# Application Note – 17 ATV71 DeviceNet implementation example









# Table of Contents

Table of Contents	2
Application Note Overview	2
References	3
PDL vs. ATV71 Implementation differences	3
ATV71 Set-up	4
To configure the Drive	5
To configure the Devicenet Scanner	8
Register EDS file	8
Adding to a project	12
Conclusion	17

### **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.

Written By	Name	Title	Date:	14-Jul-06
PAE Department	Peter Wrigley	Product Application Engineer	Ref:	AppNote 17
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-

- 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)

24,	ATV71 D	)rive #	2				? ×
G	eneial D	)evice	Parameters	170 D	efaults   E	DS File	
	<u>G</u> roups			– Onlin	e		
	DeviceN	et Interi	iace 💌	O S	ingle	Upload From	Device
	<u>R</u> estore	e Defau	lt Values	<b>c</b> .		<u>D</u> ownload To	Device
	Para	ameter H	Help		ξii	<u>S</u> tart Mo	nitor
	ID	0 IF	Parameter		Current	Value	
	12 12 12 12 12 12 12 12 12	<b>AT</b>	PollProdPa PollConsPa CCProdPat Cnf Last Fa SoftRevisio FirstParam SecondPat FirstParam SecondPat	ith aith ault on Attr ram Class ram	71 - Exte 21 - Exte 71 - Exte 104 - AB 105 - AB 72 - Spee 73 - Exte 101 - Ind 0	ended Speed Co ended Speed Co inded Speed Cor 1336 Drive Inpu 1336 Extended ed and Torque C inded Speed and exed Input Parar	ntrol Input ntrol Output ntrol Inpu t Drive Inp ontrol Input neters
	•	0	(	Cano	el _	Apply	Heip

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-

Ste	)	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.	<u>5. Hardware setup</u>
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 <u>10, 2, Signalling LED</u> ).	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 [Al1 ref.] (Al1)

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 [L15] (L15) is not active. When drive digital input five [L15] (L15) is active drive digital input three [L13] (L13) 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

Rockwell Software's EDS Wizard
Options What task do you want to complete?
<ul> <li>Register an EDS file(s).</li> <li>This option will add a device(s) to our database.</li> </ul>
Unregister a device. This option will remove a device that has been registered by an EDS file from our database.
C Change a device's graphic image. This option allows you to replace the graphic image (icon file) associated with a device.
C Create an EDS file. This option creates a new EDS file that allows our software to recognize your device.
Upload EDS file(s) from the device. This option uploads and registers the EDS file(s) stored in the device.
< <u>B</u> ack <u>N</u> ext > Cancel

#### Next







#### Select file



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

Rockwell Software's EDS Wizard	×
Change Graphic Image You can change the graphic image that is associated with a device.	
Product Types	
Change icon AC Drive	_
	1
< <u>Back</u> Next > (	Cancel

Change Icon to one supplied by Schneider Electric if desired.





Rockwell Software's EDS Wizar Change Graphic Image You can change the graphic im	d lage that is associate	ed with a devi	ce.	
Change icon	AC Drive			
	<[	<u>B</u> ack	<u>N</u> ext >	Cancel

#### Select ATV71 icon Next

Rockwell Software's EDS Wizard Final Task Summary This is a review of the task you want to c	omplete.		×
You would like to register the follow ATV71	ving device.		
	< <u>B</u> ack	<u>N</u> ext >	Cancel







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

1756-DNB/A	ATV71	30 17/74	
		⇒ AIV/I	
		General Parameters   I/O Data   EDS File	
00	01	ATV71	
Ĩ	T	Name: ATV71	
		Description:	
		Address: 12	
		Device Identity [ Primary ]	
		Vendor: Schneider Automation, Inc. [243]	
		Type: AC Drive [2]	
		Device: ATV71 [5]	
		Catalog:	
		Revision: 1.001	
		OK Cancel <u>A</u> pply	Help

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



#### Double click on scanner

1756-DNB/A	ATV71	🥞 1756-DNB/A 🔹 💽
00	12	General     Module     Scanlist     Input     Output     ADR     Summary       1756-DNB/A       Name:     1756-DNB/A
		Add <u>r</u> ess: 0
		Device Identity [ Primary ]
		Vendor: Rockwell Automation - Allen-Bradley [1]
		Type: Communication Adapter [12]
		Device: 1756-DNB/A [14]
		Catalog:  1756-DNB/A
		Revision: 5.002
		OK Cancel Apply Help

#### Select Module Tab

1756-DNB/A	ATV71	📲 1756-DNB/A 🔹 💽
00	12	General       Module       Scanlist       Input       Output       ADR       Summary         Interscan Delay:       20       msec       Upload from Scanner         Foreground to Background Poll Ratio:       2       0       Download to Scanner
		Slave Mode Advanced
		1756-DNB: Slot: 9
		OK Cancel <u>Apply</u> Help

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

1756-DNB/A ATV	171	? 🛛
	2 General Module Scanlist   Available Devices: 2 12. ATV71	Input Output ADR Summary
	Automap on Add Upload from Scanner Download to Scanner Edit I/O Parameters OK	Image: Constraint of the sector of the se

Deselect Automap on Add and add ATV71 to scan list >

1756-DNB/A	ATV71	
		🥞 1756-DNB/A 🔹 🚬 🔀
		General Module Scanlist Input Output ADR Summary
00	12	Available Devices: Scanlist:
		>> <<
		Automap on Add V Node Active
		Upload from Scanner
		Download to Scanner
		Edit I/O Parameters
		OK Cancel <u>Apply</u> Help

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

1756-DNB/A	ATV71	
		📲 1756-DNB/A 🔹 💽
		General Module Scanlist Input Output ADR Summary Available Devices: Scanlist:
00	12	Edit I/O Parameters : 12, ATV71
		Input Size: Bytes Change of State C Cyclic
		Use Output Bit: Input Size: 4 Bytes
		Polled: Output Size: 4 Bytes
		Automap on Add Input Size: 8 * Bytes Heartbeat Rate: 250 * msec
		Upload from Scanner Qutput Size: 8 - Bytes Advanced
		Download to Scanner Poll Rate: Every Scan
		Edit I/O Parameters OK Cancel Restore I/O Sizes
		OK Cancel Apply Help

#### Change

Polled

- ٠
- Input Size 8 bytes Output Size 8 bytes •

#### OK

1756-DNB/A A	ATV71				
	3	7 1756-DNB/A	?	X	
		General Module Scanlist Inpu	t   Output   ADR   Summary	1	
-	<b></b>	Availa <u>b</u> le Devices:	<u>S</u> canlist:		
00	12		Edit I/O Parameters : 12, ATV	71 ? 🛛	
			<u>S</u> trobed:	Change of State / Cyclic	
			Input Size: 0 📰 Bytes	C Change of State C Cyclic	
			∐se Output Bit: 🔽	Inpu <u>t</u> Size:	
			Polled:	Output Size: 4 Bytes	
		Auto <u>m</u> ap on Add	I <u>n</u> put Size: 8 📑 Bytes	Heart <u>b</u> eat Rate: 250 msec	
		Upload from Scanner	<u>O</u> utput Size: <sup>8</sup> → Bytes	Advanced	
Scanner	Configurat				×
1	Warning: Th restore the s Do you want	e connection sizes that you've ente izes back the default expected by the to continue using the values that you	red differ from that expected by the de he device, dick the Restore I/O sizes bu ou have manually entered?	vice. If you choose Yes to continue, the connec utton.	tion to the device may fail. To
			<u>Y</u> es <u>N</u> o		

Yes





1756-DNB/A	ATV71	
		🏝 1756-DNB/A 🔹 💽
		General Module Scanlist Input Output ADR Summary
00	12	Node △ Type Size Map AutoMap
<b>6</b>		A <u>d</u> vanced
		Coptions
		Memory: Assembly Data 💌 Start DWord: 24 🕂
		Bits 31 - 0
		9:1.Data[18] 9:1.Data[19]
		9:I.Data[21] 9:I.Data[22]
		9:I.Data[23] 9:I.Data[24] 12, ATV71 9:I.Data[25] 12 ATV/71
		9:1.Data[26]
		OK Cancel <u>A</u> pply Help

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.

1756-DNB/A ATV71	
	📲 1756-DNB/A ? 🔀
	General       Module       Scanlist       Input       Output       ADR       Summary         Node       Type       Size       Map       AutoMap         I2, AT       Polled       8       9:O.Data[24].0       Unmap         Advanced       Options         Image: Intervention of the state

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	Run	Run
					Fault	Reverse	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.



