WAGO I/O SYSTEM 750

Using WAGO Series 750 DeviceNet IO with an A-B ControlLogix 1756-DNB Scanner

Application note

A100103, English
Version 1.0.0

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Every conceivable measure has been taken to ensure the correctness and completeness of this documentation. However, as errors can never be fully excluded we would appreciate any information or ideas at any time.

We wish to point out that the software and hardware terms as well as the trademarks of companies used and/or mentioned in the present manual are generally trademark or patent protected.

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1 Important comments

To ensure fast installation and start-up of the units described in this manual, we strongly recommend that the following information and explanation is carefully read and adhered to.

1.1 Legal principles

1.1.1 Copyright

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1.1.2 Personnel qualification

The use of the product detailed in this manual is exclusively geared to specialists having qualifications in PLC programming, electrical specialists or persons instructed by electrical specialists who are also familiar with the valid standards. WAGO Kontakttechnik GmbH & Co. KG declines all liability resulting from improper action and damage to WAGO products and third party products due to non-observance of the information contained in this manual.

1.1.3 Intended use

For each individual application, the components supplied are to work with a dedicated hardware and software configuration. Modifications are only admitted within the framework of the possibilities documented in the manuals. All other changes to the hardware and/or software and the non-conforming use of the components entail the exclusion of liability on part of WAGO Kontakttechnik GmbH & Co. KG.

Please direct any requirements pertaining to a modified and/or new hardware or software configuration directly to WAGO Kontakttechnik GmbH & Co. KG.

1.2 Range of validity

This application note is based on the stated hardware and software of the specific manufacturer as well as the correspondent documentation. This application note is therefore only valid for the described installation.

New hardware and software versions may need to be handled differently. Please note the detailed description in the specific manuals.

1.3 Symbols

Danger
Always observe this information to protect persons from injury.

Warning
Always observe this information to prevent damage to the device.

Attention
Marginal conditions must always be observed to ensure smooth operation.

ESD (Electrostatic Discharge)
Warning of damage to the components by electrostatic discharge. Observe the precautionary measure for handling components at risk.

Note
Routines or advice for efficient use of the device and software optimisation.

More information
References to additional literature, manuals, data sheets and INTERNET pages

2 Description

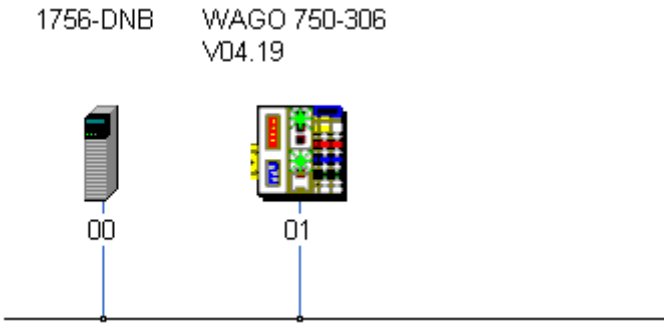
This document illustrates the various steps taken to configure an Allen-Bradley 1756-DNB Scanner Module for polled communications with a node of WAGO Series 750 DeviceNet I/O. This document should serve as a supplement to the appropriate WAGO DeviceNet product manual when installing and/or commissioning a node of WAGO Series 750 DeviceNet I/O.

3 Reference Material

This procedure has been tested with, but is not limited to, the following hardware and software:

- Allen Bradley's RSNetWorx for DeviceNet, Revision 8.00.01 (CPR7)
- Allen Bradley's 1756-DNB DeviceNet Scanner Module for the ControlLogix PLC
- WAGO Series 750 DeviceNet Node, consisting of:

  - 750-306 Ethernet Fieldbus Coupler
  - 750-402 4-point 24VDC Digital Input Module
  - 750-504 4-point 24VDC Digital Output Module
  - 750-467 2-point 0-10VDC Analog Input Module
  - 750-550 2-point 0-10VDC Analog Output Module
  - 750-600 End Module



There are five main steps in configuring the 1756-DNB Scanner Module:

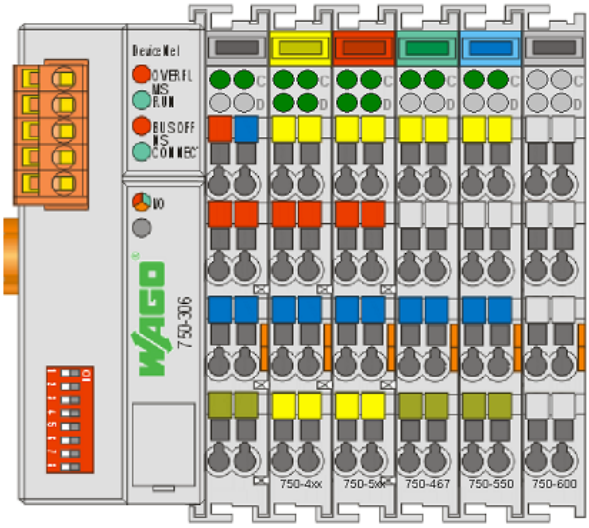
1) Determining the Process Image of the WAGO DeviceNet Node
2) Registering the WAGO EDS File using the EDS Wizard within RSNetWorx
3) Selecting and Associating Network Devices
4) Editing I/O Parameters for Polled Operation
5) Mapping Nodes of WAGO I/O to Controller Memory

4 Solution

4.1 Determining the Process Image

When the WAGO Series 750 DeviceNet buscoupler is powered up, it automatically addresses the I/O modules of the node. The data for complex modules (modules using 2 or more bytes) are mapped first in the process image. They are mapped in the order of their physical position after the coupler. As such, they start at byte address 0. Following this, the digital modules are grouped into bytes (8-bits per byte). The bits are arranged in the order of the module's location. When the number of digital points exceeds eight (8-bits), the coupler automatically starts the next byte.

The figure below illustrates the hardware of the WAGO node (digital and analog I/O) used in this example. The process image table (I/O map) is displayed in byte format below the figure. In order to properly configure the 1756-DNB Scanner Module, the process image of the WAGO node must be determined.



Input Process Image (6 Bytes of Produced Data)

Byte 0 - 750-467 Channel 1 Analog Input, Low Byte
Byte 1 - 750-467 Channel 1 Analog Input, High Byte
Byte 2 - 750-467 Channel 2 Analog Input, Low Byte
Byte 3 - 750-467 Channel 2 Analog Input, High Byte
Byte 4 - 750-402 4-Channel 24VDC Digital Input (bits 0 through 3)
(bits 4-7 of Byte 4 are not filled)
Byte 5 - Status Byte

Output Process Image (5 Bytes of Consumed Data)

Byte 0 - 750-550 Channel 1 Analog Output, Low Byte
Byte 1 - 750-550 Channel 1 Analog Output, High Byte
Byte 2 - 750-550 Channel 2 Analog Output, Low Byte
Byte 3 - 750-550 Channel 2 Analog Output, High Byte
Byte 4 - 750-504 4-Channel 24VDC Digital Output (bits 0 through 3)
(bits 4-7 of Byte 4 are not filled)

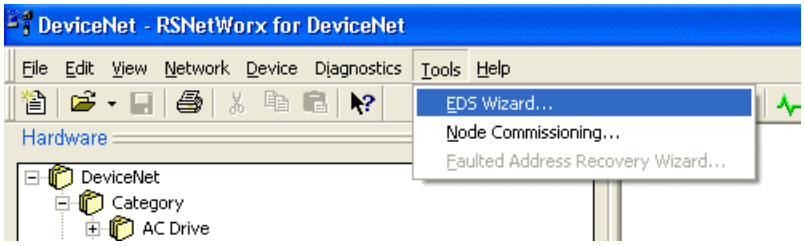
The process image of this node occupies 6 bytes of input and 5 bytes of output. The status byte is always the last byte produced by the DeviceNet node. Note that the status byte can be disabled. Instructions on how to disable the status byte can be found in WAGO application note A207000 “Altering Attributes in the DeviceNet coupler 750-306 Version 3.0”.

Note: In this example, the WAGO Series 750 I/O modules occupy either input or output memory, either producing or consuming data. Be aware that many WAGO modules, such as discrete output modules w/ diagnostics or most specialty modules, occupy both input and output memory. Consult the manual or datasheet for the corresponding WAGO module to determine the *bit width* occupied by the module in memory.

4.2 Registering the EDS File

Start RSNetWorx for DeviceNet.

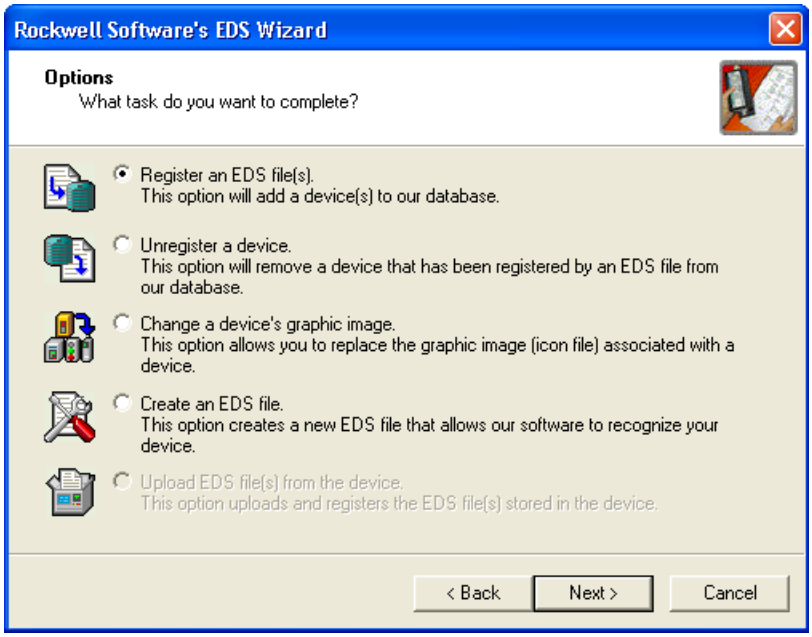
From the main menu toolbar, select **Tools** and **EDS Wizard…**



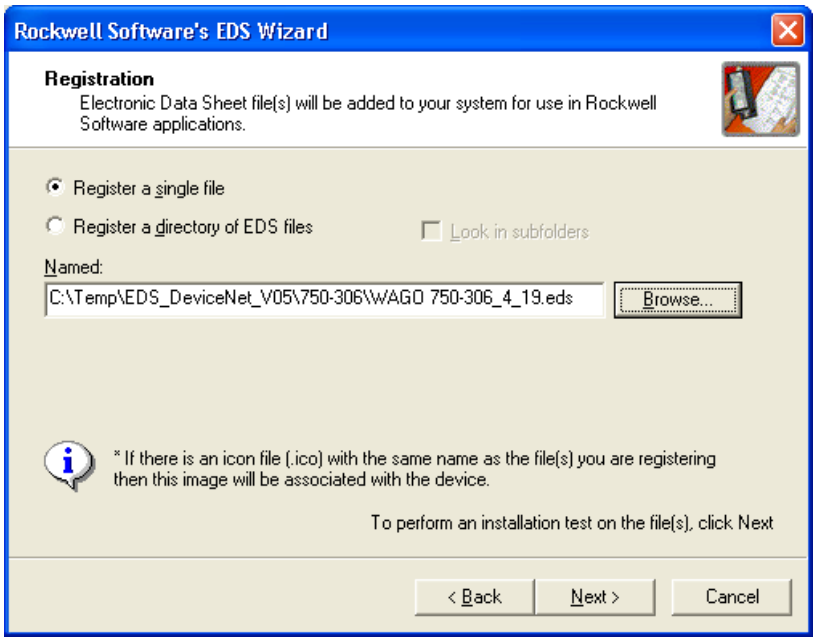
The EDS Wizard opening screen will appear:

Select **Next** to proceed with the EDS Wizard, which will assist with registering the WAGO EDS file.

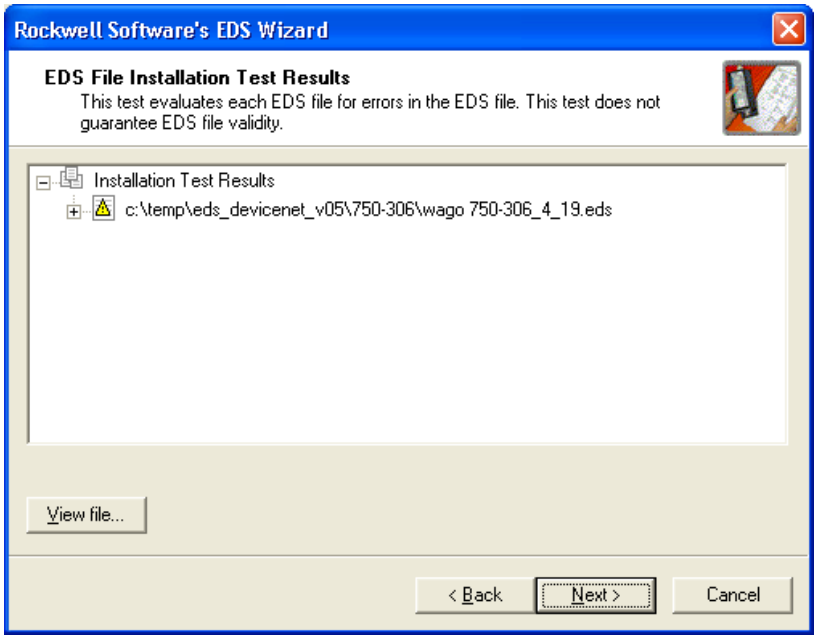
NOTE: WAGO EDS files are available for download from the WAGO website (www.wago.com). To navigate to the download area from the WAGO homepage, under the *Service* menu select *Downloads*, then *Automation*. Proceed to download Article No. 750-912 "EDS Files for DeviceNet / Series 750, 752, 755 and 767".



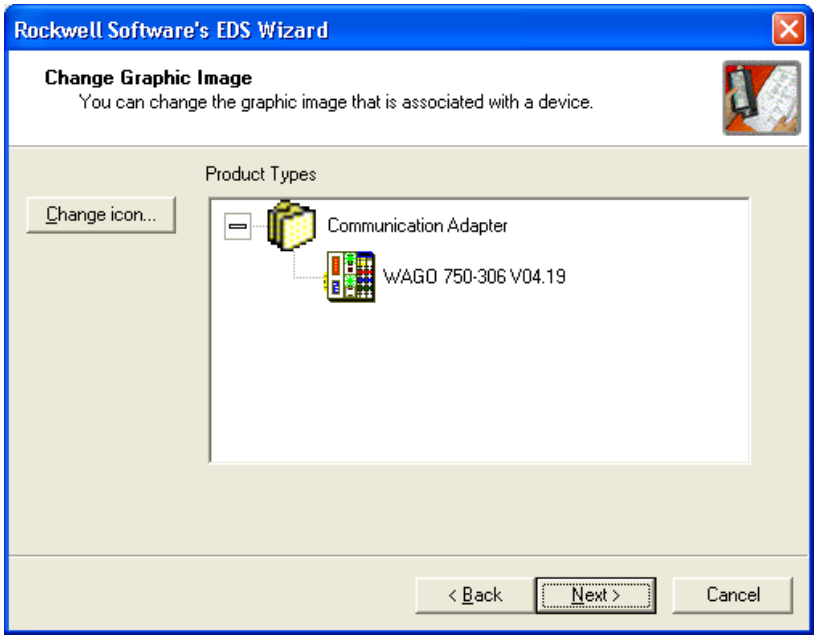
With the option *Register an EDS file(s)* selected, click **Next** to continue.



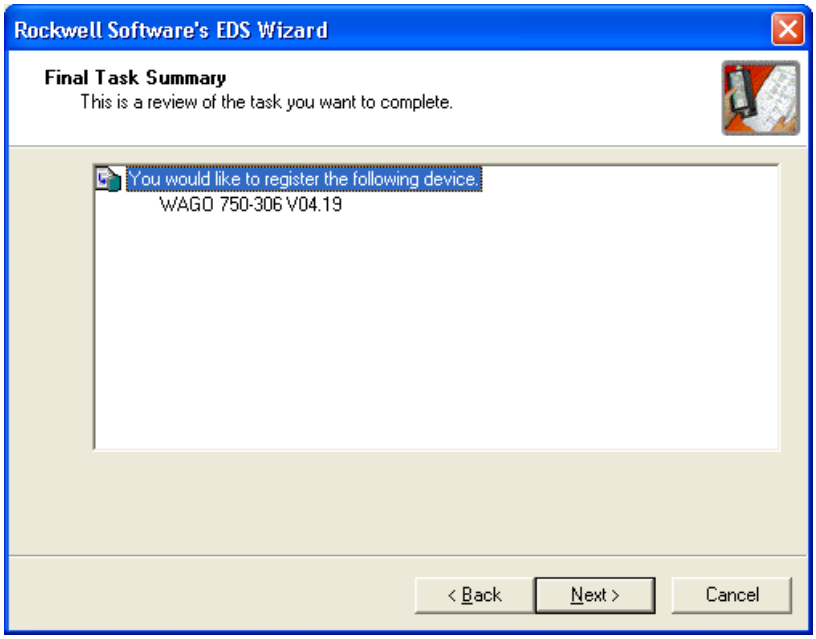
You can register a single file, or an entire directory of EDS files. For this example, the option *Register a single file* will be chosen. Enter the path and filename (browse if necessary) of the EDS file for the WAGO 750-306 product ("WAGO 750-306_4_19.eds"). Click **Next** to continue.



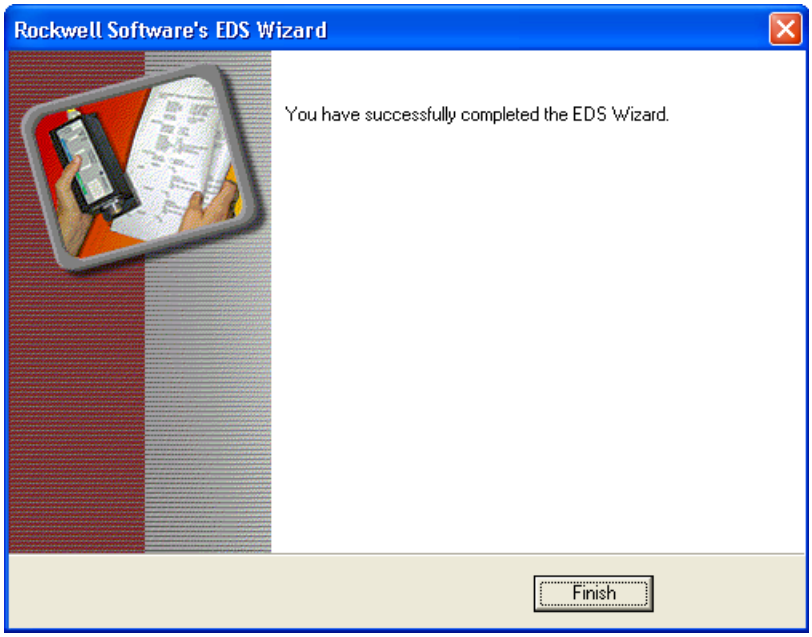
The contents of the EDS file are verified by the EDS Wizard. Minor warnings may be reported. Click **Next** to continue.



The EDS Wizard allows you to change the graphic image associated with a device. If necessary, change the icon to one resembling the WAGO-I/O-SYSTEM as shown. Click **Next** to continue.



Click **Next** to confirm your entries and proceed with device registration.



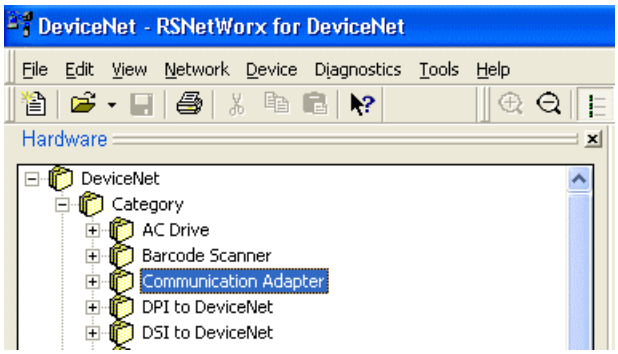
The EDS Wizard completes the registration. Click **Finish** to exit the EDS Wizard.

The EDS file for the WAGO 750-306 DeviceNet buscoupler has now been registered, and it is possible to proceed with configuring a node of WAGO I/O for use on a DeviceNet network.

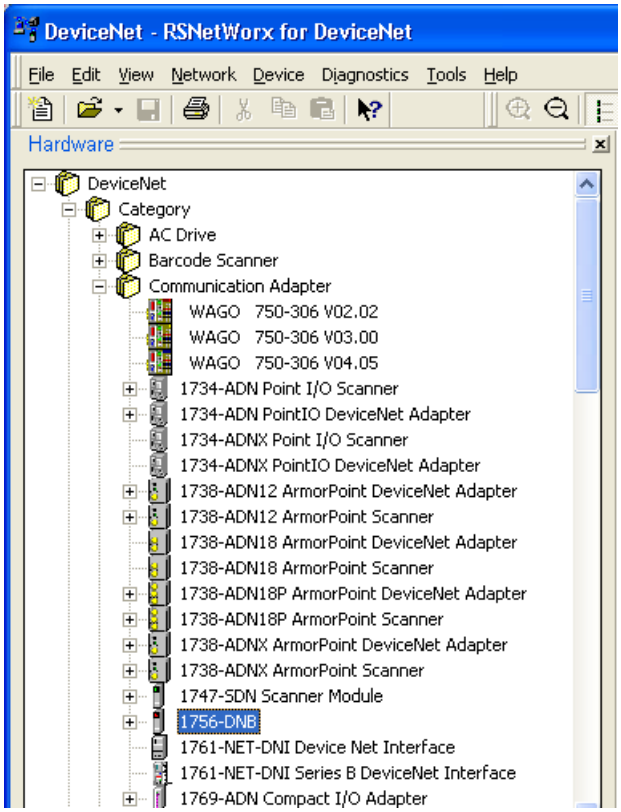
4.3 Selecting & Associating Network Devices

Start RSNetWorx for DeviceNet. (If EDS files have not been installed for the WAGO product, please complete the previous section before proceeding.)

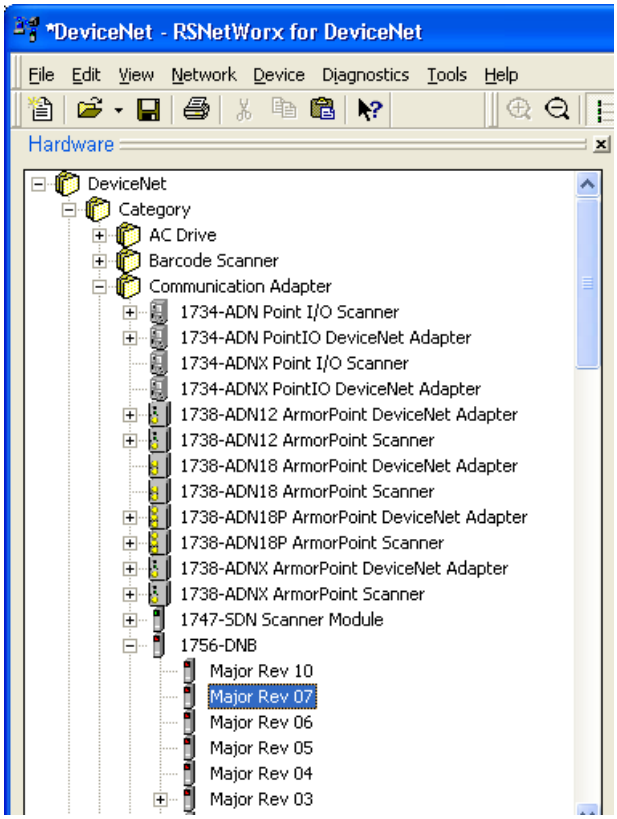
From the main menu toolbar, select **File** and **New**.



Click on the '+' sign next to *Communication Adapter*. A list of devices will appear. This list will vary depending on the EDS files that have been installed.



Click on the '+' sign next to *1756-DNB* Scanner Module. A revision list will appear.



Select (double-click) the Major (and Minor revision levels if necessary) for the 1756-DNB Scanner Module in your system. For this example, **Major Rev 07** is selected. The selected device will be displayed graphically.

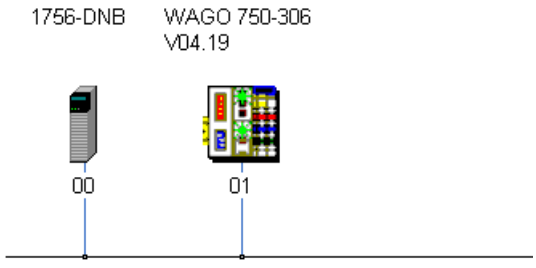
Click on the '**-**' sign next to *Communication Adapter* to collapse the device list.

Click on the '+' sign next to *Vendor* to expand the list of installed vendor devices.

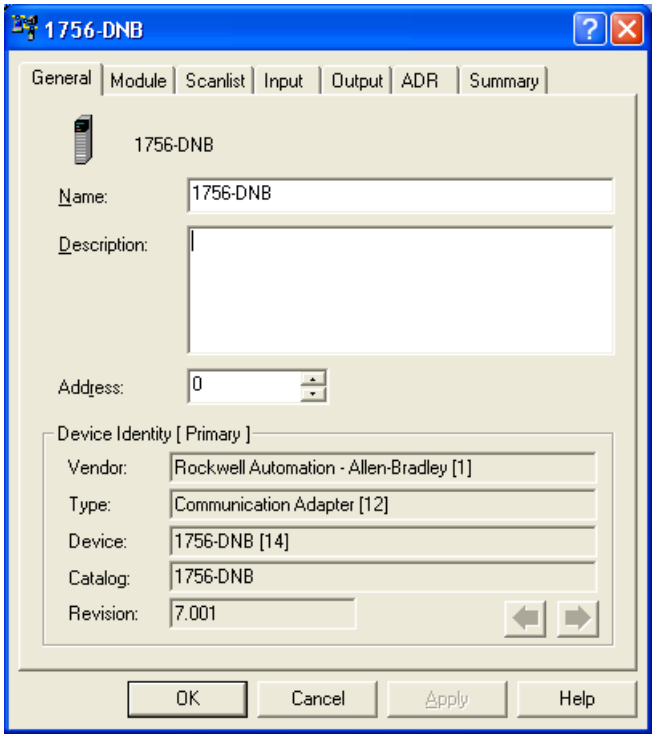
Click on the '+' sign next to *WAGO Corporation*.

Click on the '+' sign next to *Communication Adapter* to expand the list of WAGO devices.

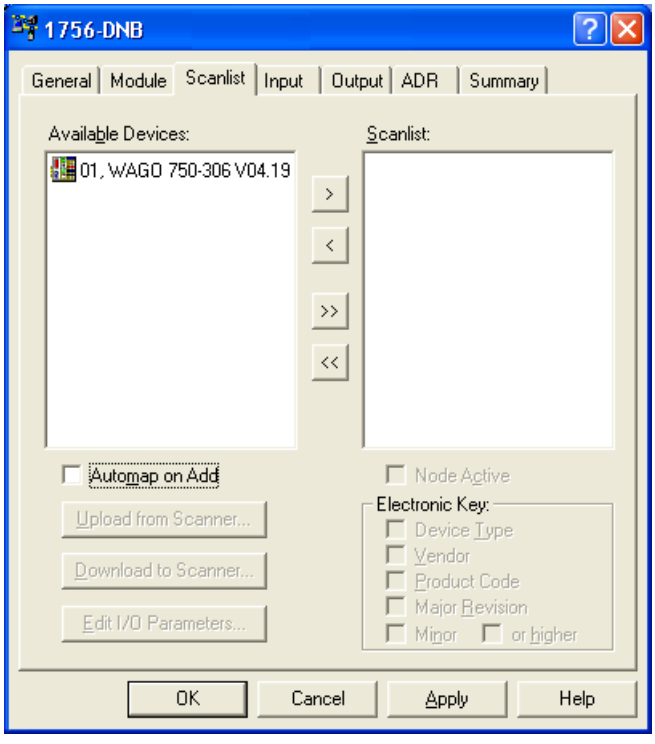
Select (double-click) the latest version (V04.19) for the WAGO 750-306 bus-coupler. A WAGO I/O node will be displayed graphically. When completed, the screen should appear as follows:



In the graphical area, double-click on the icon for the DeviceNet scanner (Node 00). The following window should appear:

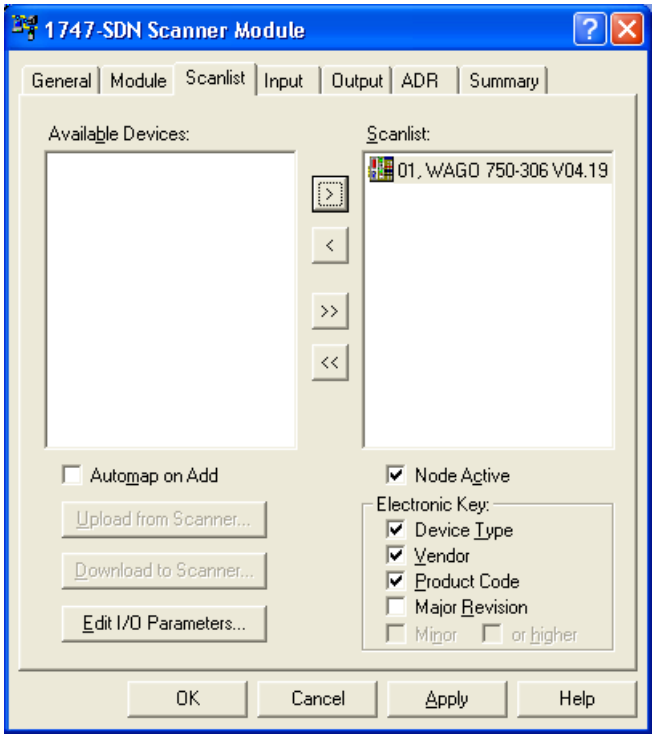


Click on the *Scanlist* tab. The following should appear:



De-select the *Automap on Add* checkbox available here. This feature will not be used for this example.

DeviceNet allows multiple scanners to reside on the same network. Therefore, it is necessary to associate other network devices to a particular scanner. To create this association, click on a device from the list of available devices, and click the right-arrow button. To quickly associate all devices shown, click the dual right-arrow button. The list of associated devices will appear in the *Scanlist* to the right.



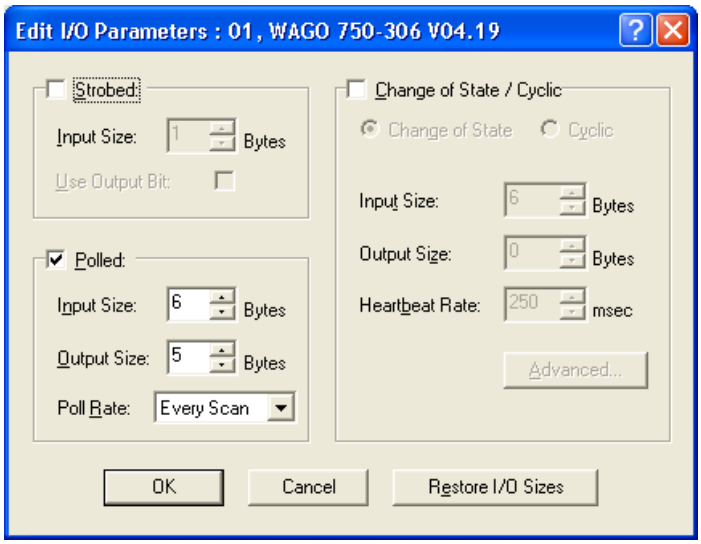
Note: If there are multiple scanners in the same rack, click on the *Module* tab and change the rack position to the correct value for each scanner.

The WAGO DeviceNet I/O Node has now been associated to the selected scanner, and it is possible to proceed with defining the I/O parameters for polled operation.

4.4 Editing I/O Parameters for Polled Operation

Click on the WAGO node shown in the *Scanlist*. Click on **Edit I/O Parameters…**

A screen will appear, allowing changes to the amount of data produced and consumed by this node.



Note: When editing I/O parameters for polled operation, the default values shown in the editor are “Input Size: 6 Bytes” and “Output Size: 5 Bytes”. Coincidentally, this is the I/O image size required for this example. Typically, these numbers will have to be edited by the user. It should not be assumed that these values are predetermined by the editor.

Position the cursor in the *Input Size* entry field, and change the value to **6**. This is the number of bytes of input that the WAGO DeviceNet node in this example will produce. *

Then position the cursor in the *Output Size* field, and change the value to **5**. This is the number of bytes of output that the WAGO DeviceNet node in this example will consume. *

Also, make sure that *Polled* is checked.

After making these changes, click **OK**.

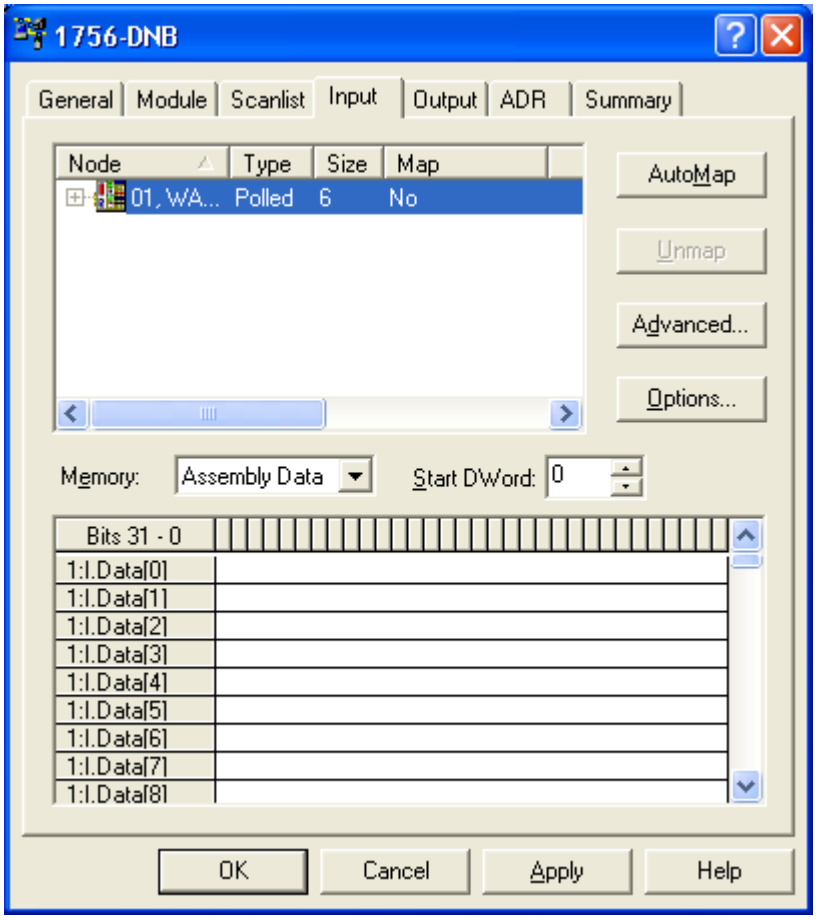
The configuration of the WAGO DeviceNet node is now defined.

* Reference section 4.1 for an explanation of how to determine the number of bytes produced/consumed by a WAGO DeviceNet I/O node.

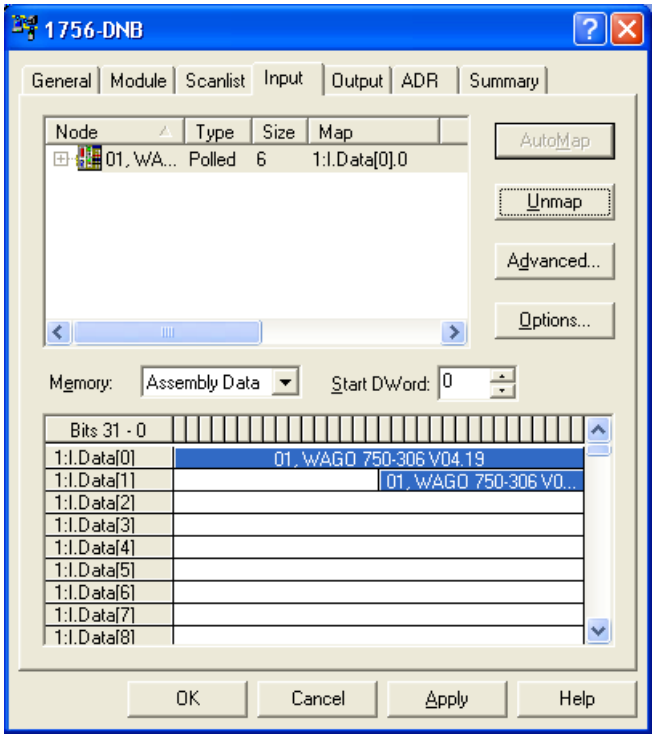
4.5 Mapping to Controller Memory

Now that the node has been associated to the scanner and the configuration has been defined, the data for the node needs to be mapped to controller memory, so the controller will know how to address the I/O data.

Click on the *Input* tab. The node is listed.



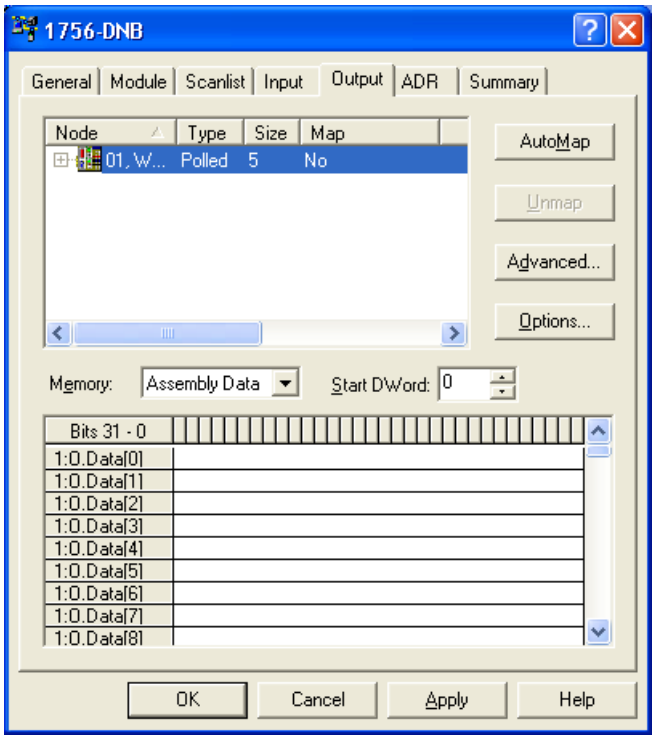
Click on the node. Then click **AutoMap.**



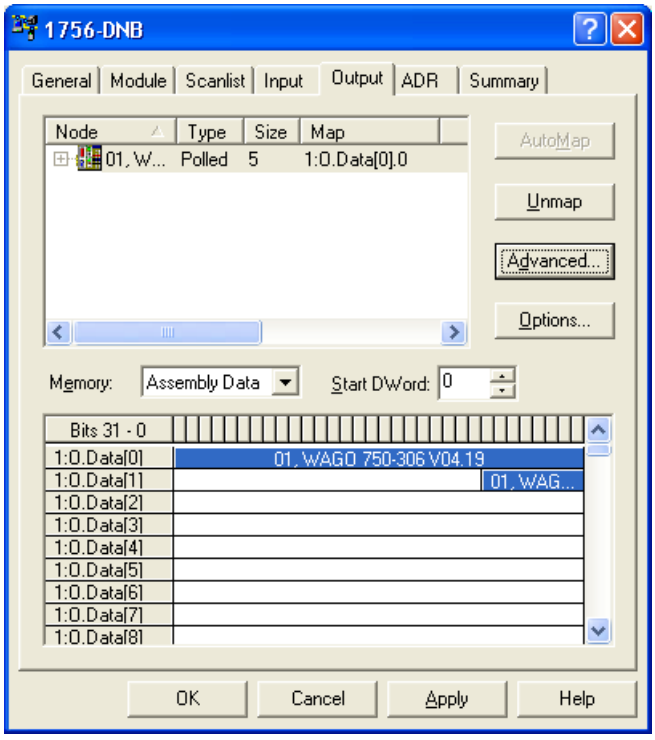
The mapping is displayed. The input process image and status byte will be automatically mapped to controller memory as follows:

Byte 0 - 750-467 Channel 1 Analog Input, Low Byte
Byte 1 - 750-467 Channel 1 Analog Input, High Byte
Byte 2 - 750-467 Channel 2 Analog Input, Low Byte
Byte 3 - 750-467 Channel 2 Analog Input, High Byte
Byte 4 - 750-402 4-Channel 24VDC Digital Input (bits 0 through 3)
(bits 4-7 of Byte 4 are not filled)
Byte 5 - Status Byte

Click on the *Output* tab. The node is listed.



Click on the node. Then click **AutoMap.**



The mapping is displayed. The output process image will be automatically mapped to the controller memory as follows:

Byte 0 - 750-550 Channel 1 Analog Output, Low Byte
Byte 1 - 750-550 Channel 1 Analog Output, High Byte
Byte 2 - 750-550 Channel 2 Analog Output, Low Byte
Byte 3 - 750-550 Channel 2 Analog Output, High Byte
Byte 4 - 750-504 4-Channel 24VDC Digital Output (bits 0 through 3)
(bits 4-7 of Byte 4 are not filled)

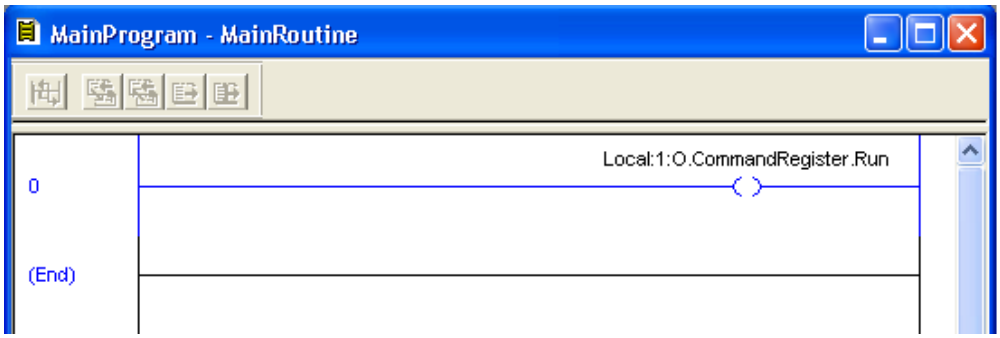
The input and output process images of the WAGO DeviceNet node have now been mapped to the controller. Notice that under the *Summary* tab, the Mapped columns now display 'Yes' for the WAGO device.

The scanner configuration is now completed for use with WAGO Series 750 DeviceNet I/O, and the configuration is ready for download.

5 Other Considerations

5.1 Putting the Scanner in Run Mode

The 1756-DNB DeviceNet Scanner requires a command from the ControlLogix controller logic to put the scanner in Run mode. This is accomplished by setting the ‘Run’ bit of the scanner ‘CommandRegister’. A rung of logic similar to the following will put the scanner in Run mode:



If the ‘Run’ bit is not set, the 1756-DNB scanner will display a message indicating that it is ‘Idle’.

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