

# PowerFlex 4 DeviceNet Set-Up



# Power Flex 4 Set-Up

# Lesson Objective

By the end of this session, students should be able to:

- 1. Configure the 22-COMM-D DeviceNet Adapter for a PowerFlex 4- AC Drive
- 2. Configure the AC Drive as a node on a DeviceNet network.
- 3. Download Ladder Logic program a ControlLogix PLC to monitor / control the AC Drive.

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ControlLogix File Required PLC\_220\_Module\_6\_PF\_4.L5K



PLC220 Lab Exercise 17, 2/17/17 I AM iSTAR, A DOL funded project

# Introduction:

This lesson will use 22-COMM-D DeviceNet Adapter to allow a PowerFlex 4 AC Drive to be a Node on a DeviceNet Network.

Once the drive is configured using RSNetWorx for DeviceNet on a DevceNet network, a ladder logic program will monitor and control the PowerFlex 4 used using RSLogix / Studio 5000 software and a ControlLogix PLC. ...

This lesson will cover installation / configuration of a:

22-COMM-D DeviceNet Adapter for a PowerFlex 4 AC Drive. Configure the PowerFlex4 as a DeviceNet node Communicate with a ControlLogix PLC and the PowerFlex4

# Install 22-COMM-D DeviceNet Adapter:

Installation of the adapter requires two components:

- 1. The 22-COMM-D DeviceNet
- 2. 22-XCOMM-DC -Base DSI External Communication Kit



22-XCOMM-DC-Base with 22-Comm-D Interface Installed

PowerFlex 4 VFD

Motor

Figure 1-A 22-COMM-D Adapter Components





# The 22-COMM-D DeviceNet Adapter installs in 22-XCOMM-DC -Base Cover

Figure 2-A 22-COMM-D DeviceNet Adapter in 22-XCOMM-DC –Base

Note: DeviceNet Open style connector 8 Switch DIP for Node Commissioning



Figure 3-A DSI Interface Installed In 22-XCOMM-DC –Base

22 RJ45CBL-C20 connects RJ-45 port on PowerFlex 4 VFD to RJ-45 port on DSI interface.



#### Note: RJ-45 port use RS-485 Serial Communication Standard -Do Not Plug in Ethernet Devices

Ribbon cable: Connects DSI Interface PC board to 22-COMM-D Interface Board Remove the original cover from the drive.

24 VDC Power Cable supplies power to the DSI Interface

See Devicenet\_22comm-D\_User\_Manual.pdf for DIP Switch setting for 22-COMM-D interface.

See Devicenet\_22comm-D\_User\_Manual.pdf for Diagnostic Indicator Descriptions for 22-COMM-D interface.

### **Equipment Required:**

Computer with RSLogix 5000 / Studio 5000 software RSLinx software RSNetWorx for DeviceNet software Ethernet Port

ControlLogix Demo board with 1756-DNB module, 1756-processor 1756-Ethernet Communication Module Discrete Input / Output Modules

DeviceNet Demo Board with 871TM Prox switch RightSight Standard Diffuse Photoelectric Sensor 855T – Stack Light 1791D 8B8P Compact Block I/O PowerFlex 4 VFD

Note: Other components are also installed on DeviceNet Demo Board





Figure 4-A

Ensure all the DeviceNet component's cables are connected to the IDC taps on the bottom of the DeviceNet Demo Board

Twisted pair Ethernet cables from Computer Ethernet Port the 1756-EtherNet Module Note: the cable may be directly connected - no Switch required

DeviceNet drop cable to connect the DeviceNet Demo Board to the front port on the 1756-DNB Module located on the ControlLogix Demo Board.

Power-up ControlLogix and DeviceNet Demo Boards

Note: If the display on the 1756-DNB Module shows - No Network Power – the 1756-DNB Module is not receiving power from the DeviceNet network (drop cable) cable.

In the Lab exercise a connection will be made from the computer's Ethernet Port thru RSNetWorx for DeviceNet using a RSLinx, EtherNet/IP Driver to connect to the DeviceNet network

Ensure the Computer can connect to the ControlLogix Demo board using the 1756 – Ethernet Communication Module with an EtherNet/IP driver.

Note: DeviceNet Scanner Module - 1756-DNB - located in slot 6.



# **Configure PowerFlex 4 Inputs and Outputs on DeviceNet:**

Connect the VFD to a DeviceNet network that has a 1756-DNB module attached. Use RSNetworx to browse the network to verify the DeviceNet VFD



PowerFlex 4 VFD as Node 2 on DeviceNet Network.

Node: PowerFlex 4 VFD on DeviceNet Demo Board may be different node address

Remove all components from the1756-DNB Scanlist. Add PowerFlex 4 VFD in the 1756-DNB Scanner Scanlist.

Available Devices:       Scanlist:         03, 871TM Shielded 18m       >         04, Right Sight Standard       >         06, DSA 4/2 (100-DNY42          09, 1792D-2BVA2D 2ln w          10, 1791D-8B8P 8 Sink I       >>         11, Stack Light DeviceNe       >>         ✓       Automap on Add       ✓         ✓       Node Active         Upload from Scanner       ✓         Download to Scanner       ✓         Edit I/O Parameters       Minor or higher	General Module Scanlist Input	Output ADR Summary
Image: Constraint of the second se	Available Devices:	Scanlist:
Image: Automap on Add       Image: Node Active         Upload from Scanner       Electronic Key:         Image: Download to Scanner       Image: Product Code         Image: Download to Scanner       Image: Product Code         Image: Edit I/O Parameters       Image: Minor Image: Product Code	<ul> <li>3. 871TM Shielded 18m</li> <li>04. RightSight Standard</li> <li>06. DSA 4/2 (100-DNY42</li> <li>09. 1792D-2BVA2D 2ln w</li> <li>10. 1791D-8B8P 8 Sink I</li> <li>11. Stack Light DeviceNe</li> </ul>	>     02, PowerFlex 4 1P 110V       <
Upload from Scanner  Download to Scanner  Edit I/O Parameters  Edit I	Automap on Add	Node Active
Download to Scanner       Vendor         Edit I/O Parameters       Major Revision         Minor       or higher	Upload from Scanner	Electronic Key:
Edit I/O Parameters     Image: Product Code       Major Revision     Minor       Minor     or higher	Download to Seamor	Vendor
Edit I/O Parameters	Download to Scanner	Product Code
	Edit I/O Parameters	Minor or higher

Figure 6-A



PowerFlex 4 VFD as Node 2 in 1756-DNB Scanner Scanlist

Navigate to the I/O Data tab for the PowerFlex 4 VFD

PowerFlex 4 1P 110V .25HP								
General Paramete	General Parameters I/O Data EDS File							
Displays the defa	ult 1/0 charao	cteristics for this device.						
For detailed inform message type is b	For detailed information, expand one or more message types (default message type is bold).							
			1					
Message Type	Size	Data Description	_ <b>^</b>					
😽 Polled								
🖙 Input	4 Bytes	Logic Status & Feedback						
	2 Byte(s)	Logic Status						
	2 Byte(s)	Feedback						
⊟ <sup></sup> Output	4 Bytes	Logic Command & Reference						
	2 Byte(s)	Logic Command	E					
	2 Byte(s)	Reference						
🖳 🖳 Cos								
🕀 Input	4 Bytes	Logic Status & Feedback						
	4 Bytes	Logic Command & Reference						
😤 Cyclic								
⊞ nput	4 Bytes	Logic Status & Feedback	-					
1	10.	1 1 2 10 2 4						
	ок	Cancel Apply	Help					
	E	ionno 7 A						

I/O Data Tab PowerFlex 4 AC Drive Note: PowerFlex 4 has 4 Bytes of Input Data and 4 Bytes of Output Data

For Input Data, Bytes 0 and 1 are Logic Status Word - Feedback from the VFD



Logic	BI	s															
15 14	1	13	12	11	10	9	8	7	6	5	4	3	2	1	0	Status	Description
															х	Ready	0 = Not Ready 1 = Ready
														х		Active	0 = Not Active 1 = Active
													х			Command Direction	0 = Reverse 1 = Forward
												x				Actual Direction	0 = Reverse 1 = Forward
											x					Accel	0 = Not Accelerating 1 = Accelerating
										х						Decel	0 = Not Decelerating 1 = Decelerating
									x							Alarm	0 = No Alarm 1 = Alarm
								x								Fault	0 = No Fault 1 = Fault
							x									At Speed	0 = Not At Reference 1 = At Reference
				x	x	x										Local Control (1)	000 = Port 0 (TB) 001 = Port 1 010 = Port 2 011 = Port 3 100 = Port 4 101 = Port 5 110 = Port 6 111 = No Local
X X	2	x	X													Reference	0000 = Ref A Auto 0001 = Ref B Auto 0011 = Preset 2 Auto 0011 = Preset 3 Auto 0100 = Preset 4 Auto 0101 = Preset 5 Auto 0101 = Preset 5 Auto 0111 = Preset 6 Auto 0111 = Preset 7 Auto 1000 = Term Bik Manual 1001 = DPI 1 Manual 1011 = DPI 3 Manual 1100 = DPI 4 Manual 1100 = DPI 4 Manual 1110 = DPI 5 Manual 1111 = Jog Ref

Logic Status Word



Logic Status Word (Word = 16 bits) monitors the VFD

For Input Data, Bytes 2 and 3 will monitors the frequency the VFD is outputting to the motor.

Output Data controls a DeviceNet VFD

For Output Data, Bytes 0 and 1 are Logic Command Signals – Controls the VFD, Stopping, Starting, Jog, etc. See Figure 9-A



Loc	ilc B	Its															
15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0	Command	Description
															х	Stop <sup>(1)</sup>	0 = Not Stop 1 = Stop
														x		Start <sup>(1)(2)</sup>	0 = Not Start 1 = Start
													х			Jog	0 = NotJog 1 = Jog
												x				Clear Faults	0 = Not Clear Faults 1 = Clear Faults
										x	x					Direction	00 = No Command 01 = Forward Command 10 = Reverse Command 11 = Hold Direction Control
									х							Local Control	0 = No Local Control 1 = Local Control
								х								MOP Increment	0 = Not increment 1 = increment
						х	х									Accel Rate	00 = No Command 01 = Accel Rate 1 Command 10 = Accel Rate 2 Command 11 = Hold Accel Rate
				x	x											Decel Rate	00 = No Command 01 = Decei Rate 1 Command 10 = Decei Rate 2 Command 11 = Hold Decei Rate
	x	x	x													Relatence Select <sup>(3)</sup>	000 = No Command 001 = Ref. 1 (Ref A Select) 010 = Ref. 2 (Ref B Select) 011 = Ref. 3 (Preset 3) 100 = Ref. 4 (Preset 4) 101 = Ref. 5 (Preset 5) 110 = Ref. 6 (Preset 6) 111 = Ref. 7 (Preset 7)
x																MOP Decrement	0 = Not Decrement 1 = Decrement
(1)	A "O =	= Not nand	Stop acts	/'cor as a	nditio morr	n (le vent	ogic ary	0) Sta	mus rt o	st fir omr	st b nan	e pr d. A	ese 1	ent l 'wi	befo Il sta	we a "1 = Starf' condit art the drive, but return	ion will start the drive. The Start ring to '0' <u>will not</u> stop the drive.
												]	Fi	gι	ire	e 9-A	
					]	Pc	юw	ve1	rF	le	х	4	L	08	zic	c Command	l Word

#### Logic Command Word

For Output Data, Bytes 2 and 3 will control the frequency the VFD is outputting to the motor – controlling motor speed.

The ControlLogix processor will start/stop the drive and control the drive speed. It will also monitor the VFD frequency output and if the ready to Run and if the VFD is running.

## Mapping VFD Inputs and Outputs in the 1756-DNB Scanner

Drive mapping to the 1756-DNB will be modified from its Automap on Add setting.

With Auto mapping applied (default) the drive inputs are mapped as a DINT and the drive outputs are mapped as a DINT.

Navigate to the 1756-DNB Scanner's Properties -> Input tab.



## See Figure 10-A

General Module	Scanlist Input	Output ADR	Summary
Node A	Type Size Polled 4 !	Map 5:I.Data[0].0	AutoMap Unmap
			Advanced
Memory: Asse	mbly Data 💌	Start DWord:	
Bits 31 - 0 5:1.Data[0] 5:1.Data[1]	02, Powe	xFlex 40 1P 110V	.50HP
5:1.Data[2] 5:1.Data[3] 5:1.Data[4]			
5:1.Data[5] 5:1.Data[6] 5:1.Data[7]			

Figure 10-A Default Input Mapping of Drive

Click the 1756-DNB Output tab



1756-DNB/A	? ×
General Module Scanlist Input Output ADR S	ummary
Node 🛆 Type Size Map	AutoMap
🔄 02, Po Polled 4 5:0.Data[0].0	
	Unmap
	Advanced
	Options
Memory: Assembly Data 💌 Start DWord: 0	3
Bit 21 . 0	
50 Data[0] 02 PowerEley 40 1P 110V 5	
5:0.Data[1]	0111
5:0.Data[2]	
E.O. D1-(2)	
5:0.Data[3]	
5:0.Data[4]	
5:0.Data[4] 5:0.Data[4] 5:0.Data[5]	
5:0.Data[4] 5:0.Data[4] 5:0.Data[5] 5:0.Data[6]	
5:0.Data[3] 5:0.Data[4] 5:0.Data[5] 5:0.Data[6] 5:0.Data[7]	
5:0.Data[3] 5:0.Data[4] 5:0.Data[5] 5:0.Data[6] 5:0.Data[7] 5:0.Data[8]	
5:0.Data[3] 5:0.Data[4] 5:0.Data[5] 5:0.Data[6] 5:0.Data[7] 5:0.Data[8]	

Figure 11-A

Default Output Mapping of Drive

Remapping of the VFDs Inputs and Outputs will make it easier to control / monitor Frequency values through the ControlLogix Ladder File.

Return to the 1756-DNB Input tab.

1. Click the Unmap Button to delete Automap information. Input Screen will appear as:



General Module Scanlist Input	Output ADR Summary
Node $ riangle Type Size $	Map AutoMap
	Unmap
	Advanced
	Dptions
Memory: Assembly Data 💌	Start DWord: 0
Memory: Assembly Data 💌 Bits 31 - 0	Start DWord: 0
Memory: Assembly Data  Bits 31 - 0 5:1.Data[0]	Start DWord: 0
Memory:         Assembly Data         ▼           Bits 31 - 0	Start DWord: 0
Memory:         Assembly Data         ▼           Bits 31 - 0	Start DWord: 0
Memory:         Assembly Data         ▼           Bits 31 - 0         ■         ■         ■           5:1.Data[0]         ■         ■         ■         ■           5:1.Data[1]         ■ <t< td=""><td>Start DWord: 0</td></t<>	Start DWord: 0
Memory:         Assembly Data         ▼           Bits 31 - 0         ■         ■         ■           5:1.Data[0]         ■	Start DWord: 0
Memory:         Assembly Data         ▼           Bits 31 - 0         ■         ■           51.0 ata[0]         ■         ■         ■           51.0 ata[1]         ■         ■         ■           51.0 ata[2]         ■         ■         ■           51.0 ata[3]         ■         ■         ■           51.0 ata[4]         ■         ■         ■	Start DWord: 0
Memory:         Assembly Data         ▼           Bits 31 - 0         ■         ■           51. Data[0]         ■         ■           51. Data[1]         ■         ■           51. Data[3]         ■         ■           51. Data[3]         ■         ■           51. Data[4]         ■         ■           51. Data[5]         ■         ■           51. Data[5]         ■         ■	Start DWord: 0



2. Click the Output tab - Unmap Outputs (Unmap Button). Output Screen will appear as:

General Module Scanlist Input Output ADR S	ummary
Node A Type Size Map	AutoMap
	Unmap
	Advanced
× D	Options
Memory: Assembly Data 💌 Start DWord: 0	
Bits 31 - 0	
5:0.Data[0]	
5:0.Data[1]	
5:0.Data[2]	
5:0.Data[3]	
_5:0.Data[4]	
5:0.Data[5]	
5:0.Data[6]	
5:0.Data[7]	
1 0:U.Datai8i I	
UK Cancel Apply	Help

Figure 13-A Outputs Unmapped

Return to Input tab to manually map Input Data for the VFD. Instead of have one (1) DINT Element for Input Data, two (2) 16 bit INTs will be used.



This will allow the VFD status bits and the speed reference feedback to appear in separate data elements, making it easier to find the data when monitoring / troublingshooting the processor ladder logic.

On the Input mapping screen click the Advanced... button.

General Module	Scanlist Input Output ADR	Summary
Node 02, Pow.	Type Size Map Polled 4 No	AutoMap
		Unmap
		Advanced
•		Options
Memory: Ass	embly Data 💌 Start DWord: 0	•
Bits 31 - 0		
5:1.Data[0]		
5:1.Data[1]		
5:1.Data[2]		
5:1.Data[3]		
5:1.Data[4]		
5:1.Data[5]		
5:1.Data[5] 5:1.Data[6]		
5:1.Data[5] 5:1.Data[6] 5:1.Data[7]		

Figure 14-A Advanced... Button

The Advanced Mapping screen appears.

мар	Message	Offset	Memory	Offset	Bit Leng
1	<not mapped=""></not>				
2	<not mapped=""></not>				
3	<not mapped=""></not>				
4	<not mapped=""></not>				
4					•
- Map F Mes Byte	rom: :age: <none></none>		-Map To: Memory: DWord:	Assembl	y Data
Bitt		i	Bit:		3 

Figure 15-A Advanced Mapping Screen Make sure Map 1 is selected in upper region of the Advanced Mapping Window.



On the left side of the screen in the Map From region – Message box, select Polled.



Figure 16-A Select Polled Message

The data for DeviceNet components uses a byte (8 bits) as the default data size.

Map From: at Byte 0, Bit 0, Map To DWord 0, Bit 0, Bit Length 16. The Advanced Mapping screen will appear as:

– Map From: –		Map To:	
Message:	Polled 💌	Memory:	Assembly Data
Byte:	0 -	DWord:	0 •
Bit:	0 *	<sup>кб</sup> Віс	0 .
Apply	Mapping	Bit Length:	
Delete	Mapping	Close	Help

Figure 17-A Advanced Mapping

Click the Apply Mapping button to save the modified map settings.

The upper region of the Advanced Mapping Screen will appear as:

Map	Message	Offset	Memory	Offset	Bit Lengtł
1	Polled	0:0	Assembl	0:0	16
2 3 4	<not mapped=""> <not mapped=""> <not mapped=""></not></not></not>				
•					

Figure 18-A



	Apply Mapping												
Select Map 2.													
$\backslash$													
$\backslash$	Map	Message	Offset	Memory	Offset	Bit Lengtł							
	1	Polled	0:0	Assembl	0:0	16							
	2	<not mapped=""></not>											
	3	<not mapped=""></not>											
	4	<not mapped=""></not>											
	- Mar F	- Man From - Man Tay											
			Figure	e 19-A									
		l	Map 2	Selected									

. .

In Map From region, select Message – Polled, Byte 2, Bit 0

In Map To, select DWord 1, Bit 0

Bit Length 16.

The Advance Mapping screen should appear as:

	Map From: -		Map To:		
	Message:	Polled 💌	Memory:	Ass	embly Data
	Byte:	2 •	DWord:	1	-
	Bit:	0 -	Bit	0	-
	Apply	Mapping	Bit Length:	16	*
	Delete	Mapping	Close		Help
/		Figu Map	re 20-A 2 Data		

Click the Apply Mapping button.

Map 1- 16 bits will be the Logic Status Word – See Figure 8

Map 2 - 16 bits will be the frequency Feedback of the VFD.

The Advance Mapping screen for PowerFlex 4 inputs appears as:



## See Figure 21-A

Man	Месседе	Offeet	Memory	Offeet	Rit Length
1 Map	Dellad	0.0	Accord	0.0	1C
2	Polled	2.0	Assembl	1.0	16
2 3 4	<not mapped=""> <not mapped=""></not></not>	2.0	Assemble	1.0	
- Map F	rom:		Мар То: —		
Mess	sage: Polled	•	Memory:	Assembl	y Data 💌
Byte:	2 -		DWord:	1	
Bitt	0 -		Bitt	0	-
	Apply Mapping	]	Bit Length:	16	
	Delete Mapping	1	Close		Help

Figure 21-A Input Advanced Mapping Completed

Click the Close button.

•

The Close button will return to the Input screen for the PowerFlex 4 VFD.

The Input Logic Status Data for the drive will use the first 16 bits (0-15) of I.Data[0] The Input Feedback will use the first 16 bits (0-15) of I.Data[1].

General Module Scanlist Input Output ADR Summary
Node         △         Type         Size         Map         AutoMap           ····································
Unmap
Advanced
Cptions
Memory: Assembly Data 💌 Start DWord: 0
Bits 31 - 0           5:I.Data[0]           02, PowerFlex 40 1P 1
5:LData[1] 02, PowerFlex 40 1P 1 5:LData[2] 5:LData[3]
51.Data[4] 51.Data[5]
51.Data[7] 51.Data[7]
UK Lancel Apply Help

Figure 22-A



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### Inputs after Advance Mapping

Click the Apply button to accept the mapping

The Logic Status Word of the VFD is now mapped to first input data element, Bits (0-15) of the 1756-DNB module.

The 1756-DNB Scanner Module is located in Slot 6 of the ControLogix Demo Board

If bit Local:6:I.Data[0].0 is ON in the PLC -the drive is Ready to run - Not Faulted

If bit Local:6:I.Data[0].1 is ON in the PLC –the drive is running (Active)

If bit Local:6:I.Data[0].4 is ON in the PLC –the drive is accelerating.

Drive Frequency Feedback information is in 6:I.Data[1] – bits 0-15.

				gic	, 01	au	uə			u							
Log	jic B	Its															
15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0	Status	Description
															х	Ready	0 = Not Ready 1 = Ready
														х		Active	0 = Not Active 1 = Active
													х			Command Direction	0 = Reverse 1 = Forward
												х				Actual Direction	0 = Reverse 1 = Forward
											х					Accel	0 = Not Accelerating 1 = Accelerating
										х						Decel	0 = Not Decelerating 1 = Decelerating
									х							Alarm	0 = No Alarm 1 = Alarm
								х								Fault	0 = No Fault 1 = Fault
							х									At Speed	0 = Not At Reference 1 = At Reference
				x	x	x										Local Control (1)	000 = Port 0 (TB) 001 = Port 1 010 = Port 2 011 = Port 3 100 = Port 4 101 = Port 5 110 = Port 6 111 = Not Local

#### Logic Status Word





Logic Status Word

The PowerFlex 4 Outputs will be mapped using the 1756-DNB Scanner Properties - Output tab.

The procedure is similar to the Advanced Mapping of Inputs.

Automapping of Outputs removed on page 11. See Figure 13-A.

Click the Advanced button on the Output tab window, the Advanced Mapping screen for drive Outputs appears.

Advance	d Mapping : 02,	PowerF			? ×	
Мар	Message	Offset	Memory	Offset Bi	t Lengtł	
1 2 3	<not mapped=""> <not mapped=""> <not mapped=""></not></not></not>					
4	<not mapped=""></not>					
⊢ Map F	-rom:		Мар То: —			
Mes	sage: </td <td>•</td> <td>Memory:</td> <td colspan="3">Assembly Data</td>	•	Memory:	Assembly Data		
Byte			DWord:	0 <u>*</u>		
Bit			Bitt			
	Apply Mapping		Bit Length:	0 <u>*</u>		
	Delete Mapping		Close	He	:lp	

Figure 23-A



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Advanced Mapping Screen for Drive Outputs

Follow the steps on pages 12-15 to configure the Advanced Mapping for the VFD Outputs. Steps are the same as mapping Inputs

- Note; Map 1 Bytes 0 and 1 are the Logic Command Word 16 bits Controls stopping, starting, etc.
  - Map 2 Bytes 2 and 3 are the Speed Reference Word -16 bits Word value will control the frequency output of the VFD

The completed Advanced Output screen will appear as:

Map	Message	Offset	Memory	Offset	Bit Lengt
1	Flaited	0:0	Assembl	0:0	16
2	Polled	2:0	Assembl	1:0	16
3	<not mapped=""></not>				
4	<not mapped=""></not>				
- Map F	From:		- Map To:		
Mes	sage: Polled	<b>_</b>	Memory:	Assembl	y Data 🚬
Byte	2 -		DWord:	1	
Bitt	0 -		Bit	0	
	Apply Mapping	]	Bit Length:	16	
	Delete Mapping		Close		Help

Figure 25-A Advance Mapping for Drive Outputs

Click the close button on the Advance Mapping screen to return to the Output tab screen. The screen will appear as:

See Figure 25-A



1756-DNB/A	? X
General Module Scanlist Input Output ADR S	iummary
Node 🛆 Type Size Map	AutoMap
	Unmap
	Advanced
×	Options
Memory: Assembly Data 💌 Start DWord: 0	-
Bits 31 - 0	
5:0.Data[0] 02, PowerF	lex 40 1P 1
5:0.Data[1] 02, PowerF	lex 40 1P 1
5:0.Data[2]	
5:0.Data[4]	
5:0.Data[5]	
5:0.Data[6]	
5:0.Data[7]	
5:U.Datal8	Ľ
OK Cancel Apply	Help

Figure 26-A Drive Outputs After Advanced Mapping

Click the Apply button to accept the output mapping.

The Logic Command of the VFD is now mapped to first output data Element, Bits (0-15) of the 1756-DNB module.

For example if bit Local:6:O.Data[0].0 is ON in the PLC –the drive will stop.

- If bit Local:5:O.Data[0].1 is toggled from OFF to ON in the PLC -the drive will start
- Note: For VFD starting and stopping only a momentary signal is required 3 Wire Control
- Note: The Start Bit requires a toggle from OFF to ON to start the drive. The bit being True / ON does not necessarily mean the drive is running.

Note: Stop signal take precedence over start signal

Drive Speed Reference information is in 6:O.Data[1] – bits 0-15.



	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0	Command	Description
															х	Stop (1)	0 = Not Stop 1 = Stop
														х		Start <sup>(1)(2)</sup>	0 = Not Start 1 = Start
													х			Jog	0 = NotJog 1 = Jog
												х				Clear Faults	0 = Not Clear Faults 1 = Clear Faults
										x	x					Direction	00 = No Command 01 = Forward Command 10 = Reverse Command 11 = Hold Direction Control
									х							Local Control	0 = No Local Control 1 = Local Control
								х								MOP Increment	0 = Not increment 1 = increment
						х	х									Accel Rate	00 = No Command 01 = Accel Rale 1 Command 10 = Accel Rale 2 Command 11 = Hold Accel Rate
				x	x											Decel Rate	00 = No Command 01 = Decel Rale 1 Command 10 = Decel Rale 2 Command 11 = Hold Decel Rate
	x	x	x													Reference Select <sup>(3)</sup>	000 = No Command 001 = Ref. 1 (Ref A Select) 010 = Ref. 2 (Ref B Select) 011 = Ref. 3 (Preset 3) 100 = Ref. 4 (Preset 3) 101 = Ref. 5 (Preset 5) 110 = Ref. 6 (Preset 6) 111 = Ref. 7 (Preset 7)
(																MOP Decrement	0 = Not Decrement 1 = Decrement

#### Logic Command Word

command acts as a momentary Start command. A "1" will start the drive, but returning to "0" will not stop the drive. Figure 27-A

#### PowerFlex 4 Logic Command Word

See Chapter 4 and Appendix D of Devicenet\_22comm-D\_User\_Manual.pdf for additional information on configuring the 22-Comm-D VFD DeviceNet Interface.

## Configure Drive For Network Use:

Ensure RSNetWorx is Online

Using RSNetworx Upload the parameters from the PowerFlex 4 drive.

Right click the PowerFlex 4 icon on the Network Layout window - Select Properties



PowerFlex 110V .25H	4 1P 871TM P Shielded 18mm with micro	RightSight Standard Diffuse
5 💆 እ	6 Cut	Ctrl+X
0 8	궐 <u>С</u> ору	Ctrl+C
	<u>P</u> aste	Ctrl+V
	<u>D</u> elete	Del
	Upload from Device	
	Download to Device	
	Class Instance Editor	
	<u>R</u> e-register Device	
	Prop <u>e</u> rties	
	Eigene 28 A	

Figure 28-A PowerFlex 4 Properties

Click the Parameters tab

Click the Upload button if required

EDS Edit	or		23										
Do you want to upload the configuration from the device, updating the software's configuration; or download the software's configuration to the device, updating the device?													
	For more information, press F1												
	Upload Download Cancel												
Figure 29-A													
	Unload VFD Pa	rameters											
E	DS Editor	x											
	Uploading 'Param66'												
	Cancel												



Figure 30-A Upload Progress Bar - VFD Parameters

Navigate to view Parameters 36 – Start Source and Parameter 38 – Speed Reference

PowerFlex 4 1P 110	V .25HP	? ×
General Parameters	I/O Data EDS File	
Select the participation action using	arameter that you want to co the toolbar.	nfigure and initiate an
🗖 Groups 😽	💈 💯 Single 💌 =	Monitor 퉪 🐴
ID 🗸 🔂	Parameter	Current Value
28 🖻 🕯	Reserved	0
29 🔒 🕯	Reserved	0
30 🖻 🤹	Reserved	0
31 🔹	Motor NP Volts	230 V
32	Motor NP Hertz	60 Hz
33 🔹	Motor OL Current	1.5 A
34 🔹	Minimum Freq	0.0 Hz
35 🔹	Maximum Freq	60 Hz
36	Start Source	Comm Port
37	Stop Mode	Ramp, CF
38	Speed Reference	Comm Port
39 🔹	Accel Time 1	10.0 Sec
40 🖬	Decel Time 1	10.0 Sec
/1	Reset To Defalts	Ready/Idle *
•	III N	
ОК	Cancel	Apply Help

Figure 31-A PowerFlex 4 VFD Parameters

Current Value of Parameter 36 – Start Source:

Current Value of Parameter 38 – Speed Reference:

Verify parameters 36, Start Source, and Parameter 38, Speed Reference, are set for Comm Port.

If the Parameters' values are not Comm Port change both Parameter values to Comm Port using the drop-down selection boxes for the Parameters



		Start Source	Co	mm Port		•
		Stop Mode	3-V	Vire		
		Speed Reference	2-1	Vire		
	4	Accel Time 1	2-V	V LvI Sens		=
	de la	Decel Time 1	2-V	V Hi Speed		
	_	Recet To Defalte	Co	mm Port	N	÷.
4					2	<b>b</b>

Figure 32-A Start Source PowerFlex 4 VFD Parameters

	Stop Mode	Ramp, CF	•
	Speed Reference	Comm Port	-
1	Accel Time 1	InternalFreq	-
	Recet To Defailts	0-10V Input 4-20mA Input	=
•		Preset Freq	
	Figure 33-	A	- J.

Speed Reference PowerFlex 4 VFD Parameters

See pages 3-9 through 3-11 of 22a-Powerflex\_4\_User\_Manual.pdf for additional information on configuring Start, Stop and Speed Reference Parameters of the PowerFlex 4 VFD.

Click the Apply button to download changes to the VFD



Figure 34-A PowerFlex 40 Download Parameters

Click Yes to Confirm Download to the PowerFlex 4 VFD

See Figure 35-A





Figure 35-A Confirm Download to VFD

Save the DeviceNet Configuration file as Module\_6\_PF4\_VFD.dnt



Figure 36-A Save VFD Network Configuration File

Download the Module\_6\_PF4\_VFD.dnt to the 1756-DNB Scanner







Download File to the 1756-DNB Scanner

Open and Import PLC\_220\_Module\_6\_PF\_4.L5K to Studio 5000

1.

Download the demo program PLC\_220\_Module\_6\_PF\_4.ACD to the ControlLogix Demo Unit.

Put processor in RUN mode

Put 1756-DNB Scanner into Run Mode

If the PowerFlex 4 VFD is faulted, press the Stop button on the Drive's keypad Unit to Reset Fault.

Press the blue Escape button (Esc) on the PowerFlex 4 until the Numeric Display on the VFD reads 0.0

# PLC220 Lab Exercise 17, 2/17/17 I AM iSTAR, A DOL funded project



	Change 1700-DND fore / Ruit	
	Local 21 Data 7	Local:6:0.CommandRegister.Run
°		
		Stop VFD
1	Local21Data 1	Local:6:O.Data[0].0
		Start VED
	Local 21 Data 2	Local:6:0.Data[0].1
2		
	Local 21 Data 3	Jog VFD Local:6:0.Data(0).2
3		o
	Ready	
4		Local:3:0.Data.0
	Running	
5	Local61Data(0).1	Local:3:0.Data.1
6	Local 21 Data 6 Mov	Move Mov
	Source Speed 0 <del>4</del>	Source Local:6:I.Data[1] 0
	Dest Locali6:0.Data[1] 0 <del>4</del>	Dest Speed_Fdbk 0
(End)		

#### Figure 38-A Ladder Logic Demo File

Verify Operation:

Rung 0 – Puts the 1756- DNB in RUN Mode

ь.

- Rung 1- Stop s the VFD
- Rung 2 Starts the V FD
- Rung3 Jogs the VFD
- Rung 4 Monitors if VFD is Ready to Run
- Rung 5 Monitors if VFD is Running
- Rung 6 Speed Tag sends Frequency command to VFD Speed Fdbk – shows VFD Frequency Output
- Ensure PLC and 1756-DNB Scanner are in RUN Mode

Verify that VFD is not Faulted

If the PowerFlex 4 VFD is faulted, press the Stop button on the Drive's keypad Unit

Verify PL0 on Contrologix Demo Board is on - Drive Ready to RUN

Press PB2 on the Contrologix Demo Board

Does PL1 on Contrologix Demo Board come On?\_\_\_\_\_

Is the VFD Running?\_\_\_\_\_



Ensure SW6 on Contrologix Demo Board is ON (right position)			
At Rung 6 enter the value of 30 in the Speed tag.			
Is the VFD running?			
What frequency is the VFD outing to the motor?			
At Rung 6 Value of Speed_Fdbk?			
Explain:			
Press PB1 on the Contrologix Demo Board			
What happens to the VFD?			
What happens to PL1?			
Put the 17566-DNB Module into IDLE Mode			
State of PL0 on Contrologix Demo Board;			
Explain:			
Press Stop button on VFD keypad Unit			
State of PL0 on Contrologix Demo Board;			
Explain:			
Put the 17566-DNB Module into RUN Mode			
Press PB3 on the ControlLogix Demo Board			
What happens to the VFD?			
Release PB3 pushbutton			
What happens to the VFD?			
Press and hold PB3 on the ControlLogix Demo Board			



What is the maximum frequency the VFD ouputs?\_\_\_\_\_

PB3 controls what function for the VFD?

Navigate to the RSNetWorx For DeviceNet - View PowerFlex 4 Parameter #78

Use Monitor to view Parameter #78 Online

Groups	<b>K</b> 2	1 Single 💌	Monitor 🔚 🛤
ID	🔒 츑	Parameter	Cur Cur Cur
71	4	Preset Freq 1	5.0 Hz
72	4	Preset Freq 2	10.0 Hz
73	4	Preset Freq 3	20.0 Hz
74	ê 🌵	Reserved	0
75	ê 🌵	Reserved	0
76	ê 🌵	Reserved	0
77	ê 🌵	Reserved	0
<b>⇔</b> 78	₫	Jog Frequency	20.0 Hz
79	÷	Jog Accel/Decel	10.0 Sec
		Figure 39-A	A
	•		

Mointor PowerFlex 4 Parameter 78

Value of PowerFlex 4 Parameter 78:

Press PB1 and PB2 pushbuttons on the ControlLogix Demo Board

What happens with the VFD?_	
-----------------------------	--

Explain:\_\_\_\_\_

Add a Rung 7 that will turn ON PL7 when the VFD reaches its commanded frequency (At Speed)



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# **Review Questions**

- 1. T F Input bits in the 1756-DNB modules stop, start, jogs a DeviceNet VFD
- 2. How much Output data does the PowerFlex 4 VFD use in the 1756-DNB?
  - **a)** 16 Bits
  - b) 1 Bytes
  - c) 32 Bits
  - d) 2 Bytes
- 3. Which data bit will Jog a PowerFlex 4 VFD
  - **a)** 0
  - b) 1
  - c) 2
  - d) 3
- 4. T F PowerFlex 4 output data monitors the VFD
- 5. How many bits make up the PowerFlex 4's Feedback value?
  - a) 2
  - b) 4



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6. T F Output Data bit 0 stops a PowerFlex 4 VFD

## **Review Question Answers**

- 1) F 2) c
- 3) c
- 4) F
- 5) d
- 6) T

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