AutomationDirect Productivity Series Ethernet Driver

Table of Contents

AutomationDirect Productivity Series Ethernet Driver Help

Help version 1.037

CONTENTS

Overview

The AutomationDirect Productivity Series Ethernet Driver provides a reliable way to connect AutomationDirect Productivity Series Ethernet devices to OPC client applications, including HMI, SCADA, Historian, MES, ERP, and countless custom applications.

Device Setup

Supported Devices

P3-550

Important: The PS-550 device cannot be used as a MODBUS TCP server when DHCP IP addressing is being used.

Firmware Versions

P3-550: ver.1.0.7.2

Hardware Setup

It is recommended that users keep the default setting "No exception response for non-existing MODBUS address requests". For more information, refer to the device's programming software under "Project Properties: MODBUS Server Settings."

Maximum Number of Channels and Devices

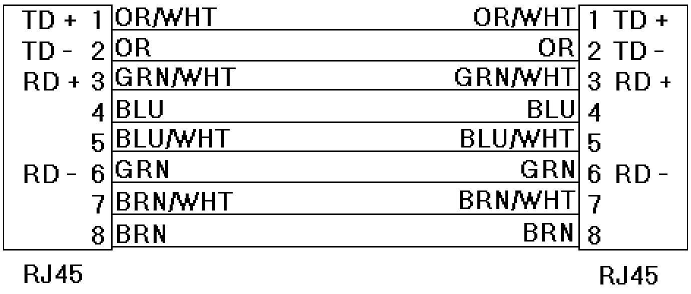
The maximum number of channels supported is 100. The maximum number of devices supported per channel is 256.

Device ID

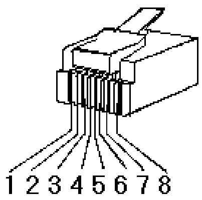
This parameter specifies the IP address of the device with the extension *:#*, where # is the Slave ID.

Cable Diagrams

Patch Cable (Straight Through)

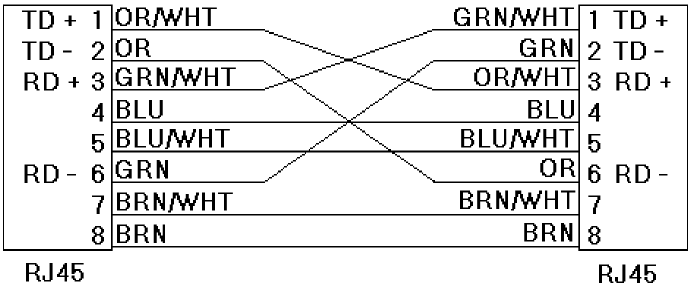


10 BaseT

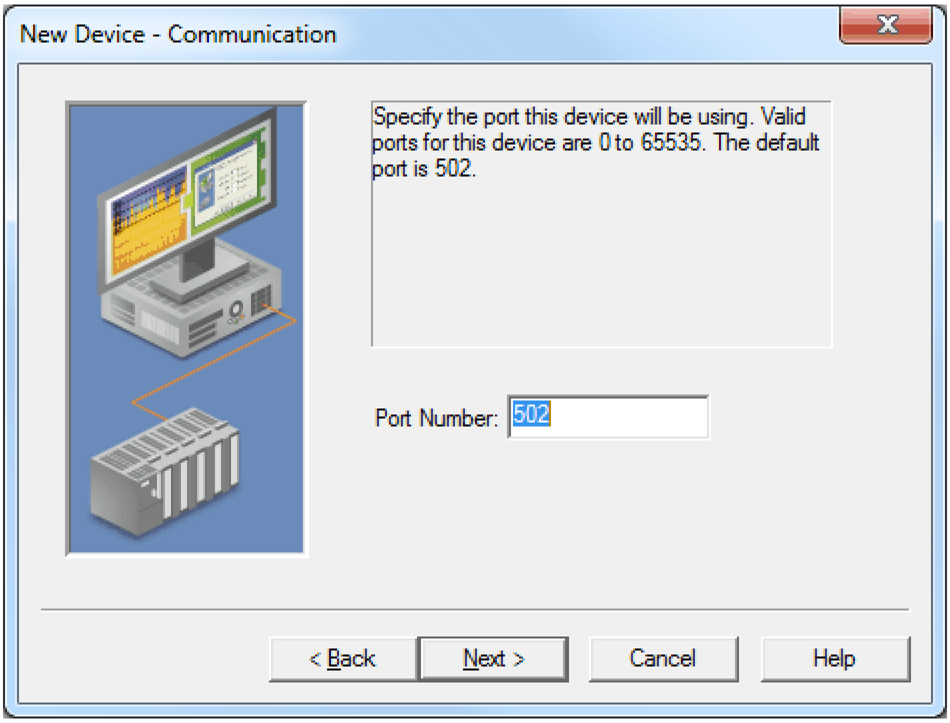


8-pin RJ45

Crossover Cable



Communication



New Device - Communication

Specify the port this device will be using. Valid ports for this device are 0 to 65535. The default port is 502.

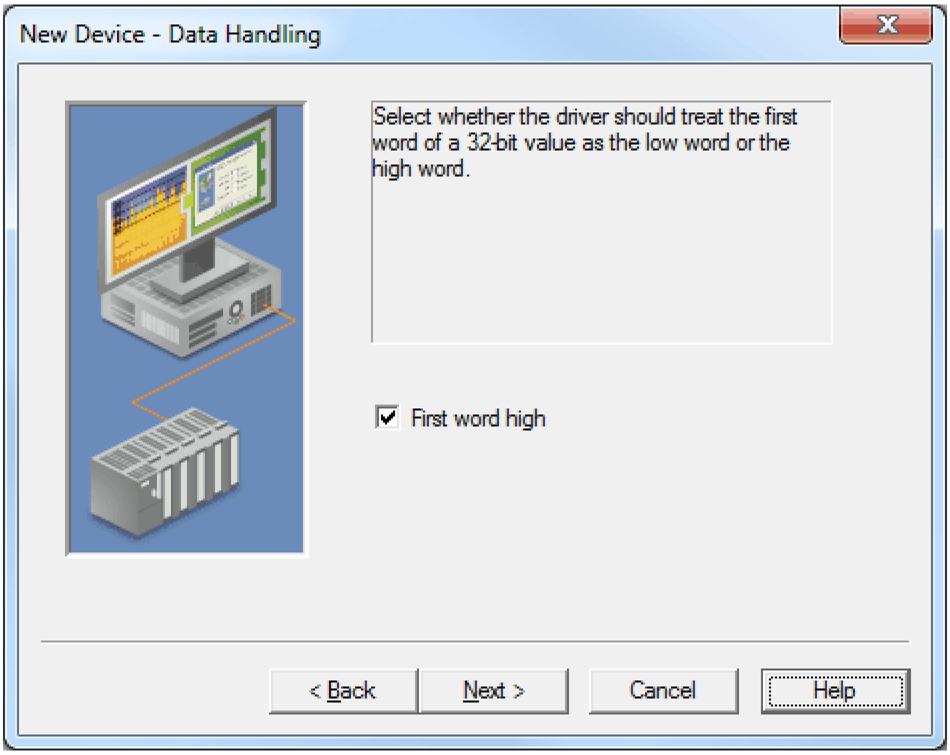
Port Number: 502

Description of the parameter is as follows:

- **Port Number:** This parameter is used to specify the port number. The default setting is 502.

Note: The default communication protocol is MODBUS® TCP/IP.

Data Handling



New Device - Data Handling

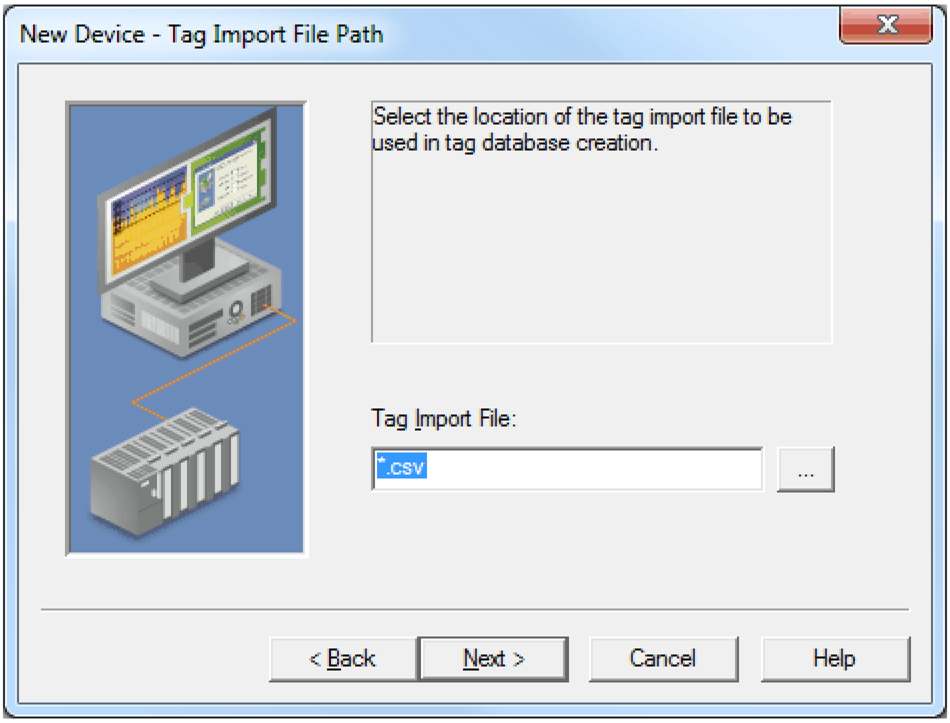
Select whether the driver should treat the first word of a 32-bit value as the low word or the high word.

☑ First word high

Description of the parameter is as follows:

- **First word high:** In an AutomationDirect Productivity Series Ethernet device, the addresses of two consecutive registers are used for 32-bit data types. When this option is checked, the driver will assume the first word is high for the 32-bit value. When this option is unchecked, the driver will assume that the first word is low for the 32-bit value. The default setting is checked.

Tag Import File Path


New Device - Tag Import File Path
Select the location of the tag import file to be used in tag database creation.
Tag Import File:
*.csv
...
< Back
Next >
Cancel
Help

Description of the parameter is as follows:

- **Tag Import File:** This parameter specifies the exact location of the tag import file. The "*.csv" file must be created in the Productivity Suite Programming Software. The tag import file will be used by the Automatic Tag Database Generation feature to create the tag database. All tags will be imported and expanded according to their respective data types.

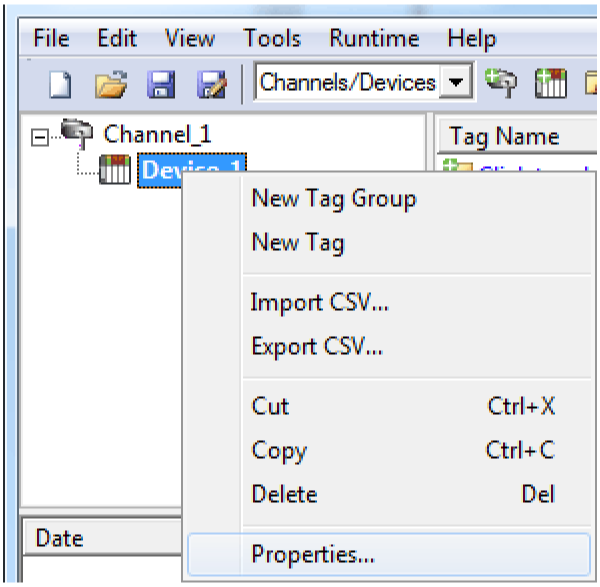
Note: For more information, refer to **Automatic Tag Database Generation**.

Automatic Tag Database Generation

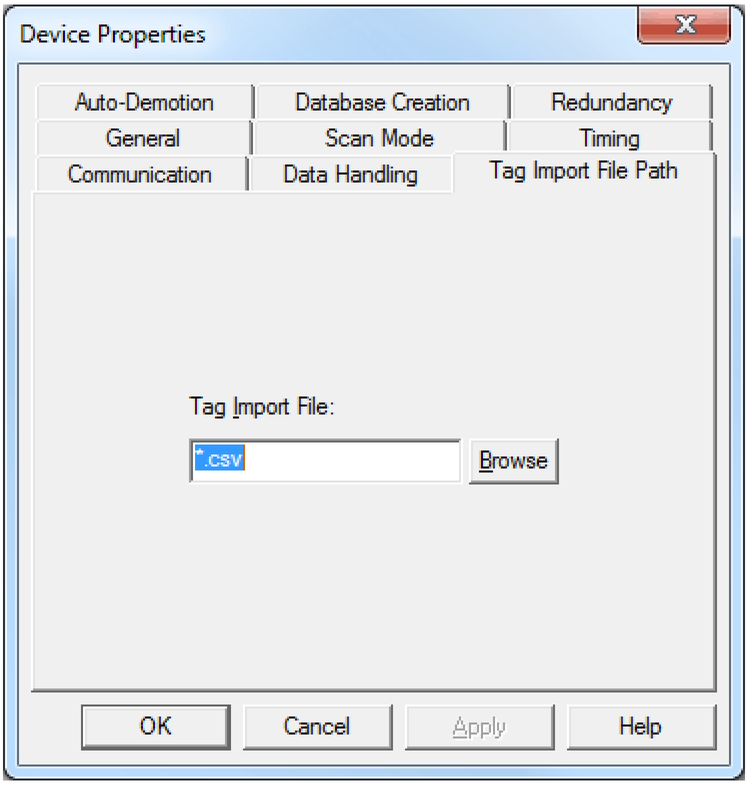
The AutomationDirect Productivity Series Ethernet Driver supports the OPC server's Automatic Tag Database Generation feature, which allows the driver to automatically create tags that access data points used in a device configuration. The OPC server uses the tag import file to create the tag database. The tag import file (*.csv) must be created in the Productivity Suite Programming Software. For more information, refer to **Tag Import File Path**.

For information on using automatic tag database generation, refer to the following instructions.

1. In the OPC server project, right-click on the device and then select **Properties**.



2. Next, open the **Tag Import File Path** tab.



Tag Import File: *.csv

3. Click **Browse** to locate the folder containing the import file (*.csv).

   Note: Productivity Software Suite Versions 1.4 to 1.9 add a field to exported .csv files that is not supported and causes tag import to fail. To use these files, delete the last field or column. The modified .csv file can be imported. Starting with version 1.10 2 files are created with _basic and _extended appended to the file name. The _basic file is correctly formatted to be used for Auto Tag Generation.

4. Next, select the import file and then click **OK** to start the import and tag generation process.
5. The OPC server's Event Log will show when the tag generation process started, any errors that occurred during processing, and when the process completed.

Note: For more information, refer "Automatic Tag Database Generation" in the server help documentation.

See Also:
Exporting a CSV File from Productivity Suite

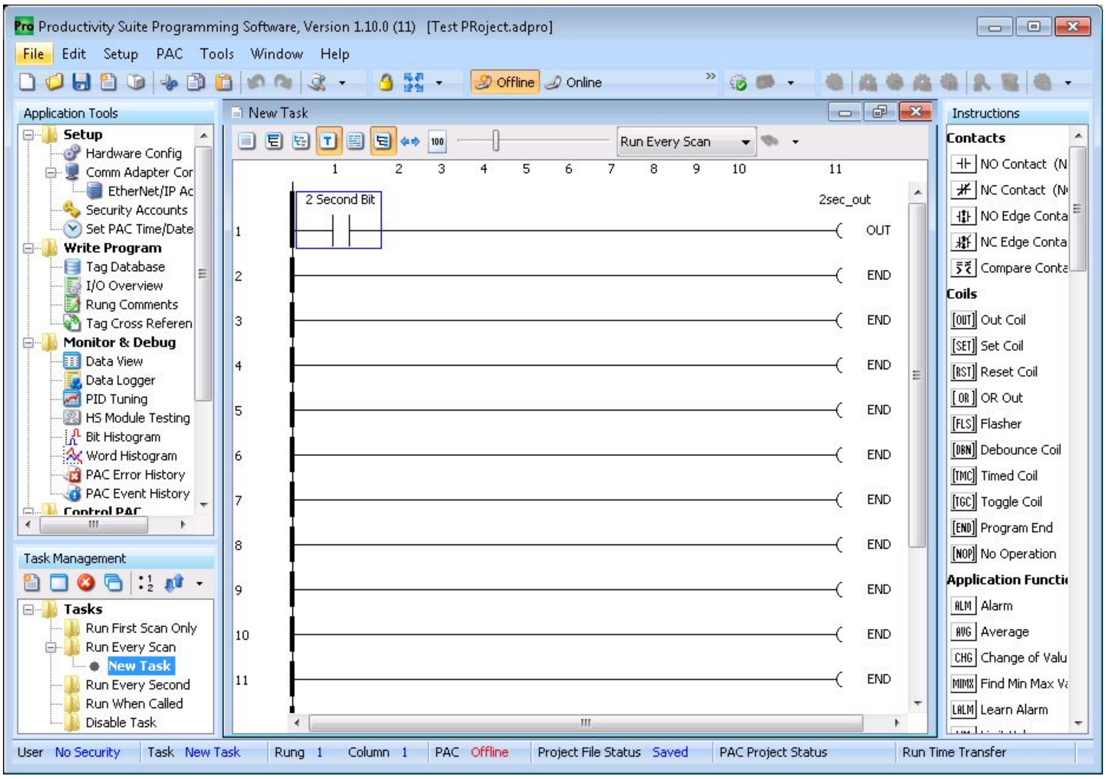
Exporting a CSV File from Productivity Suite

Tag export from the Productivity Suite software produces a CSV (Comma Separated Value) file. Prior to Productivity Suite Version 1.10.0.11, it created a single CSV file. Version v1.10.0.11 and newer create two CSV files: basic and extended. Use the basic file for Automatic Tag Generation.

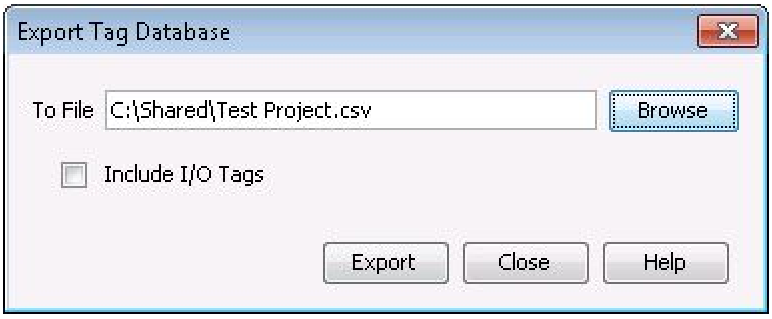
Example
TestProject_basic.csv
TestProject_extended.csv

To export the tag database:

1. In the Productivity Suite main menu, select **File | Export | Tags...**.



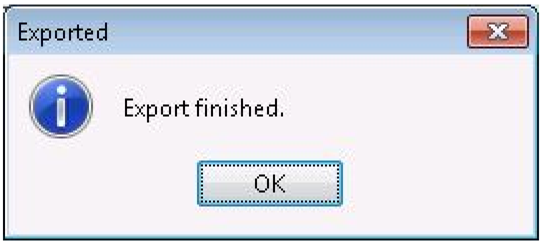
2. Browse to and select the location in which to save the exported tag CSV file.


Export Tag Database

To File C:\Shared\Test Project.csv

☐ Include I/O Tags

3. Click **Export** to create the .csv export files.


Exported

Export finished.

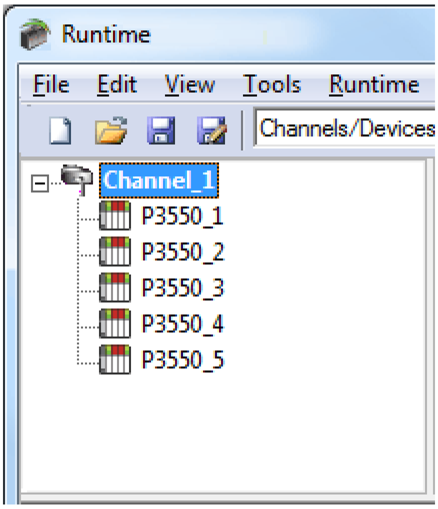
4. Click **OK**.

See Also:
Automatic Tag Database Generation

Optimizing AutomationDirect Productivity Series Ethernet Communications

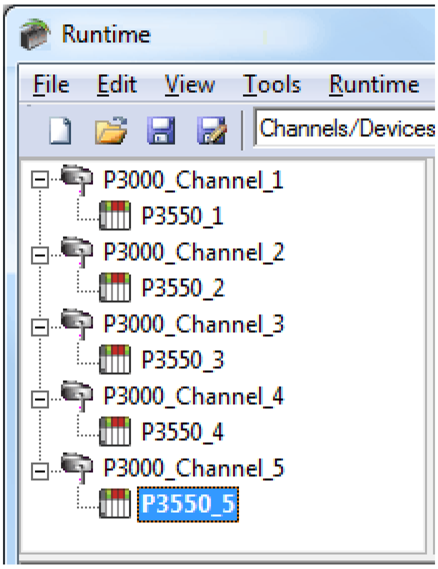
The AutomationDirect Productivity Series Ethernet Driver has been designed to provide the best performance with the least amount of impact on the system's overall performance. While the AutomationDirect Productivity Series Ethernet Driver is fast, there are a couple of guidelines that can be used to optimize the application and gain maximum performance.

This server refers to communications protocols like AutomationDirect Productivity Series Ethernet Driver as a channel. Each channel defined in the application represents a separate path of execution in the server. Once a channel has been defined, a series of devices must then be defined under that channel. Each of these devices represents a single controller from which data will be collected. While this approach to defining the application will provide a high level of performance, it won't take full advantage of the AutomationDirect Productivity Series Ethernet Driver or the network. An example of how the application may appear when configured using a single channel is shown below.



Each device appears under a single AutomationDirect Productivity Series Ethernet Driver channel. In this configuration, the driver must move from one device to the next as quickly as possible in order to gather information at an effective rate. As more devices are added or more information is requested from a single device, the overall update rate begins to suffer.

If the AutomationDirect Productivity Series Ethernet Driver could only define one single channel, then the example shown above would be the only option available; however, the AutomationDirect Productivity Series Ethernet Driver can define up to 256 devices per 100 channel. Using multiple channels distributes the data collection workload by simultaneously issuing multiple requests to the network. An example of how the same application may appear when configured using multiple channels to improve performance is shown below.



Each device has now been defined under its own channel. In this new configuration, a single path of execution is dedicated to the task of gathering data from each device. If the application has 256 or fewer devices, it can be optimized exactly how it is shown here.

The performance will improve even if the application has more than 256 devices. While 256 or fewer devices may be ideal, the application will still benefit from additional channels. Although spreading the device load across all channels will cause the server to move from device to device again, it can now do so with far less devices to process on a single channel.

See Also: Data Handling

Data Types Description

Data Type	Description
Boolean	Single bit.
Byte	Unsigned 8-bit value. bit 0 is the low bit. bit 7 is the high bit.
Word	Unsigned 16-bit value. bit 0 is the low bit. bit 15 is the high bit.
Short	Signed 16-bit value. bit 0 is the low bit. bit 14 is the high bit. bit 15 is the sign bit.
DWord	Unsigned 32-bit value. bit 0 is the low bit. bit 31 is the high bit.
Long	Signed 32-bit value. bit 0 is the low bit. bit 30 is the high bit. bit 31 is the sign bit.
BCD	Two byte packed BCD. Value range is 0-9999. Behavior is undefined for values beyond this range.
LBCD	Four byte packed BCD. Value range is 0-99999999. Behavior is undefined for values beyond this range.
Float	32-bit floating point value. The driver interprets two consecutive registers as a floating point value by making the second register the high word and the first register the low word.
String	Null terminated ASCII string. Support includes HiLo LoHi byte order selection.

Address Descriptions

The default data types are shown in **bold**.

System Index Addresses

Device Type	Range	Data Type	Access
Analog Input Float 32	AIF32-00.00.00.01-AIF32-99.05.11.32	**Float**	Read Only
Analog Input Signed 32	AIS32-00.00.00.01-AIS32-99.05.11.32	**Long**	Read Only
Analog Output Float 32	AOF32-00.00.00.01-AOF32-99.05.11.32	**Float**	Read/Write
Analog Output Signed 32	AOS32-00.00.00.01-AOS32-99.05.11.32	**Long**	Read/Write
Discrete Inputs	DI-00.00.00.01-DI-99.05.11.128	**Boolean**	Read Only
Discrete Outputs	DO-00.00.00.01-DO-99.05.11.128	**Boolean**	Read/Write
I/O Module Status Bits	MST-00.00.00.01-MST-99.05.11.128	**Boolean**	Read Only

Continuous Addresses

Device Type	Range	Data Type	Access
Internal BCD 16	BCD16-000001-BCD16-999999	**BCD**	Read/Write
Internal BCD 32	BCD32-000001-BCD32-999999	**LBCD**	Read/Write
Internal Bits	C-000001-C-999999	**Boolean**	Read/Write
Internal Float 32	F32-000001-F32-999999	**Float**	Read/Write
Internal Unsigned 8	US8-000001-US8-999999	**Byte**	Read/Write
Internal Signed 16	S16-000001-S16-999999	**Short**	Read/Write
Internal Signed 32	S32-000001-S32-999999	**Long**	Read/Write
String	STR-000001:1-STR-999999:128	**String**	Read/Write
System String	SSTR-000001:1-SSTR-999999:50	**String**	Read Only
System Read Only Bit	SBR-000001-SBR-999999	**Boolean**	Read Only
System Read/Write Bit	SBRW-000001-SBRW-999999	**Boolean**	Read/Write
System Read Only Word	SWR-000001-SWR-999999	**Word**	Read Only
System Read/Write Word	SWRW-000001-SWRW-999999	**Word**	Read/Write
Internal Unsigned 16	US16-000001-US16-999999	**Word**	Read/Write

One Dimensional Array Elements

Device Type	Range	Data Type	Access
1 Dimensional Internal BCD 16	AR1BCD16-00001(1)-AR1BCD16-999999 (65535)	**BCD**	Read/Write
1 Dimensional Internal BCD 32	AR1BCD32-00001(1)-AR1BCD32-999999 (65535)	**LBCD**	Read/Write
1 Dimensional Internal Bits	AR1C-000001(1)-AR1C-999999(65535)	**Boolean**	Read/Write
1 Dimensional Internal Float 32	AR1F32-00001(1)-AR1F32-999999 (65535)	**Float**	Read/Write
1 Dimensional Internal Unsigned 8	AR1US8-00001(1)-AR1US8-999999 (65535)	**Byte**	Read/Write
1 Dimensional Signed 16	AR1S16-00001(1)-AR1S16-999999 (65535)	**Short**	Read/Write
1 Dimensional Signed 32	AR1S32-00001(1)-AR1S32-999999 (65535)	**Long**	Read/Write
1 Dimensional String	AR1STR-00001:1(1)-AR1STR-999999:128(65535)	**String**	Read/Write
1 Dimensional Internal Unsigned 16	AR1US16-00001(1)-AR1US16-999999 (65535)	**Word**	Read/Write

Two Dimensional Array Elements

Device Type	Range	Data Type	Access
2 Dimensional Internal BCD 16	AR2BCD16-00001(1),(1)-AR2BCD16-999999 (65535),(65535)	**BCD**	Read/Write
2 Dimensional Internal BCD 32	AR2BCD32-00001(1),(1)–AR2BCD32-999999 (65535),(65535)	**LBCD**	Read/Write
2 Dimensional Internal Bits	AR2C-000001(1),(1)-AR2C-999999	**Boolean**	Read/Write

Device Type	Range	Data Type	Access
	(65535),(65535)		
2 Dimensional Internal Float 32	AR2F32-00001(1),(1)-AR2F32-999999 (65535),(65535)	**Float**	Read/Write
2 Dimensional Unsigned Hex 8	AR2US8-00001(1),(1)-AR2US8-999999 (65535),(65535)	**Byte**	Read/Write
2 Dimensional Signed 16	AR2S16-00001(1),(1)-AR2S16-999999 (65535),(65535)	**Short**	Read/Write
2 Dimensional Signed 32	AR2S32-00001(1),(1)-AR2S32-999999 (65535),(65535)	**Long**	Read/Write
2 Dimensional String	AR2STR-00001:1(1),(1)–AR2STR-999999:128 (65535),(65535)	**String**	Read/Write
2 Dimensional Internal Unsigned 16	AR2US16-00001(1),(1)-AR2US16-999999 (65535),(65535)	**Word**	Read/Write

See Also: Ordering of Array Data

Ordering of Array Data

1. Dimensional Arrays - array [dim1]
1 dimensional array data is passed to and from the controller in ascending order:

```
for (dim1=0; dim1<dim1_max; dim1++)
```

Example: 3 element array

array [0]
array [1]
array [2]

2. Dimensional Arrays - array [dim1, dim2]
2 dimensional array data is passed to and from the controller in ascending order:

```
for (dim1=0; dim1<dim1_max; dim1++)
for (dim2=0; dim2<dim2_max; dim2++)
```

Example: 3X3 element array

array [0, 0]
array [0, 1]
array [0, 2]
array [1, 0]
array [1, 1]
array [1, 2]
array [2, 0]
array [2, 1]
array [2, 2]

Address Formats

Tag Names

The default tag names are assigned when hardware is added. Tag names for I/O modules generally follow the *AAAAA-B.C.D.E* format, where:

- **AAAAA:** Category.
- **B:** Base Group Number.
- **C:** Base Number.
- **D:** Slot Number.
- **E:** Point or Channel Number.

Note: For example, "DI-0.1.1.1" is Discrete Input P3-550.

Category

The category of data may also include the data type. Descriptions of the categories are as follows:

- **Discrete I/O points:** "DI" is the Discrete Input Point. "DO" is the Discrete Output Point .
- **Boolean:** This category includes data items other than I/O points. For example, a blown fuse or out-of-range error bits. "MST" is the Module Status.
- **Analog points:** This category uses five digits. The first two digits designate the type of point and the last three digits describe the data type being used. "AIxxx" is the Analog Input Point. "AOxxx" is the Analog Output Point. "xxF32" is the Floating Point 32-bit data type. "xxS32" is the Signed 32-bit data type .

Base Group Number

The base group number is where the module resides. For the P3-550, the base group is group 0.

Base Number

The base number within the group is where the module resides. For the P3-550 or P3-RS, the base is base 1.

Slot Number

The slot number in the base is where the module resides. The slot to the right of the CPU is slot 1.

Point or Channel Number

If the tag name is for an I/O point of a module, this digit will be the channel number. If the tag name is for a status indication, this digit will differentiate them.

For example, a P3-16TR has one fuse on both commons and a blown fuse indicator bit for each. Their default tag names are "MST-x.x.x.1" and "MST-x.x.x.2". "MST-x.x.x.1" is the blown fuse indicator for the fuse on the common of channels 1 through 8.

Error Descriptions

The following error/warning messages may be generated. Click on the link for a description of the message.

Automatic Tag Database Generation Error Messages

Tag name <tag name> encountered validation error and will not be imported.
Unable to generate a tag database for device <device name>. Reason: Auto tag generation aborted.
Unable to generate a tag database for device <device name>. Reason: Import file is invalid or corrupt.
Unable to generate a tag database for device <device name>. Reason: Import file not found.
Unable to generate a tag database for device <device name>. Reason: Low memory resources.

Driver Error Messages

Unable to bind to adapter: <network adapter>. Connect failed. Winsock Err # <Error number>.
Winsock initialization failed (OS Error = <error code>).
Winsock shut down failed (OS Error = <error code>).
Winsock V1.1 or higher must be installed to use the Productivity Series Ethernet device driver.

Read Errors

Cannot read <tag count> items starting at tag <tag address>: address does not exist in device <device name>.
Cannot read <tag count> items starting at tag <tag address>: device <device name> returned error code <error code>.
Cannot read <tag count> items starting at tag <tag address>: error receiving response frame from device <device name>.
Cannot read <tag count> items starting at tag <tag address>: System ID <System ID> does not exist in device <device name>.
Cannot read <tag count> items starting at tag <tag address>: value is invalid for data type <data type> in device <device name>.
Cannot read tag <tag address>: address does not exist in device <device name>.
Cannot read tag <tag address>: device <device name> returned with error code <error code>.
Cannot read tag <tag address>: error receiving response frame from device <device name>.
Cannot read tag <tag address>: System ID <System ID> does not exist in device <device name>.
Cannot read tag <tag address>: value is invalid for data type <data type> in device <device name>.

Write Errors

Cannot write to tag <tag address>: address does not exist in device <device name>.
Cannot write to tag <tag address>: device <device name> returned with error code <error code>.
Cannot write to tag <tag address>: error receiving response frame from device <device name>.
Cannot write to tag <tag address>: System ID <System ID> does not exist in device <device name>.
Cannot write to tag <tag address>: value is invalid for data type <data type> in device <device name>.

See Also:

MODBUS Exception Codes

MODBUS Exception Codes

The following data is from MODBUS Application Protocol Specifications documentation.

Code Dec/Hex	Name	Description
01/0x01	ILLEGAL FUNCTION	The function code received in the query is not an allowable action for the server (or slave). This may be because the function code is only applicable to newer devices and was not implemented in the unit selected. It could also indicate that the server (or slave) is in the wrong state to process a request of this type. For example, because it is unconfigured and is being asked to return register values.
02/0x02	ILLEGAL DATA ADDRESS	The data address received in the query is not an allowable address for the server (or slave). More specifically, the combination of reference number and transfer length is invalid. For a controller with 100 registers, a request with offset 96 and length 4 would succeed, a request with offset 96 and length 5 will generate exception 02.
03/0x03	ILLEGAL DATA VALUE	A value contained in the query data field is not an allowable value for server (or slave). This indicates a fault in the structure of the remainder of a complex request, such as that the implied length is incorrect. It specifically does not mean that a data item submitted for storage in a register has a value outside the expectation of the application program, since the MODBUS protocol is unaware of the significance of any particular value of any particular register.

Tag name <tag name> encountered validation error and will not be imported.

Error Type:
Warning

Possible Cause:
The tag import file contains tag(s) that have invalid character(s). This error message will be returned for each tag that contains an invalid character.

Solution:
Remove the invalid character(s).

Unable to generate a tag database for device <device name>. Reason: Auto tag generation aborted.

Error Type:
Warning

Possible Cause:
The Automatic Tag Generation process was aborted.

Solution:
Retry the Automatic Tag Generation process.

See Also:
Automatic Tag Database Generation

Unable to generate a tag database for device <device name>. Reason: Import file is invalid or corrupt.

Error Type:
Warning

Possible Cause:

1. The Tag Import File is a corrupt project file.
2. The .csv file was created with Productivity Software Suite Versions 1.4 to 1.9, which adds a field that in not supported for import.

Solution:

1. In the OPC server project, right-click on the device and then select **Properties** from the context menu. Next, click on the **Tag Import File Path** tab. Select a valid, properly formatted **Productivity Suite Programming Software Import File** or produce a new import file by retrying the tag export process in the application.
2. Delete the last field or column from the Versions 1.4 to 1.9 .csv file and try the import again.

See Also:
Automatic Tag Database Generation
Exporting a CSV File from Productivity Suite

Unable to generate a tag database for device <device name>. Reason: Import file not found.

Error Type:
Warning

Possible Cause:
The Tag Import File could not be found.

Solution:
In the OPC server project, right-click on the device and then select **Properties** from the context menu. Next, click on the **Tag Import File Path** tab. Select a valid, properly formatted **Productivity Suite Programming Software Import File**, or produce a new import file by retrying the tag export process in the application.

Unable to generate a tag database for device <device name>. Reason: Low memory resources.

Error Type:
Warning

Possible Cause:
Memory required for database generation could not be allocated. The process is aborted.

Solution:
Close unused applications and/or increase the amount of virtual memory and try again.

Unable to bind to adapter: <network adapter>. Connect failed. Winsock Err# <error number>.

Error Type:
Fatal

Possible Cause:

1. The operating system could not find an unused port to use for communication with this device.
2. Network system failure, such as Winsock or network adapter failure.
3. Other applications have claimed all available ports (possible but unlikely).

Solution:

1. Reboot the computer and check the network adapter.
2. Check for applications that could be causing conflicts and shut them down.

Winsock initialization failed (OS Error = <OS error code>).

Error Type:
Fatal

OS Error	Indication	Possible Solution
10091	Indicates that the underlying network subsystem is not ready for network communication.	Wait a few seconds and restart the driver.
10067	Limit on the number of tasks supported by the Windows Sockets implementation has been reached.	Close one or more applications that may be using Winsock and restart the driver.

Winsock shut down failed (OS Error =<OS error code>).

Error Type:
Fatal

OS Error	Possible Solution
10036	The network subsystem is still busy with unfinished processing. Wait a few seconds and restart the driver.
10050	The network subsystem has failed. Refer to the Network Administrator.
10093	The network subsystem was not initialized before the shutdown was attempted. Wait a few seconds and try again.

Winsock V1.1 or higher must be installed to use the Productivity Series Ethernet device driver.

Error Type:
Fatal

Possible Cause:
The version number of the Winsock DLL found on the system is less than 1.1.

Solution:
Upgrade Winsock to version 1.1 or higher.

Cannot read <tag count> items starting at tag <tag address>: address does not exist in device <device name>.

Error Type:
Warning

Possible Cause:
The PLC returned an error code of 0x02 (illegal data address) for a blocked Read transaction.

Solution:
Replace the current data address with one within the valid range (as listed in the device protocol).

Cannot read <tag count> items starting at tag <tag address>: device <device name> returned error code <error code>.

Error Type:
Warning

Possible Cause:
The PLC has returned an error code.

Solution:
Refer to the list of error code descriptions located in the PLC's manual.

Cannot read <tag count> items starting at tag <tag address>: error receiving response frame from device <device name>.

Error Type:
Warning

Possible Cause:

The response frame received from the PLC contains an error.

Solution:
Check the connection to the PLC and then resend the data.

Cannot read <tag count> items starting at tag <tag address>: System ID <System ID> does not exist in device <device name>.

Error Type:
Warning

Possible Cause:
The PLC returned an error code of 0x01 (illegal function) for a blocked Read transaction.

Solution:
Replace the current System ID with a valid one (as listed in the device protocol).

Cannot read <tag count> items starting at tag <tag address>: value is invalid for data type <data type> in device <device name>.

Error Type:
Warning

Possible Cause:
The PLC returned an error code of 0x03 (illegal data value) for a blocked Read transaction.

Solution:
Replace the current data with valid values (depending on the data type).

Cannot read tag <tag address>: address does not exist in device <device name>.

Error Type:
Warning

Possible Cause:
The PLC returned an error code of 0x02 (illegal data address) for an unblocked Read transaction.

Solution:
Replace the current data address with one within the valid range (as listed in the device protocol).

Cannot read tag <tag address>: device <device name> returned with error code <error code>.

Error Type:
Warning

Possible Cause:
The PLC has returned an error code.

Solution:
Refer to the list of error code descriptions located in the PLC's manual.

Cannot read tag <tag address>: error receiving response frame from device <device name>.

Error Type:
Warning

Possible Cause:
The response frame received from the PLC contains an error.

Solution:
Check the connection to the PLC and then resend the data.

Cannot read tag <tag address>: System ID <System ID> does not exist in device <device name>.

Error Type:
Warning

Possible Cause:
The PLC returned an error code of 0x01 (illegal function) for an unblocked Read transaction.

Solution:
Replace the current System ID with a valid one (as listed in the device protocol).

Cannot read tag <tag address>: value is invalid for data type <data type> in device <device name>.

Error Type:
Warning

Possible Cause:
The PLC returned an error code of 0x03 (illegal data value) for an unblocked Read transaction.

Solution:
Replace the current data with valid values (depending on the data type).

Cannot write to tag <tag address>: address does not exist in device <device name>.

Error Type:
Warning

Possible Cause:
The PLC returned an error code of 0x02 (illegal data address) for a Write transaction.

Solution:
Replace the current data address with one within the valid range (as listed in the device protocol).

Cannot write to tag <tag address>: device <device name> returned with error code <error code>.

Error Type:
Warning

Possible Cause:
The PLC has returned an error code.

Solution:
Refer to the list of error code descriptions located in the PLC's manual.

Cannot write to tag <tag address>: error receiving response frame from device <device name>.

Error Type:
Warning

Possible Cause:
The response frame received from the PLC contains an error.

Solution:
Check the connection to the PLC and then resend the data.

Cannot write to tag <tag address>: System ID <System ID> does not exist in device <device name>.

Error Type:
Warning

Possible Cause:
The PLC returned an error code of 0x01 (illegal function) for a Write transaction.

Solution:
Replace the current System ID with a valid one (as listed in the device protocol).

Cannot write to tag <tag address>: value is invalid for data type <data type> in device <device name>.

Error Type:
Warning

Possible Cause:
The PLC returned an error code of 0x03 (illegal data value) for a Write transaction.

Solution:
Replace the current data with valid values (depending on the data type).

Index