type.

**Prerequisites**

The option 3024-1 EtherNet/IP Scanner must be installed.

**Default value**

The default value is Multicast.

**Allowed values**

Multicast or Point-to-point
6.3.21 Connection Priority

**Parent**

*Connection Priority* belongs to the type *Device*, in the topic *I/O System*.

**Description**

The *Connection Priority* parameter specifies how I/O data is prioritized on the network. Network priority is accomplished by using Quality of Service (QoS) mechanisms in the device.

**Note**

Refer the user manual for EtherNet/IP device that supports QoS.

**Prerequisites**

The option 3024-1 *EtherNet/IP Scanner* must be installed.

**Default value**

The default value is *Low*.

**Allowed values**

- Low
- High
- Schedule
- Urgent
Output RPI belongs to the type Device, in the topic I/O System.

Output RPI (Originator to Target Request Packet Interval) is the time between I/O packets from the scanner to the I/O device.

Use this parameter to decide at which interval the scanner shall produce output data to the I/O device.

The Request Packet Interval is specified in micro seconds.

Note

In case of connection problems, it is recommended to increase the Connection Timeout Multiplier. See Connection Timeout Multiplier on page 74.

The option 3024-1 EtherNet/IP Scanner must be installed.

The default value is 50000.

The minimum limit is 1 and maximum limit is 4.294967E+09.
6.3.23 Input RPI

**Parent**

*Input RPI* belongs to the type *Device*, in the topic *I/O System*.

**Description**

*Input RPI* (Target to Originator Request Packet Interval) is the time between I/O packets from the I/O device to the scanner.

**Usage**

Use this parameter to decide at which interval the scanner shall consume input data from the I/O device.

The Request Packet Interval is specified in micro seconds.

**Note**

In case of connection problems, it is recommended to increase the Connection Timeout Multiplier. See *Connection Timeout Multiplier on page 74*.

**Prerequisites**

The option *3024-1 EtherNet/IP Scanner* must be installed.

**Default value**

The default value is 50000.

**Allowed value**

The minimum limit is 1 and maximum limit is 4.294967E+09.
6 System parameters

6.3.24 Connection Timeout Multiplier

**Parent**

Connection Timeout Multiplier belongs to the type Device, in the topic I/O System.

**Description**

Connection Timeout Multiplier specifies the multiplier applied to the expected packet rate value to derive the value for the Inactivity/Watchdog Timer.

**Usage**

The Connection Timeout Multiplier is a number among 4, 8, 16, 32, 64, 128, 256. It is used together with RPI to calculate the timeout on connections. RPI multiplied by Connection Timeout Multiplier gives the maximum time before dropping the connection.

**Note**

For the IRB 14000 and IRB 14050 robots this parameter may have to be tuned depending on your network setup.

**Prerequisites**

The option 3024-1 EtherNet/IP Scanner must be installed.

**Allowed values**

Allowed values are 4, 8, 16, 32, 64, 128, 256, 512.

Default value is 4.
6.4 Type EtherNet/IP Command

6.4.1 Name

<table>
<thead>
<tr>
<th>Parent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Name belongs to the type EtherNet/IP Command, in the topic I/O System.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>The parameter Name specifies the name of the industrial network.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Usage</th>
</tr>
</thead>
<tbody>
<tr>
<td>The name of the network is used as a reference to the specific network when configuring the I/O devices on the industrial network.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Default value</th>
</tr>
</thead>
<tbody>
<tr>
<td>The default value is specified by the specific industrial network option.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Allowed values</th>
</tr>
</thead>
<tbody>
<tr>
<td>A string of maximum 32 characters.</td>
</tr>
</tbody>
</table>
6 System parameters

6.4.2 Device

6.4.2 Device

<table>
<thead>
<tr>
<th>Parent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Device belongs to the type EtherNet/IP Command, in the topic I/O System.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Specifies the name of the I/O device the command is connected to.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Default value</th>
</tr>
</thead>
<tbody>
<tr>
<td>The default value is an empty string.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Allowed values</th>
</tr>
</thead>
<tbody>
<tr>
<td>A string defining the name of the I/O device with maximum 32 characters.</td>
</tr>
</tbody>
</table>

Note

Names that differ only in upper and lower case are considered to be equal.
6.4.3 Identification Label

Parent

Identification Label belongs to the type EtherNet/IP Command, in the topic I/O System.

Description

Identification Label provides a way to identify the industrial network physically.

Usage

Using Identification Label is optional. It provides a label to identify the physical industrial network or hardware communication interface (connection port) that this network configuration is representing.

Default value

The default value is an empty string.

Allowed values

A string with maximum 80 characters.
6 System parameters

6.4.4 Download Order

6.4.4 Download Order

Parent

*Download Order* belongs to the type *EtherNet/IP Command*, in the topic *I/O System*.

Description

The parameter *Download Order* specifies the sequence number in which this command shall be downloaded to the I/O device that have several commands assigned to it.

Usage

Use *Download Order* to control the order in which the commands are downloaded (and executed) on an I/O device. Lower download orders are downloaded before higher download orders.

Default value

The default value is 0.

Allowed values

0 - 100.
6.4.5 Path

Parent

Path belongs to the type EtherNet/IP Command, in the topic I/O System.

Description

Path defines the path to EtherNet/IP object instance or attribute.

Usage

Path is used to describe the path to the instance or attribute, the data type identifier and the data size that are to be affected by the explicit message. Information about how to define this can be found in the [Params] section of the EDS file.

Default value

The default value is an empty string.

Allowed values

A string with maximum 30 characters.

Related information

For more information and examples, see Explicit messaging services on page 32.

For information about which explicit messaging services are available for a specific I/O device and how to set the parameters, refer to the supplier documentation of the I/O device and the Common Industrial Protocol (CIP) Specification, see References on page 7.

Example

6,20 01 24 08 30 01,C6,1

Description:

- 6 is the length of the path - that is, the number of hexadecimal figures until the next comma. This is an optional parameter.
- Path (20 01 24 08 30 01) is a software description of EtherNet/IP class, instance and attribute.
- C6 is the hexadecimal value for the data type identifier.
- 1 is the data size - that is, the number of bytes as a hexadecimal value. This is an optional parameter.
## 6 System parameters

### 6.4.6 Service

<table>
<thead>
<tr>
<th>Parent</th>
<th>Service belongs to the type EtherNet/IP Command, in the topic I/O System.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Description</td>
<td>Service defines the explicit service that should be performed on EtherNet/IP object instance or attribute pointed out in Path.</td>
</tr>
<tr>
<td>Usage</td>
<td>Service is used to define the type of action to be used.</td>
</tr>
<tr>
<td>Default value</td>
<td>The default value is Set Attribute Single.</td>
</tr>
<tr>
<td>Allowed values</td>
<td>Following values are allowed:</td>
</tr>
<tr>
<td></td>
<td>• Reset (0x05 or 5 in the configuration file)</td>
</tr>
<tr>
<td></td>
<td>• Set Attribute Single (0x10 or 16 in the configuration file)</td>
</tr>
</tbody>
</table>
6.4.7 Value

Parent

Value belongs to the type EtherNet/IP Command, in the topic I/O System.

Description

The parameter Value specifies the value for this command.

Default value

The default value is an empty string.

Allowed values

A string with maximum 200 characters.
### 6 System parameters

#### 6.5 Type EtherNet/IP Internal Device

#### 6.5.1 Name

<table>
<thead>
<tr>
<th>Parent</th>
<th>Name belongs to the type EtherNet/IP Internal Device, in the topic I/O System.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Description</td>
<td>The parameter Name specifies the name of the industrial network.</td>
</tr>
<tr>
<td>Usage</td>
<td>The name of the network is used as a reference to the specific network when configuring the I/O devices on the industrial network.</td>
</tr>
<tr>
<td>Default value</td>
<td>The default value is specified by the specific industrial network option.</td>
</tr>
<tr>
<td>Allowed values</td>
<td>A string of maximum 32 characters.</td>
</tr>
</tbody>
</table>
6.5.2 Connected to Industrial Network

**Parent**

*Connected to Industrial Network* belongs to the type *EtherNet/IP Internal Device*, in the topic *I/O System*.

**Description**

The parameter *Connected to Industrial Network* specifies which industrial network this I/O device is physically connected to.

**Default value**

The default value is an empty string.

**Allowed values**

A string with maximum 32 characters.  
The string must follow the RAPID rules described in *Technical reference manual - RAPID Overview*.  
The name must be unique among all named objects in the I/O system configuration.  

**Note**

Names differing only in upper and lower case are considered to be equal.
6 System parameters

6.5.3 Identification Label

6.5.3 Identification Label

Parent

Identification Label belongs to the type EtherNet/IP Internal Device, in the topic I/O System.

Description

Identification Label provides a way to identify the industrial network physically.

Usage

Using Identification Label is optional. It provides a label to identify the physical industrial network or hardware communication interface (connection port) that this network configuration is representing.

Default value

The default value is an empty string.

Allowed values

A string with maximum 80 characters.
6.5.4 Connection Input Size

**Parent**

Connection Input Size belongs to the type EtherNet/IP Internal Device, in the topic I/O System.

**Description**

Connection Input Size defines the data size in bytes for the input area received from the connected EtherNet/IP scanner.

**Usage**

Connection Input Size is an EtherNet/IP specific parameter.

**Prerequisites**

The option 3024-1 EtherNet/IP Scanner or 3024-2 EtherNet/IP Adapter must be installed.

**Default value**

For option 3024-1 EtherNet/IP Scanner or 3024-2 EtherNet/IP Adapter, the default value is 64.

**Allowed values**

For option 3024-1 EtherNet/IP Scanner or 3024-2 EtherNet/IP Adapter, allowed values ranges from 0 to 505.
6 System parameters

6.5.5 Connection Output Size

### Parent

*Connection Output Size* belongs to the type *EtherNet/IP Internal Device*, in the topic *I/O System*.

### Description

*Connection Output Size* defines the data size that is transmitted to the device over the first connection.

### Usage

The value of *Connection Output Size* can either be found in the [IO_Info] section of the Electronic Data Sheet (EDS) for the device, or by using a predefined device template.

### Prerequisites

The option *3024-1 EtherNet/IP Scanner* or *3024-2 EtherNet/IP Adapter* must be installed.

### Limitations

Maximum and minimum values might be constrained by the device.

### Default value

Default value is 0.

### Allowed values

Allowed values are the integers 0-64 (0-512 signal bits), specifying the data size in bytes.

For devices that can give the device size itself by an explicit message, the value -1 is also allowed.
7 Troubleshooting

7.1 Frequently asked questions

Is it recommended to configure the WAN connector and the selected LAN connector on the same subnet?

No, the EtherNet/IP address for the WAN connector must belong to another subnet than the address of the selected LAN connector.

For example, if the address of the LAN connector is 111.122.133.144, the address for the selected LAN connector cannot be 111.122.133.145 if the subnet mask 255.255.255.0 (but it can be 111.122.134.145) is being used.

How to identify the desired EtherNet/IP I/O devices on the network?

There are two ways to identify the EtherNet/IP devices on the industrial network.

There is a list with the I/O device names, IP addresses and corresponding MAC addresses. In the window Inputs and Outputs, tap View and select Industrial Networks. Select the desired EtherNet/IP network and tap I/O Device Identification in the command bar. A window will be displayed with all the devices on the selected EtherNet/IP industrial network and their corresponding IP and MAC addresses.

Another way is to open the Inputs and Outputs window, tap View and select Devices. Select the EtherNet/IP device to be identified, tap Actions in the command bar and select Unit Identification. A message box will be shown displaying the MAC address for the selected device.

Can tool change be done without using dedicated QuickConnect I/O devices?

Yes. If time is really not important, there are many different I/O devices available today which can serve as tool changer equipment.

The only requirement for proper and deterministic behaviour is that, the I/O device must issue gratuitous ARP requests when powered on. If so, the connection time will be determined by the I/O device startup time.

If the I/O device does not support gratuitous ARP, the connection time will be dependent on the refresh of ARP timers in the robot communication software. Typically 20 seconds can be expected but it can take up to some minutes. Also, the error log "71058 Lost communication with I/O device" will be issued.
## 7 Troubleshooting

### 7.2 Troubleshooting

#### Error log "71367 No contact with device" is shown after startup

<table>
<thead>
<tr>
<th>Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Check cabling.</td>
</tr>
<tr>
<td>2. Ensure that the device address matches the configuration.</td>
</tr>
<tr>
<td>3. Ensure that all addresses are unique, and not used by more than one device.</td>
</tr>
<tr>
<td>4. If the address is changed, the power supply to the device must be cycled (switched OFF and then back ON) to ensure the address has been changed.</td>
</tr>
<tr>
<td>5. Verify that the configured Input Assembly and Output Assembly correspond to the data in the EDS file for your I/O device.</td>
</tr>
<tr>
<td>6. Verify the configured Input Size and Output Size.</td>
</tr>
<tr>
<td>7. Verify if the device needs the Configuration Assembly. See the EDS file.</td>
</tr>
</tbody>
</table>

#### Error log "71201 Unknown industrial network" is shown after startup

<table>
<thead>
<tr>
<th>Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Ensure that the Industrial Network option EtherNet/IP Scanner/Adapter is installed.</td>
</tr>
<tr>
<td>2. Check the EtherNet/IP address.</td>
</tr>
<tr>
<td>3. Check the gateway settings.</td>
</tr>
<tr>
<td>4. When using any of the LAN connectors make sure to configure the WAN connector and the LAN connector on separate subnets.</td>
</tr>
</tbody>
</table>

#### Error log "71058 Lost communication with I/O unit" is shown when activating QuickConnect I/O devices

This error occurs when connecting to the device when it is not ready to join the network.

<table>
<thead>
<tr>
<th>Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Check that the QuickConnect device is activated for QuickConnect functionality.</td>
</tr>
<tr>
<td>2. Check if the electrical lock signal is working as expected.</td>
</tr>
<tr>
<td>3. Check if the OmniCore controller waits for sufficient amount of time after electrical lock has been engaged before connecting to the device.</td>
</tr>
<tr>
<td>4. Check if the network allows the gratuitous ARP request correctly. This is essential when doing QuickConnect on devices with the same IP address. The Spanning Tree Protocol should be disabled at the switch.</td>
</tr>
</tbody>
</table>
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