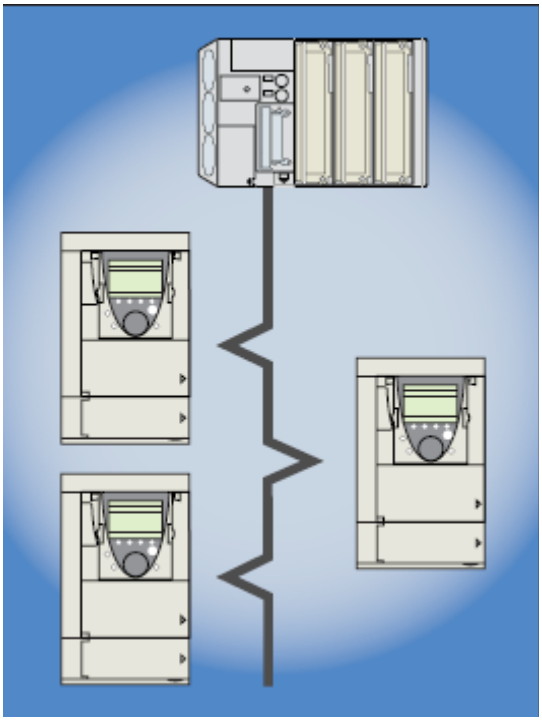
Application Note – 17

ATV71 DeviceNet implementation example



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Application Note Overview

This note describes how to install an ATV71 onto an existing devicenet network and how to attain similar performance to an Elite drive configured for PDL instances 100 and 101. Key differences in devicenet implementation between the ATV 71 and PDL Elite ranges are also described.

Should you need more information on this or other features of the drive please see a Schneider-Electric representative.

Prerequisites: Good understanding of PLC ladder logic and RSLogix5000.
Basic understanding of an ATV71 drives control.

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Approved By:	Marc Marchal	**Application Engineering Manager**	**Version:**	Release 01

References

- ATV71 option board installation manual (1754480)
- ATV71 Installation annual (1755849).
- ATV71 Communications parameters user manual (1755861)
- ATV71 Devicenet Card user manual (1755877)
- PDL Elite Series Technical Manual (4201-180 Rev L)
- PDL EDNI Device Interface Manual (4201-212 Rev C)

PDL vs. ATV71 Implementation differences

There are two major differences that need to be considered in relation to devicenet implementation of an ATV71 drive versus an Elite drive. They are-

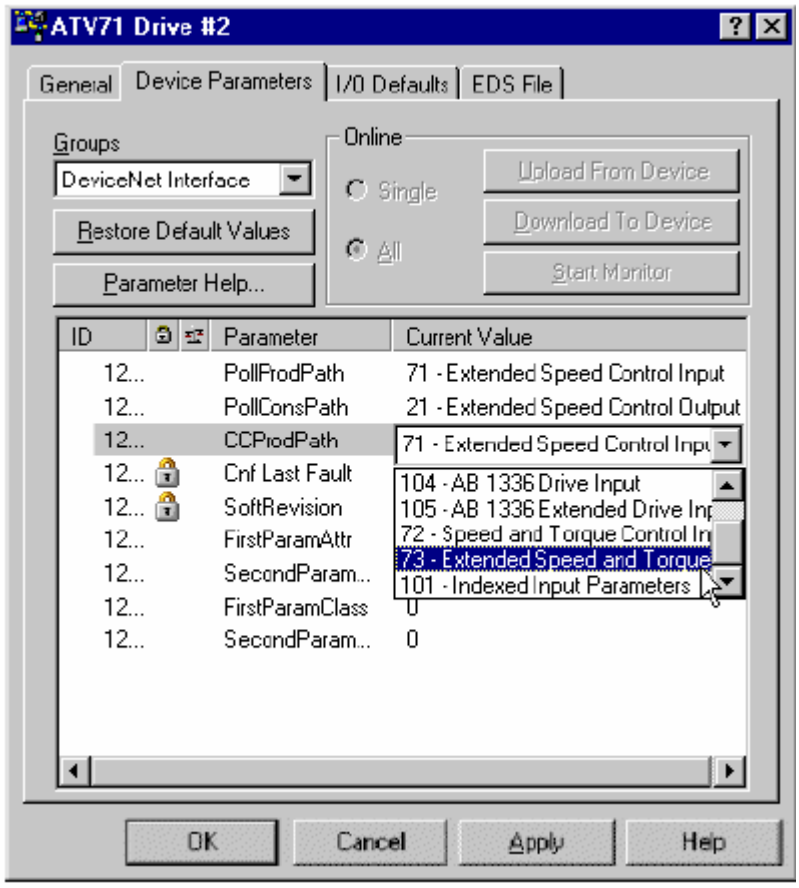
1. The Elite drive forced the user to select either one of the standard ODVA instances (both input and output) or alternatively the PDL specific instances 100 and 101. The ATV71 however is not limited to these instances and the control and speed references are completely customisable. The ATV71 devicenet card itself is configured for either the ODVA instances, Schneider specific instances or AB specific instances but how the drive responds to these is completely flexible.
2. The PDL instances 100 and 101 allowed for multiplexing data from the Elite drives. This feature is not supported by the ATV71. The explicit messaging function should be used to duplicate this functionality.

ATV71 Set-up

The following pages describe how to setup an ATV71 to behave similarly to how an Elite would have if configured for PDL instances 100 and 101. This setup will assume only two parameters other than the status and speed are required to be read cyclicly.

The different instances can also have different byte transmission / receive requirements. Input instance 70 and output instance 20 for example only require 4 bytes of data each while 100 and 101 require 8 bytes each. This requirement must be known by both the drive and the devicenet scanner. With the ATV71 the only way to change this setting is via parameters PollProdPath, PollConsPath and CCProdPath. These settings can only be changed by devicenet configuration software (RSNetworx in this example).

With RSNetworx this is done by right clicking on the device and selecting Properties. Then select Device Parameters and select the Devicenet Interface group. (You may have to upload the EDS file if it is not registered)



If these parameters don't match then an error will occur. The scanner configuration is detailed later in this document. For this note we would select instances 100 and 101. When designing your devicenet network consider that the ATV71 out of the box defaults to instances 100 and 101. These instances can be used to duplicate any of the other instances as they are completely open. If however instance 70 is used and a drive / devicenet card combination has to be replaced then the above settings will need to be changed. If instances 100 and 101 have been used all settings can be done via the drive display only without the need to modify settings via devicenet configuration software (RSNetworx for example)

To configure the Drive-

Firstly ensure the following steps have been taken-

Step		Refer to
1	**Review the safety precautions for the Altivar drive and DeviceNet card.**	Installation manual
2	**Verify that the Altivar drive is properly installed.**	Installation manual
4	**Install the DeviceNet card in the drive.** Verify that the Altivar drive is not powered. Then, dismount the drive cover, mount the card in the drive. Finally mount the cover.	Installation manual
4	**Commission the DeviceNet card.** Verify that the Altivar drive is not powered. Set a unique node address and the appropriate data rate using the switches on the card. If desired, you can disable the switches and use parameter settings instead.	5. Hardware setup
5	**Connect the drive to the DeviceNet network.** Verify that the Altivar drive is not powered. Then, connect the card to the network using a DeviceNet cable.	6. Wiring to the network
6	**Apply power to the drive.** The card receives power from the drive. Apply power to the drive. The status indicator should be green.If it flashes red, there is a problem (refer to 10. 2. Signalling LED).	10. Diagnostics by the drive HMI

To attain similar performance to PDL's Output instance 100 make the following adjustments to the drive parameters-

Output Instance 100: PDL Control Output

BYTE	BIT 7	BIT 6	BIT 5	BIT 4	BIT 3	BIT 2	BIT 1	BIT 0
0		Network Reference	Network Control			Fault Reset	Run Reverse	Run Forward

In Menu **[1.5 INPUTS / OUTPUTS CFG] (I-O-)**

Set **tCC [2/3 wire control] to [2 wire]** (2C): 2-wire control.

Assuming all settings listed in this note are made this configures the drive to run forward when bit 0 of the command word is high and reverse when bit 1 of the command word is high and drive digital input five [LI5] (LI5) is not active..

Set tCt **[2 wire type] to [Level]** (LEL)

Assuming all settings listed in this note are made this configures the drive to run forward when bit 0 of the command word is high and reverse when bit 1 of the command word is high and drive digital input five [LI5] (LI5) is not active..

Set **rrS [Reverse assign.] to [CD301]** (CD301)

Assuming all settings listed in this note are made this configures the drive to run forward when bit 0 of the command word is high and reverse when bit 1 of the command word is high and drive digital input five [LI5] (LI5) is not active.

In Menu **[1.6 COMMAND] (CtL-)**

Set [Profile] (CHCF) to [I/O profile] (IO)

Assuming all settings listed in this note are made this configures the drive to operate in IO mode which makes the command and reference completely customizable.

Set [Ref.1 chan] (Fr1) to [Com. card] (nEt)

Assuming all settings listed in this note are made this configures the drive speed reference to come from the Network when drive digital input five [LI5] (LI5) is not active.

Set [Cmd channel 1] (Cd1) to [Com. card] (nEt)

Assuming all settings listed in this note are made this configures the drive to run forward when bit 0 of the command word is high and reverse when bit 1 of the command word is high and drive digital input five [LI5] (LI5) is not active.

Set [Cmd channel 2] (Cd2) to [Terminals] (tEr)

Assuming all settings listed in this note are made this configures the drive to run forward when drive digital input one [LI1] (LI1) is active and reverse when drive digital input two [LI2] (LI2) is active and drive digital input five [LI5] (LI5) is active

Set [Cmd switching] to (CCS) [LI5] (LI5)

Assuming all settings listed in this note are made this configures the drive to accept run commands from devicenet when drive digital input five [LI5] (LI5) is not active and from the terminals when it is.

In Menu **[1.7 APPLICATION FUNCT.] (FUn-)**

Set [Ref 1B switching] to (rCb) [LI5] (LI5)

Assuming all settings listed in this note are made this configures the drive speed reference to come from the Network when drive digital input five [LI5] (LI5) is not active and from drive analogue input one **[AI1]** (AI1) when it is.

Set [Ref.1B chan] (Fr1b) to [AI1 ref.] (AI1)

Assuming all settings listed in this note are made this configures the drive speed reference to come from analogue input one **[AI1]** (AI1) when drive digital input five [LI5] (LI5) is active.

In Menu **[1.8 FAULT MANAGEMENT] (FLt-)**

Set rSt **[FAULT RESET] to [CD302]** (CD302)

Assuming all settings listed in this note are made this configures bit 2 of the command word to reset the drive for faults that are able to be reset without cycling the drive power when drive digital input five [LI5] (LI5) is not active. When drive digital input five [LI5] (LI5) is active drive digital input three [LI3] (LI3) will reset the drive for faults that are able to be reset without cycling the drive power.

In Menu **[1.9 COMMUNICATION] (COM-)**

Set [Scan. Out1 address] (nCA1) to 8601

This configures the IO scanner to direct bytes 0 and 1 to address 8601 which is the drive command word. (**CMd**)

Set [Scan. Out2 address] (nCA2) to 8602

This configures the IO scanner to direct bytes 2 and 3 to address 8602 which is the drive speed reference. (**LFRD**)

Set [Scan. Out3 address] (nCA3) to 9001

This configures the IO scanner to direct bytes 4 and 5 to address 9001 which is the drive acceleration rate. (**ACC**)

Set [Scan. Out4 address] (nCA4) to 9002

This configures the IO scanner to direct bytes 6 and 7 to address 9002 which is the drive deceleration rate. (**dEC**)

[Scan. Out5 address] (nCA5) to [Scan. Out8 address] (nCA8) are not useful for the DeviceNet card.

Set [Scan. In1 address] (nMA1) to 8603

This configures the drive to direct the value held in address 8603 which is the drive status word (**EtA**) to bytes 0 and 1 of the IO scanner.

Set [Scan. In2 address] (nMA2) to 8604

This configures the drive to direct the value held in address 8604 which is the drive output speed (**rFrd**) to bytes 2 and 3 of the IO scanner.

Set [Scan. In3 address] (nMA3) to 9630

This configures the drive to direct the value held in address 9630 which is the motor thermal state (**tHd**) to bytes 4 and 5 of the IO scanner.

Set [Scan. In4 address] (nMA4) to 3204

This configures the drive to direct the value held in address 3204 which is the motor current (**LCr**) to bytes 6 and 7 of the IO scanner.

[Scan. In5 address] (nCA5) to [Scan. In8 address] (nCA8) are not useful for the DeviceNet card.

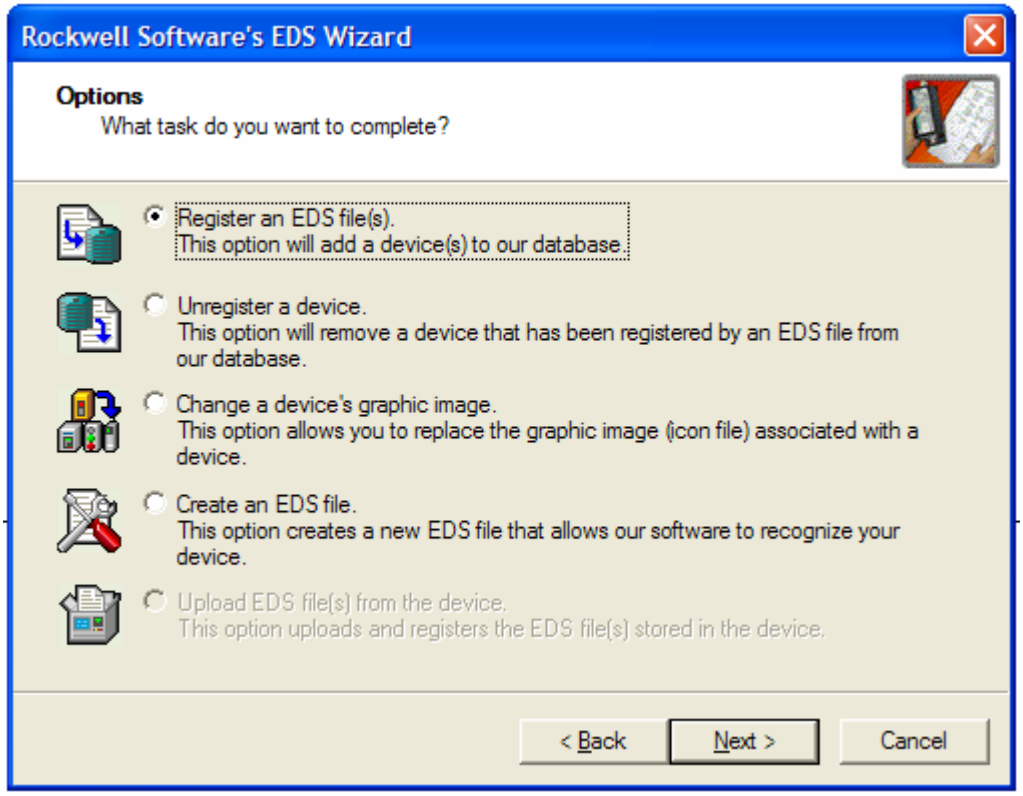
To configure the Devicenet Scanner-

Using RSNetWorx for DeviceNet 6.00.00(build 97)(CPR 6)

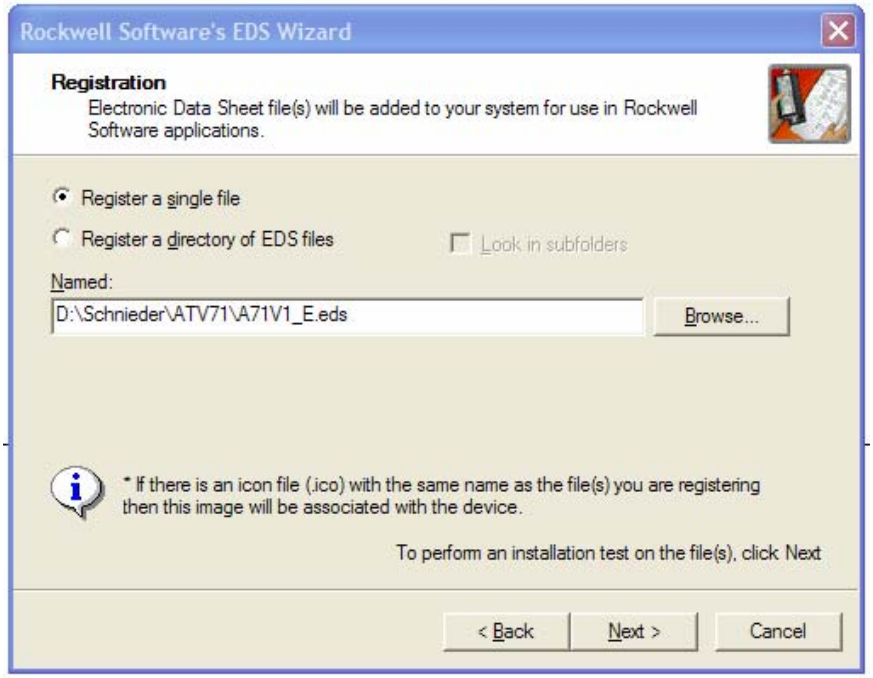
Register EDS file if no ATV71's have been installed previously otherwise skip this section.

Menu

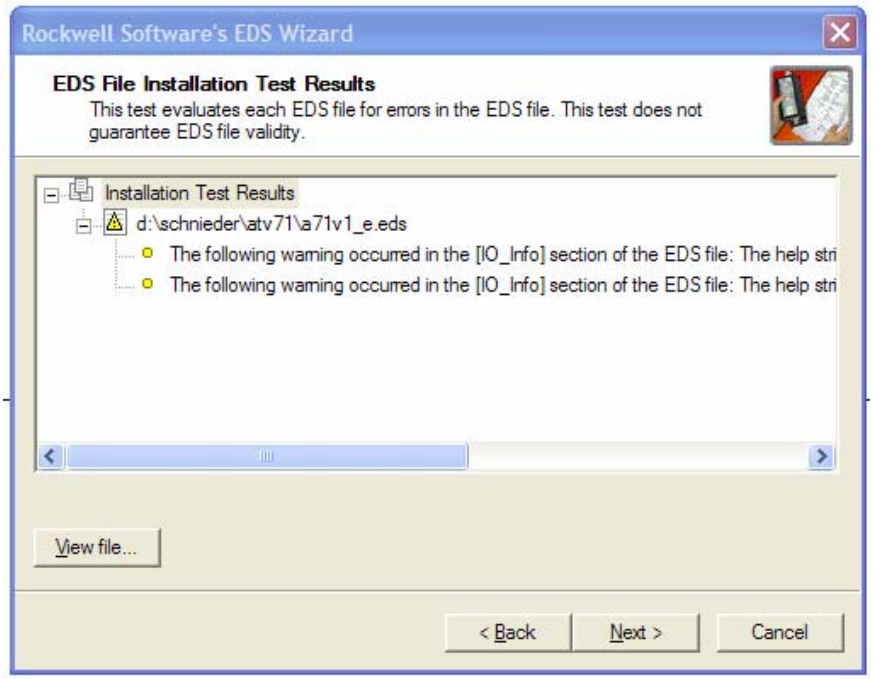
- Tools
- EDS Wizard



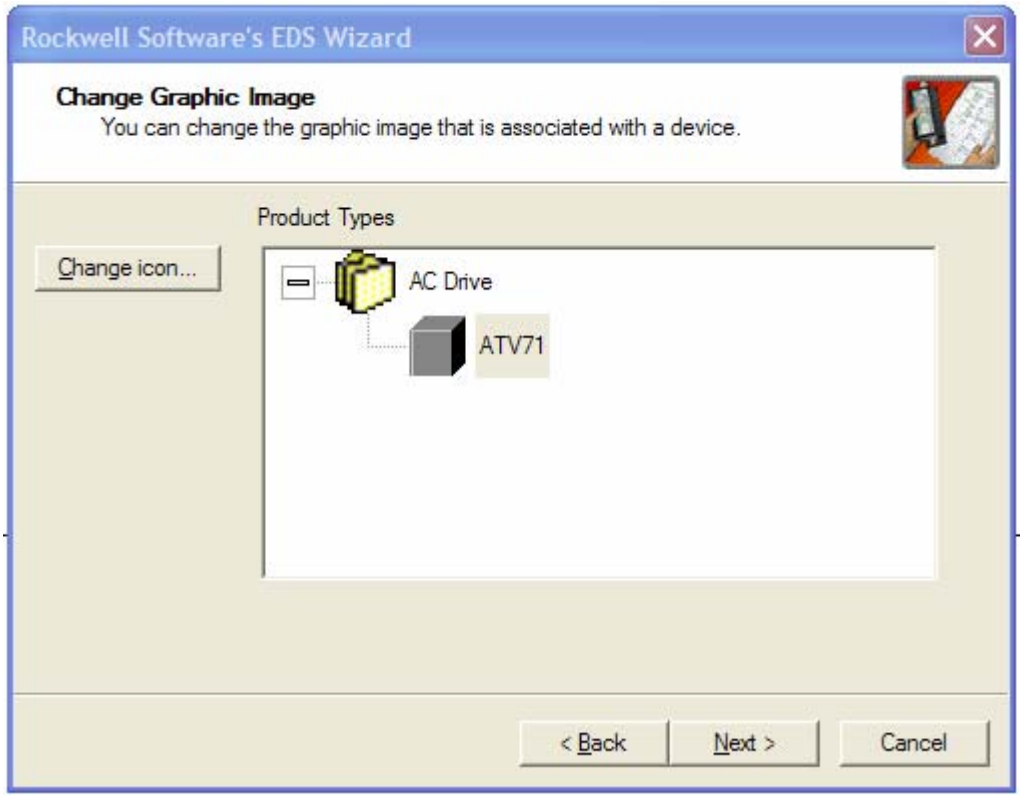
Next



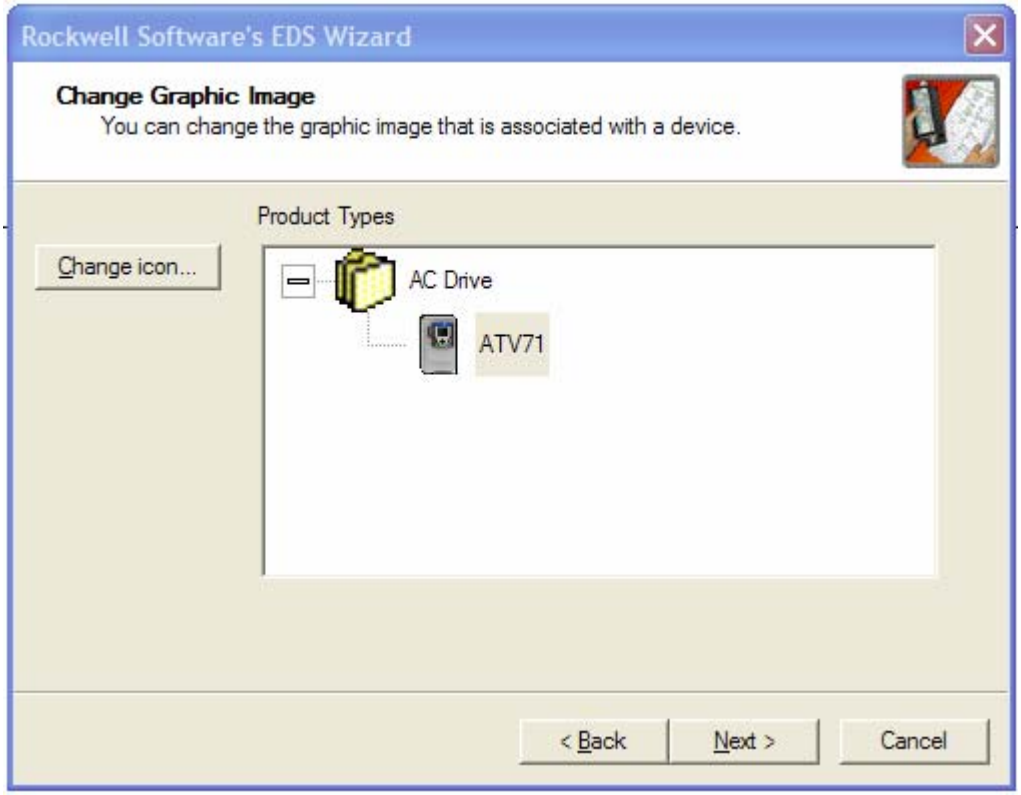
Select file



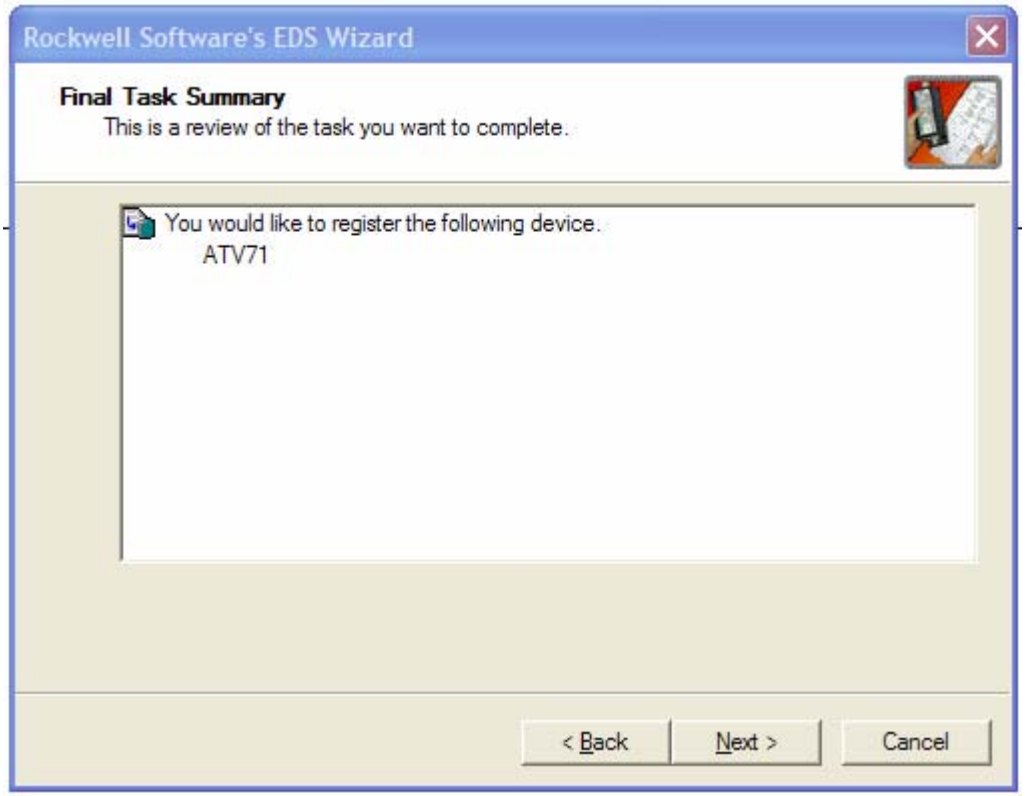
Ignore warnings as they are simply due to a mismatch in string length.



Change Icon to one supplied by Schneider Electric if desired.



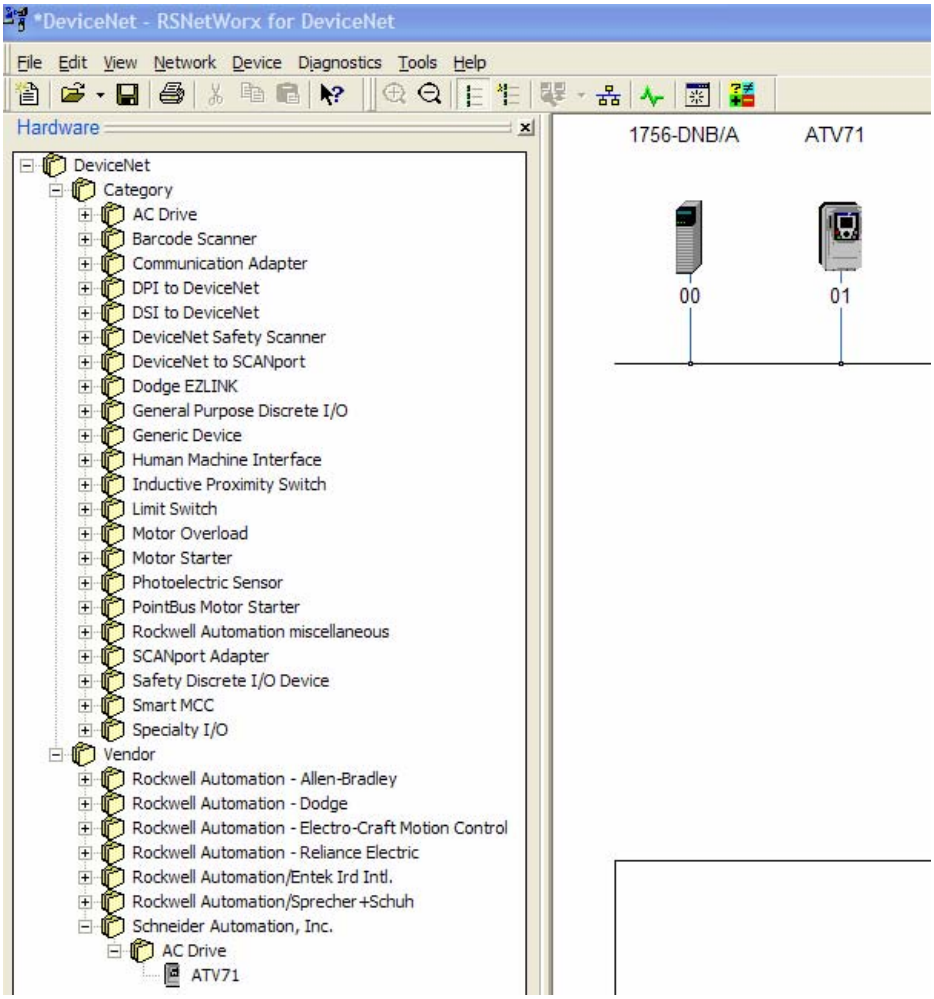
Select ATV71 icon
Next



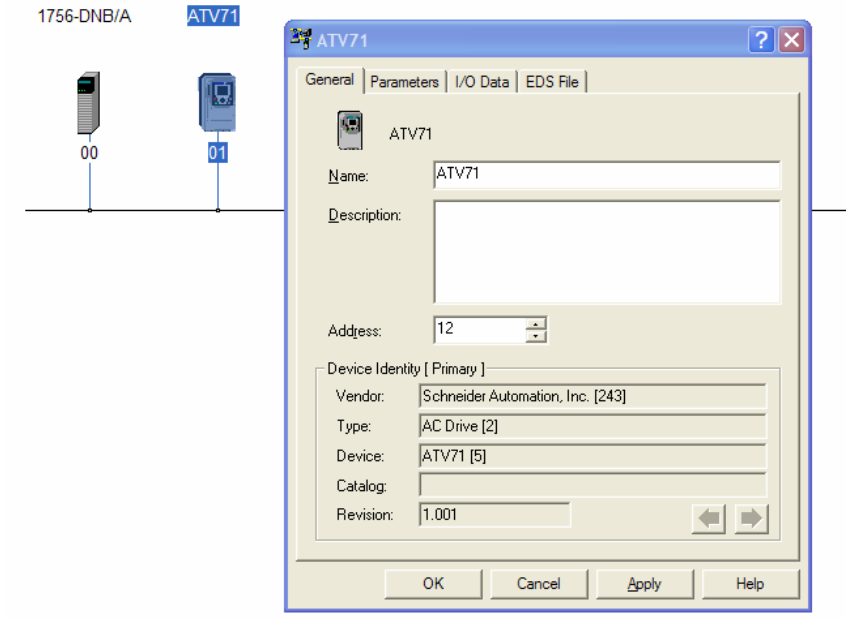
Next

EDS Registered

Adding to a project

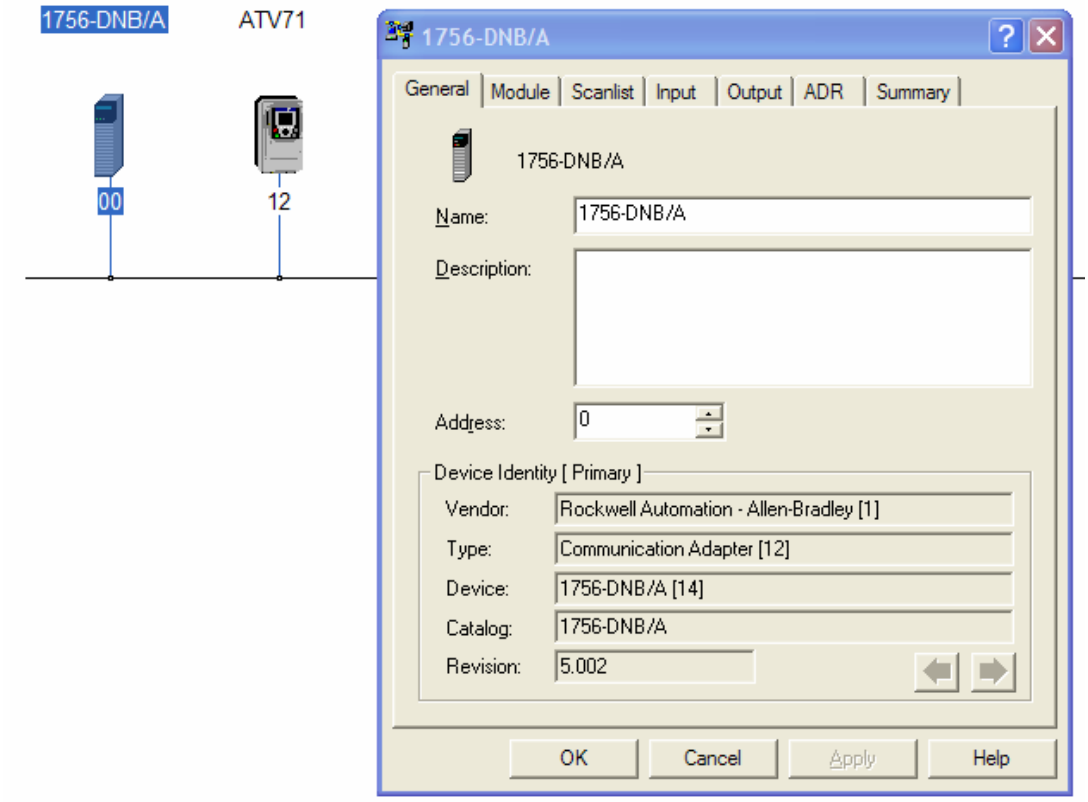


Select the ATV71 from the vendor list and drag and drop it onto the network.
Double click on drive

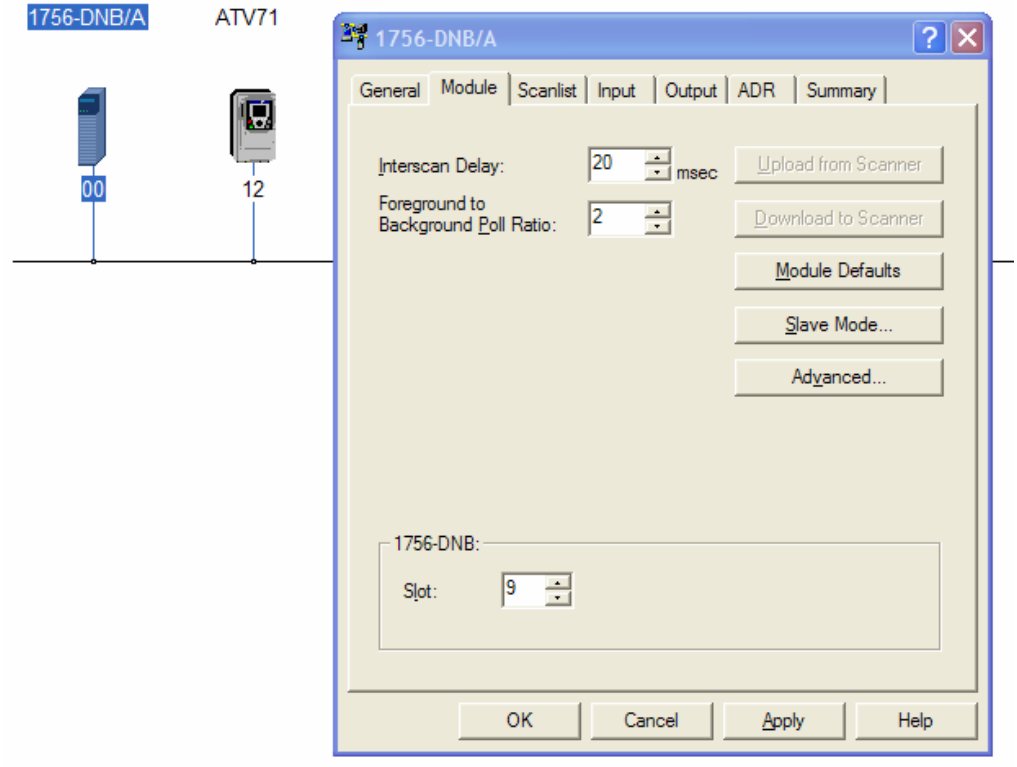


Change to node address set for drive previously e.g. 12 then click OK

Double click on scanner



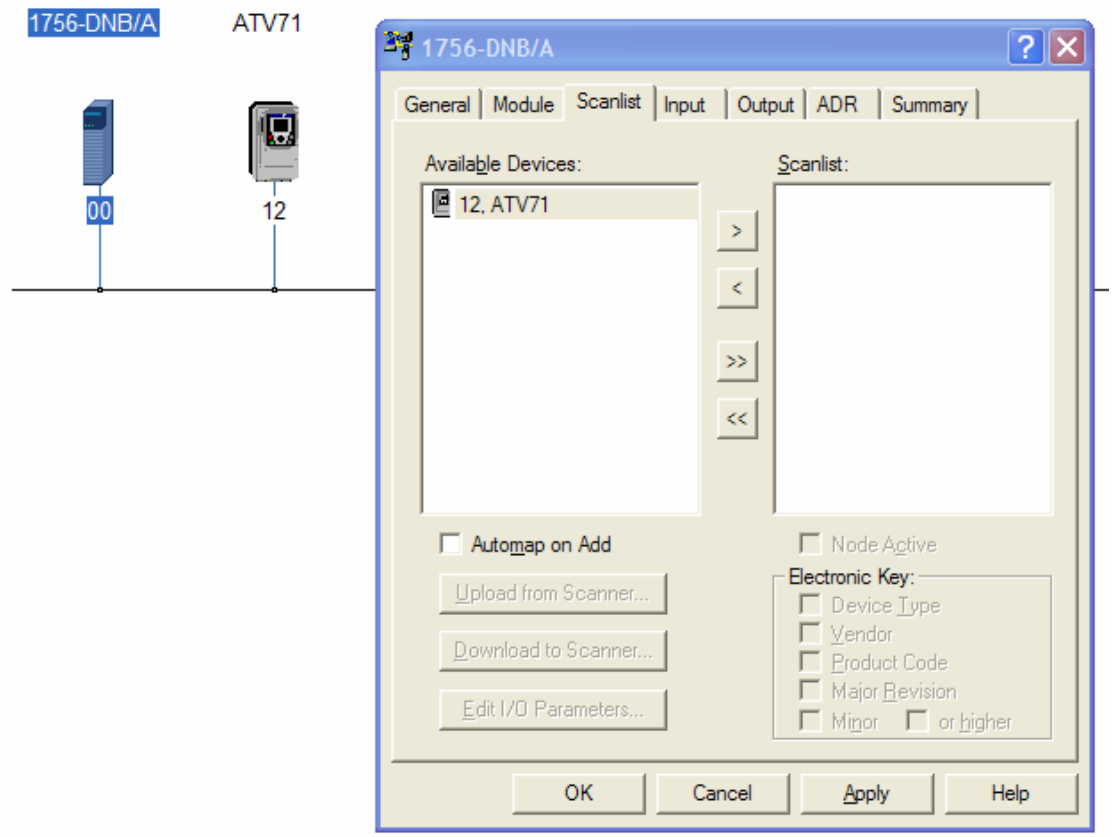
Select Module Tab



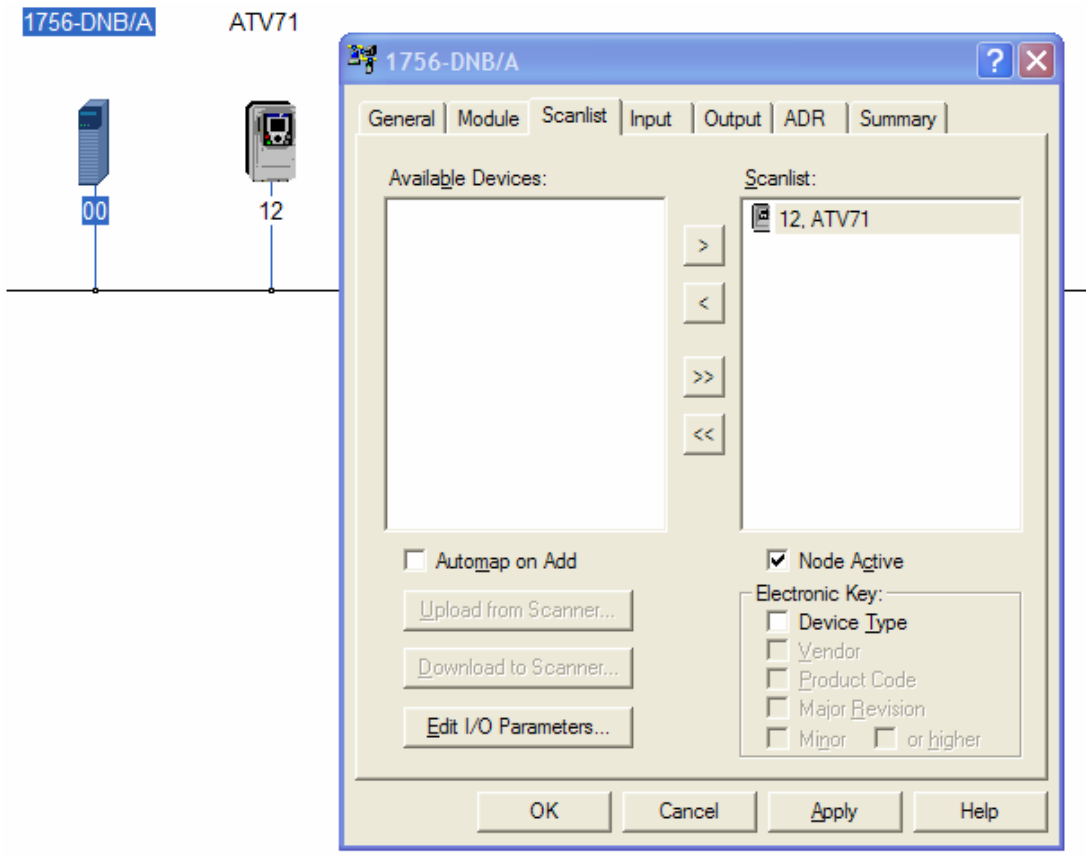
Change settings to requirements if creating a new network or alternatively skip this portion.

Interscan Delay = 20mSec
Foreground/Background Poll Ratio = 2
Select slot scanner is located in e.g = 9

Select Scanlist Tab

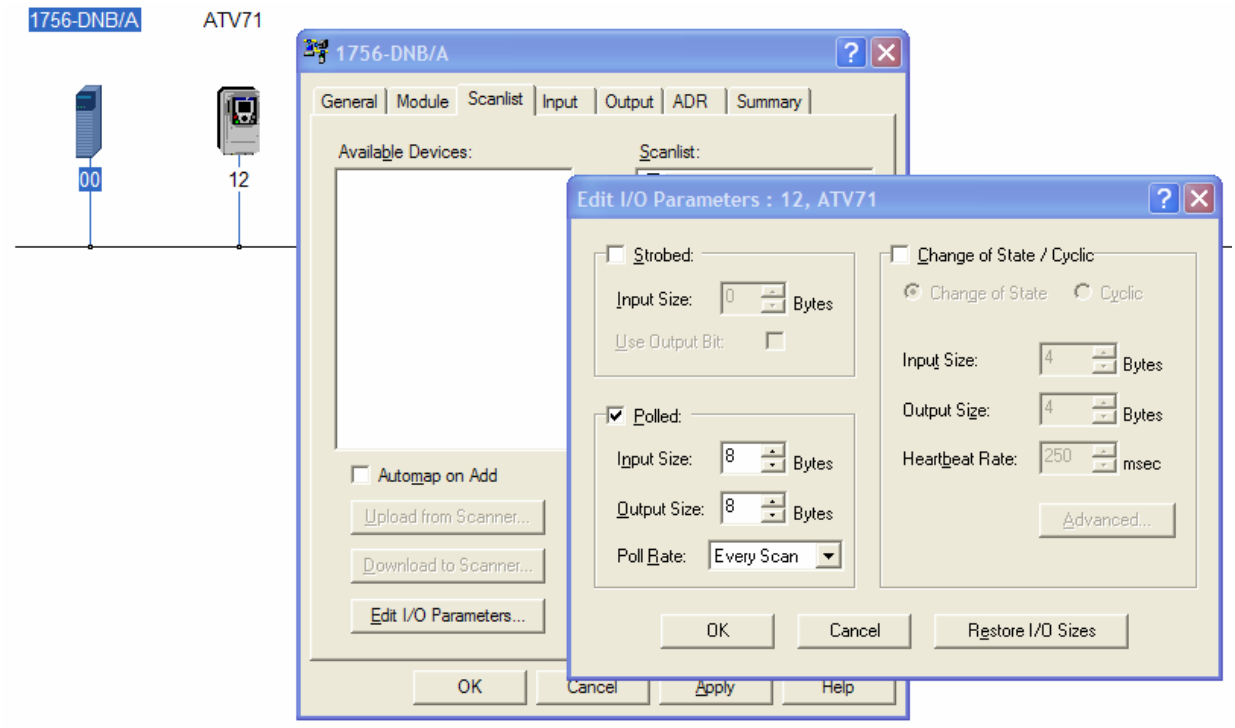


Deselect Automap on Add and add ATV71 to scan list >



Deselect Device Type, Vendor and Product code as these will cause issues when changing drives at a later date if they have a different software version for example.

Select Edit I/O Parameters

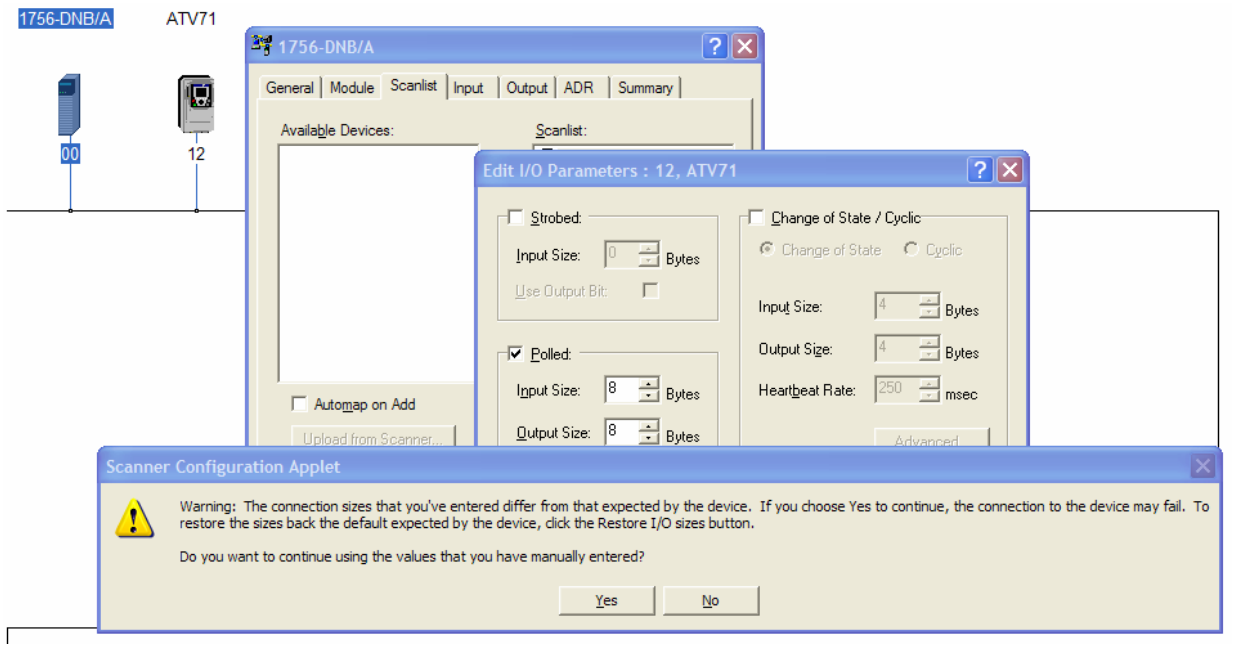


Change

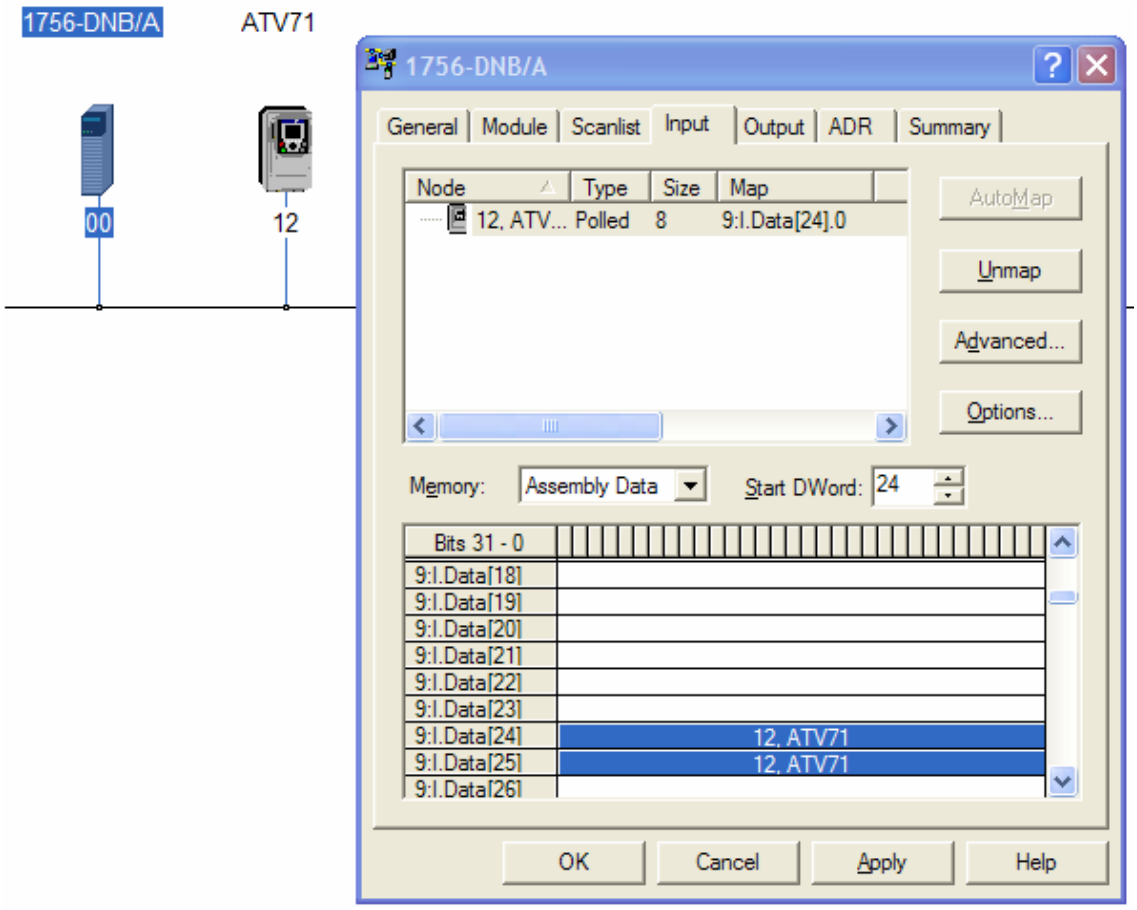
Polled

- Input Size 8 bytes
- Output Size 8 bytes

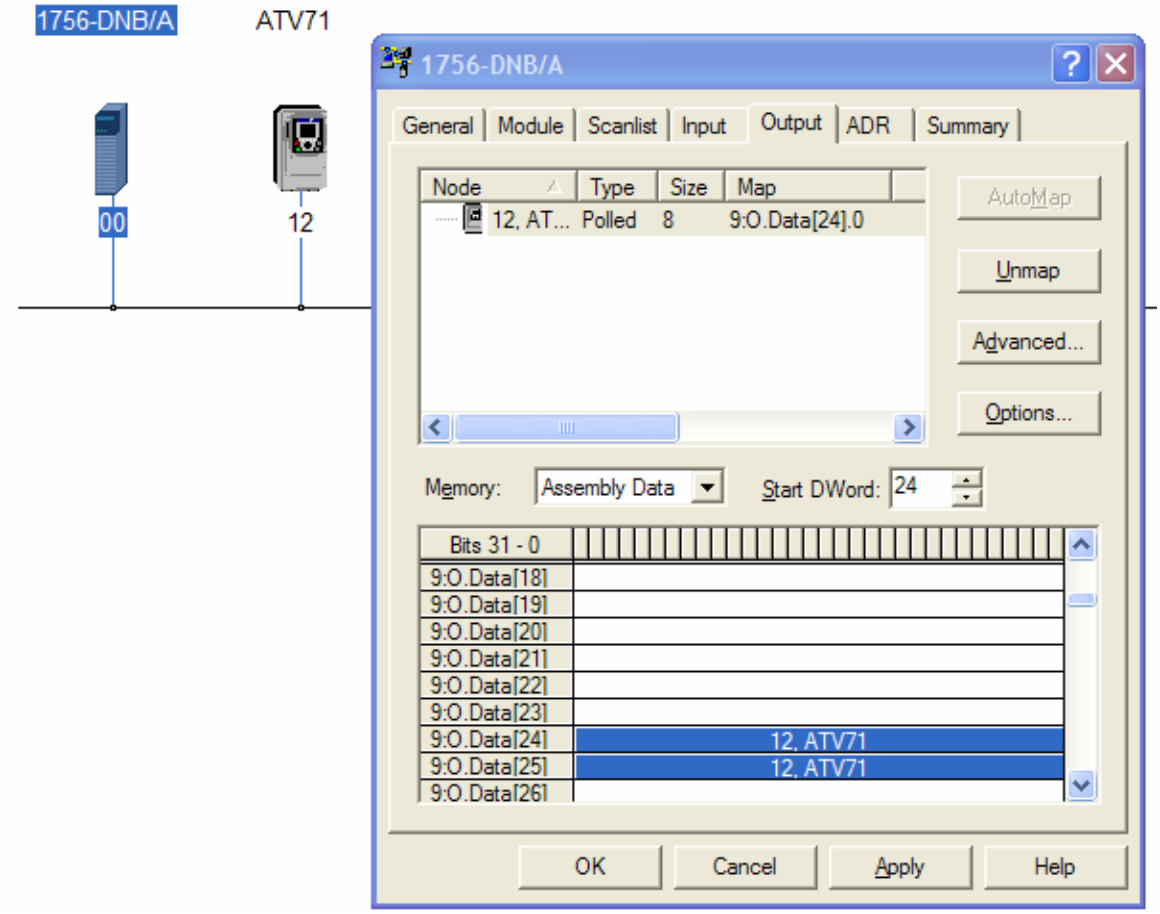
OK



Yes



Map device to appropriate Input word e.g. Node # x 2 = 24, by choosing node number X 2 you always leave space for other devices to be added.



The same for outputs

Conclusion

PDL instances 100 and 101 allowed for strobing data to and from the drive. This feature is not supported by the ATV71 drive. Explicit messaging must be used if more than four variables are required to be read from or written to the ATV71.

When an ATV71 is configured as per this application note the drive will respond to the commands and will derive its speed reference from the (**CMd**) word and (**LFRD**) word respectively if drive digital input five [LI5] (LI5) is not active. When this input is active the command is taken from the terminals and the speed reference is taken from drive analogue input one [AI1 ref.] (AI1).
Please note that a stop command from the terminals is active even when command from the network is true (digital input five [LI5] (LI5) is not active).

The first two bytes written to the drive comprise of the (**CMd**) word which is configured for the following-

BIT 7	BIT 6	BIT 5	BIT 4	BIT 3	BIT 2	BIT 1	BIT 0
					Reset Fault	Run Reverse	Run Forward

If drive digital input five [LI5] (LI5) is not active then bit 0 is a drive run forward command, bit 1 is a drive run reverse command and bit 2 is a drive reset command. If drive digital input five [LI5] (LI5) is active then drive digital input one [LI1] (LI1) is a drive run forward command, digital input two [LI2] (LI2) is a drive run reverse command and digital input three [LI3] (LI3) is a drive reset command.

Bytes two and three written to the drive comprise of the speed reference (**LFRD**) which is an integer and the unit is rpm.

Bytes four and five written to the drive comprise of the acceleration rate **ACC [Acceleration]** which is an unsigned integer and the unit is dependent on (Inr) **[Ramp increment]**

If Inr = 0: Unit = 0.01 s, adjustment range = 1 to 9999
If Inr = 1: Unit = 0.1 s, adjustment range = 1 to 9999
If Inr = 2: Unit = 1 s, adjustment range = 1 to 6000

Bytes six and seven written to the drive comprise of the deceleration rate **dCC [Deceleration]** which is an unsigned integer and the unit is dependent on (Inr) **[Ramp increment]**

If Inr = 0: Unit = 0.01 s, adjustment range = 1 to 9999
If Inr = 1: Unit = 0.1 s, adjustment range = 1 to 9999
If Inr = 2: Unit = 1 s, adjustment range = 1 to 6000

The first two bytes read from the drive comprise of the status word (**ETA**) which comprises of the following-

Status word (ETA)

bit 7	bit 6	bit 5	bit 4	bit 3	bit 2	bit 1	bit 0
Alarm	Reserved (= 0 or 1)	Reserved (=1)	Power present	Fault	Running	Ready	Reserved (= 0 or 1)

bit 15	bit 14	bit 13	bit 12	bit 11	bit 10	bit 9	bit 8
Direction of rotation	Stop via STOP key	Reserved (=0)	Reserved (=0)	Reference outside limits	Reference reached	Command or reference via network	

Bytes two and three read from the drive comprise of the output speed (rFrd) which is an integer and the unit is rpm.

Bytes four and five read from the drive comprise of the motor thermal state (**tHd**) which is an unsigned integer and the unit is 1%.

Bytes six and seven read from the drive comprise of the motor current (**LCr**) which is an unsigned integer and the unit is 0.1A.