SECTION 9

DeviceNet

Section Overview

This IMS MicroLYNX DeviceNet version is specifically designed per the ODVA Volume II, Release 2.0, Errata 3. Included in this section are:

- MicroLYNX DeviceNet features.
- Connector locations and pin descriptions.
- Attribute tables.
- I/O messaging and response.
- DeviceNet Programmer.

MicroLYNX DeviceNet Features

ODVA DeviceNet MicroLYNX

- Conforms to the Predefined Master/Slave Connection Set as a Group 2 Slave.
- Supports Poll IO and Explicit Messaging only.
- No support for UCMM.
- Device Type: Position Controller (16)

Graphical User Interface (GUI) Software

NOTE: GUI to be developed.

The GUI Software provided with the ODVA DeviceNet MicroLYNX will ONLY work with the following DeviceNet cards:

SST (a Woodhead Industries Inc. company) series 5136-DNP Pro Series format cards.

Part Numbers:	5136-DNP-PCI	PCI
	5136-DNP-PCM-ST	PCMCIA
5-pin DeviceNet Conn.		
	5136-DNP-PCM-SM	PCMCIA
With Sealed Micro Conn.		
	5136-DNP-ISA	ISA format

Setup

To setup the MicroLYNX DeviceNet Configuration Utility, perform the following steps.

1. Install the program to your PC's hard drive.
2. Run the program.
3. Click the button labeled "Load" to load the SST DeviceNet card you are using.
4. Select the MACID (0-63) of the MicroLYNX being configured from the pull-down, click the button labeled "Select", or click the button labeled "Scan" to scan the DeviceNet buss for connected MicroLYNX.

Specific Features

The following listed features are specific to the MicroLYNX DeviceNet MX-CS30X-X01

1. Dedicated Isolated Input/Output Functions
   - IO 21 = Home Input
   - IO 22 = CW Limit Input
   - IO 23 = CCW Limit Input
   - IO 24 = Fault Input
   - IO 25 = Brake Output
   - IO 26 = General Purpose IO
2. Dedicated Encoder Functions
   - IO 13+ = Encoder A+
   - IO13- = Encoder A -
   - IO 14+ = Encoder B+
   - IO 14- = Encoder B-
   - IO 17 = Encoder Index (Z+)
   - IO 17- = Encoder Index (Z-)
3. Node Address MSD and LSD switch-selectable on front panel
4. Data Rate switch-selectable on front panel

Connector Locations and Pin Descriptions

Connector Locations

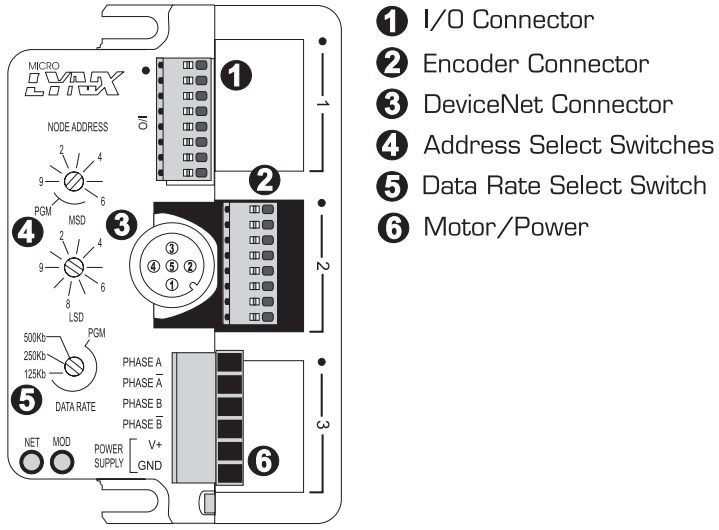

Figure 9.1: MicroLYNX DeviceNet Port Pin Configuration

Connector Pin Configuration

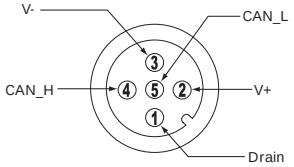

Figure 9.2: DeviceNet Port Pin Configuration

Power and Motor Connections

Pin Number	Pin Function
1	Motor Phase A
2	Motor $\overline{\text{Phase A}}$
3	Motor Phase B
4	Motor $\overline{\text{Phase B}}$
5	+12 to +48 VDC (MicroLYNX 4) +24 to +75 VDC (MicroLYNX 7)
6	Power Ground Supply

Table 9.1: Motor Power Connections

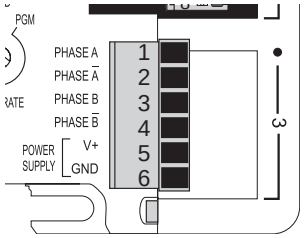

Figure 9.3: Motor Power Terminals

Isolated Digital Input

Pin Number	Pin Function
1	V Pull-Up
2	Home Input (level active)
3	CW Limit Input (disabled)
4	CCW Limit Input (disabled)
5	Fault Input (level active)
6	Brake Output
7	General Purpose IO
8	Isolated Ground

Table 9.2: Isolated Digital Inputs

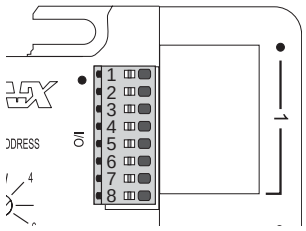

Figure 9.4: Isolated Digital Input Terminals

Encoder Inputs

Single Encoder	Differential Encoder	8 Pin Pheonix	10 Pin Header	Pin Function
Channel A	Channel A+	5	6	Channel A / A+
	Channel A-		5	Channel A-
Channel B	Channel B+	6	8	Channel B / B+
	Channel B-		4 or 7	Channel B-
Index	Index +	7	10	Index / Index+
	Index -		9	Index-
+5 VDC	+ 5 VDC	3	2	+ 5 VDC
GND	GND	2	3	Ground

Table 9.3: Encoder Input Connections

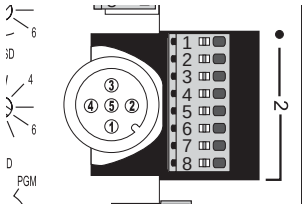

Figure 9.5: Encoder Connect - 8 Pin Pheonix

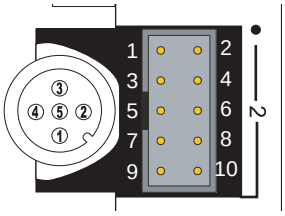

Figure 9.6: Encoder Connect - 10 Pin Header

Attribute Tables

Attribute Map - Part 1 of 3

Object	Attribute	Access Rule	Name	Data Type	Semantics / Description	Factory Default	Stored in NVM
0x24 - Position Controller Supervisor Object							
0x24	1 (class)	Get	Revision	UINT	Rev = 2		
0x24	3	Get	Axis Instance	USINT	1 = axis 1 other values = error	1	
0x24	5	Get	General Fault	BOOL	0 = no alarms 1 = fault	0	
0x24	6	Get / Set	Command Assembly Type	USINT		0	
0x24	7	Get / Set	Response Assembly Type	USINT		0	
0x24	8	Get	Fault Input State	BOOL	1 = active 0 = inactive	0	
0x24	9	Get / Set	Fault Input Action	USINT	0 = disable 1 = hard stop 2 = smooth stop 3 = no action (ignore fault)	3	X
0x24	11	Get / Set	Home Active Level	BOOL	0 = active low 1 = active high	0	X
0x24	12	Get / Set	Home Arm (Start Find Home)	BOOL	1 = find home 0 = home complete	0	
0x24	16	Get	Home Input State	BOOL	1 = active 0 = inactive	0	
0x24	101	Get / Set	Homing Type	USINT	1 = home to switch 2 = home to index mark	1	X
0x24	102	Get / Set	General Fault Action	USINT	0 = Stop and Disable Drive when General Fault = 1 1 = Process Commands if General Fault = 1	1	X
0x24	103	Get / Set	Alarm Clear	USINT	1 = General Fault (0x25-5) 2 = General Fault (0x24-5) and Following Error Fault (0x25-47)	0	
0x24	104	Get	Alarm Code	DINT		0	
0x24	110	Get / Set	Fault Input Logic		0 = active low 1 = active high	0	X
0x24	111	Get / Set	Enable NVM Storage	BOOL	Attributes labeled as stored in NVM will behave as follows 0 = NVM disabled, attributes not stored 1 = NVM enabled, attributes stored Note: Once the NVM is enabled, it will remain enabled until disabled or power is cycled	0	
0x24	112	Get / Set	Restore NVM to Factory Defaults	BOOL	0 = Restore Complete / Ready 1 = Restore to Factory Defaults / In Progress Will restore on next power cycle	0	
0x24	113	Get	MicroLYNX Firmware Version	REAL			
0x24	114	Get	MicroLYNX DeviceNet Code Version	REAL			

Table 9.4: MicroLYNX DeviceNet Attribute Map (Part 1)

Attribute Map - Part 2 of 3

Object	Attribute	Access Rule	Name	Data Type	Semantics / Description	Factory Default	Stored in NVM
0x25 - Position Controller Object							
0x25	1 (class)	Get	Revision	UINT	Rev = 2		
0x25	1	Get	Number of Attributes	USINT			
0x25	2	Get	Attribute List	Array of USINT			
0x25	3	Get / Set	Mode	USINT	0 = Position Mode 1 = Velocity Mode	0	X
0x25	6	Get / Set	Target Position	DINT	Range 0x80000001 to 0x7FFFFFFF	Undefined	
0x25	7	Get / Set	Target Velocity	DINT	Positive Number ≥ 0	768,000	X
0x25	8	Get / Set	Acceleration	DINT	Positive Number > 0	1,000,000	X
0x25	9	Get / Set	Deceleration	DINT	Positive Number > 0	1,000,000	X
0x25	10	Get / Set	Absolute / Incremental	BOOL	0 = Absolute Position Value 1 = Relative Position Value	0	X
0x25	11	Get / Set	Load Data / Profile	BOOL	1 = Trajectory start, in motion 0 = move complete	0	
0x25	12	Get	On Target Position (motor within deadband)	BOOL	1 = On Target / End of Move	1	
0x25	13	Get / Set	Actual Position (absolute)	DINT	Actual position in steps or encoder counts	0	
0x25	14	Get	Actual Velocity	DINT	Actual Velocity	0	
0x25	15	Get	Command Position	DINT	Command Position (echo 0x25-6)	0	
0x25	17	Get / Set	Enable	BOOL	0 = Disable 1 = Enable	1	X
0x25	20	Get / Set	Smooth Stop	BOOL	Bring motor to a controlled stop at the programmed deceleration rate.	0	
0x25	21	Get / Set	Hard Stop	BOOL	Bring motor to an immediate stop.	0	
0x25	23	Get / Set	Direction (V Mode)	BOOL	0 = CCW Direction 1 = CW Direction	1	
0x25	24	Get / Set	Reference Direction	BOOL	1 = CW is positive direction 0 = CCW is positive direction	1	X
0x25	38	Get / Set	Position Deadband	USINT	Range 0 to 255	2	X
0x25	39	Get / Set	Feedback Enable	BOOL	0 = Disable 1 = Enable	0	X
0x25	40	Get / Set	Feedback Resolution	DINT	Encoder Lines X 4 Positive Number > 0	2,000	X
0x25	41	Get / Set	Motor Resolution	DINT	Full motor steps / revolution Positive Number > 0	200	X
0x25	42	Get / Set	Position Tracking Gain	DINT	Range 0 to 100	0	X
0x25	43	Get / Set	Max Correction Velocity	UINT	Range 1 to 65,535	10,240	X
0x25	45	Get / Set	Max Dynamic Following Error	DINT	Positive Number > 0	10	X
0x25	46	Get / Set	Following Error Action	USINT	2 = Stop motor at programmed deceleration 3 = Do not stop motor	2	X
0x25	47	Get / Set	Following Error Fault	BOOL	0 = No Error 1 = Following Error	0	
0x25	49	Get / Set	Hard Limit Action	USINT	1 = Hard Stop 2 = Smooth Stop	1	X
0x25	50	Get	CW Limit Input	BOOL	0 = Inactive 1 = Active	0	
0x25	51	Get	CCW Limit Input	BOOL	0 = Inactive 1 = Active	0	
0x25	52	Get / Set	Soft Limit Enable	BOOL	0 = Disable 1 = Enable	0	X
0x25	53	Get / Set	Soft Limit Action	USINT	1 = Hard Stop 2 = Smooth Stop	1	X
0x25	54	Get / Set	Positive Software Limit Position	DINT	Range 0x80000001 to 0x7FFFFFFF	0x7FFFFFFF	X
0x25	55	Get / Set	Negative Software Limit Position	DINT	Range 0x80000001 to 0x7FFFFFFF	0x80000001	X
0x25	56	Get	Positive Software Limit State	BOOL	1 = Exceeded Limit	0	
0x25	57	Get	Negative Software Limit State	BOOL	1 = Exceeded Limit	0	
0x25	58	Get / Set	Load Data Complete	BOOL		0	
0x25	102	Get / Set	Position Deadband Extended Range	UINT	Range 0 to 65,535	2	X
0x25	103	Get / Set	Hard limit Input Enable	BOOL	0 = Disable 1 = Enable	0	X
0x25	104	Get / Set	Hard Limit Input Logic	BOOL	0 = Active Low 1 = Active High	0	X

Table 9.5: MicroLYNX DeviceNet Attribute Map (Part 2)

Attribute Map - Part 3 of 3

Object	Attribute	Access Rule	Name	Data Type	Semantics / Description	Factory Default	Stored in NVM
0x25	105	Get	Raw Motor Counts	DINT	Clock pulses sent to the motor drive. Note: Not updated during motion.	0	
0x25	106	Get	Raw Encoder Counts	DINT	Clock pulses received from the encoder. Note: Not updated during motion.	0	
0x25	109	Get / Set	Microstep Resolution	UINT	2 = 400 Microsteps / Revolution 4 = 800 Microsteps / Revolution 8 = 1,600 Microsteps / Revolution 16 = 3,200 Microsteps / Revolution 32 = 6,400 Microsteps / Revolution 64 = 12,800 Microsteps / Revolution 128 = 25,600 Microsteps / Revolution 256 = 51,200 Microsteps / Revolution 5 = 1,000 Microsteps / Revolution 10 = 2,000 Microsteps / Revolutionv 25 = 5,000 Microsteps / Revolution 50 = 10,000 Microsteps / Revolution 125 = 25,000 Microsteps / Revolution 250 = 50,000 Microsteps / Revolution All settings based on a 1.8° motor.	256	X
0x25	110	Get / Set	Initial Velocity	DINT	Positive Number ≥ 1	1000	X
0x25	111	Get / Set	Acceleration Profile	USINT	0 = Linear 2 = Parabolic 128 - Triangle S-Curve 129 - Sinusodial S-Curve	0	X
0x25	112	Get / Set	Deceleration Profile	USINT	0 = Linear 2 = Parabolic 128 - Triangle S-Curve 129 - Sinusodial S-Curve	0	X
0x25	113	Get / Set	Run Current	USINT	Range 1 to 100	25	X
0x25	114	Get / Set	Hold Current	USINT	Range 0 to 100	5	X
0x25	115	Get / Set	Acceleration / Deceleration Current	USINT	Range 1 to 100	25	X
0x25	116	Get / Set	Motor Setting Delay Time	UINT	Range 0 to 65,535	0	X
0x25	117	Get / Set	Hold Current Time Delay	UINT	Range 0 to 65,535	500	X
0x25	118	Get / Set	Position Maintenance Enable	BOOL	0 = Disable 1 = Enable	0	X
0x25	119	Get / Set	Isolated IO Filtering	USINT	0 = Frequency Cutoff - 27.5 kHz Min Pulse Width - 18 µsec 1 = Frequency Cutoff - 13.7 kHz Min Pulse Width - 36 µsec 2 = Frequency Cutoff - 6.89 kHz Min Pulse Width - 73 µsec 3 = Frequency Cutoff - 3.44 kHz Min Pulse Width - 145 µsec 4 = Frequency Cutoff - 1.72 kHz Min Pulse Width - 290 µsec 5 = Frequency Cutoff - 860 kHz Min Pulse Width - 581 µsec 6 = Frequency Cutoff - 430 kHz Min Pulse Width - 1,162 µsec 7 = Frequency Cutoff - 215 kHz Min Pulse Width - 2,323 µsec	7	X
0x25	197	Get / Set	Home Direction	BOOL	0 = Negative Direction 1 = Positive Direction	0	X
0x25	198	Get / Set	Home Fast Velocity	DINT	Positive Number ≥ 0	76,800	X
0x25	199	Get / Set	Home Slow Velocity	DINT	Positive Number ≥ 0	1,000	X
0x25	120	Get / Set	Enable Stall Detect	BOOL	0 = Disabled 1 = Enabled	1	X
0x25	121	Get / Set	Brake Control Mode	BOOL	0 = Manual 1 = Automatic	0	X
0x25	122	Get / Set	Brake Output Logic	BOOL	0 = Output LOW when on. 1 = Output HIGH when on.	0	X
0x25	123	Get / Set	Brake On / Off	BOOL	0 = Brake Output OFF 1 = Brake Output ON	0	
0x25	124	Get / Set	IO Configuration	USINT	0 = Input 1 = Output	0	X
0x25	125	Get / Set	IO Logic	USINT	INPUT 0 = Active LOW 1 = Active HIGH OUTPUT 0 = Active Low when ON 1 = Active High when ON	0	X
0x25	126	Get / Set	IO State	BOOL	INPUT 0 = Input Inactive 1 = Input Active OUTPUT 0 = Output OFF 1 = Output ON	0	

Table 9.6: MicroLYNX DeviceNet Attribute Map (Part 3)

I/O Messaging and Response

IO Messaging

Command Message Format

Byte 0
- bit 7 – Enable
- bit 6 – undefined
- bit 5 – Hard Stop
- bit 4 – Smooth Stop
- bit 3 – Direction (Velocity Mode)
- bit 2 – Incremental
- bit 1 - undefined
- bit 0 – Load Data/ Start Profile

Byte 1 – Byte 7 as defined by ODVA

IO Commands Supported

0x01 – Target Position
0x02 – Target Velocity
0x03 – Acceleration
0x04 – Deceleration
0x11 – Continuous Velocity
0x12 – Start Homing
0x1a – Position Controller Supervisor Attribute
0x1b – Position Controller Attribute

Response Message Format

Byte 0
- bit 7 – Enable state
- bit 6 – undefined
- bit 5 – Home Level
- bit 4 – Current Direction
- bit 3 – General Fault
- bit 2 – On Target
- bit 1 – undefined
- bit 0 – Profile in Progress

Byte 1 – as defined by ODVA

Byte 2
- bit 7 – load complete
- bit 6 – undefined
- bit 5 – Following Error
- bit 4 – Negative Software Limit
- bit 3 – Positive Software Limit
- bit 2 – CCW limit
- bit 1 – CW limit
- bit 0 – undefined

Byte 3 – Byte 7 as defined by ODVA, IO Response Supported

IO Response Supported

0x01 – Actual Position
0x02 – Commanded Position
0x03 – Actual Velocity
0x14 – Command/Response Error
0x1a – Position Controller Supervisor Attribute
0x1b – Position Controller Attribute

Poll IO Command Format

Note that all commands **require** a transition from 0 to 1 in order to execute.

Target Position:

This command starts motion if :
Mode (C: 0x25 A:3) = 0

Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
0	Enable	Undefined	Hard Stop	Smooth Stop	Direction (Velocity Mode)	Incremental	Undefined	Load Data / Start Profile
1	Block #							
2	Command Axis Number			Command Message Type				
3	Response Axis Number			Response Message Type				
4	Target Position Low Byte							
5	Target Position Low Middle Byte							
6	Target Position High Middle Byte							
7	Target Position High Byte							

Table 9.7: Target Position Command Message (Type 01 Hex)

Target Velocity:

This Command Starts Motion if:
Mode (C: 0x25 A:3) = 1

Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
0	Enable	Undefined	Hard Stop	Smooth Stop	Direction (Velocity Mode)	Incremental	Undefined	Load Data / Start Profile
1	Block #							
2	Command Axis Number			Command Message Type				
3	Response Axis Number			Response Message Type				
4	Target Velocity Low Byte							
5	Target Velocity Low Middle Byte							
6	Target Velocity High Middle Byte							
7	Target Velocity High Byte							

Table 9.8: Target Velocity Command Message (Type 02 Hex)

Acceleration:

Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
0	Enable	Undefined	Hard Stop	Smooth Stop	Direction (Velocity Mode)	Incremental	Undefined	Load Data / Start Profile
1	Block #							
2	Command Axis Number			Command Message Type				
3	Response Axis Number			Response Message Type				
4	Acceleration Low Byte							
5	Acceleration Low Middle Byte							
6	Acceleration High Middle Byte							
7	Acceleration High Byte							

Table 9.9: Acceleration Command Message (Type 03 Hex)

Deceleration:

Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
0	Enable	Undefined	Hard Stop	Smooth Stop	Direction (Velocity Mode)	Incremental	Undefined	Load Data / Start Profile
1	Block #							
2	Command Axis Number			Command Message Type				
3	Response Axis Number			Response Message Type				
4	Deceleration Low Byte							
5	Deceleration Low Middle Byte							
6	Deceleration High Middle Byte							
7	Deceleration High Byte							

Table 9.10: Deceleration Command Message (Type 04 Hex)

Continuous Velocity:

This command will start a velocity mode profile (slew) without using explicit messaging. The following attributes are modified with this command:

0x25 – 7: Target Velocity

0x25 – 3: Mode

NOTE: A Hard Stop or a Smooth Stop MUST be issued via IO messaging to revert to a prior mode!

The mode will be restored to the mode prior to the use of the Continuous Velocity command.

Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
0	Enable	Undefined	Hard Stop	Smooth Stop	Direction (Velocity Mode)	Incremental	Undefined	Load Data / Start Profile
1	Block #							
2	Command Axis Number			Command Message Type				
3	Response Axis Number			Response Message Type				
4	Continuous Velocity Low Byte							
5	Continuous Velocity Low Middle Byte							
6	Continuous Velocity High Middle Byte							
7	Continuous Velocity High Byte							

Table 9.11: Continuous Velocity Command Message (Type 11 Hex)

Start Homing:

This command will start a Homing Sequence without using explicit messaging. The following attributes are modified with this command:

0x24 – 12: Home Arm
0x24 – 13: Actual Position
0x24 – 101: Homing Type
0x25 – 197: Home Direction

The transition of attribute 0x25 – 11 (Load Data/Profile) from 0 to 1 will execute the motion profile. When homing is complete, the Actual Position attribute (0x24 – 13) will be reset to logic state 0.

The Direction bit (Byte 0 - bit 3) will determine the homing direction: Bit 3 = 0 - Home in CW Direction, Bit 3 = 1 - Home in CCW Direction

Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
0	Enable	Undefined	Hard Stop	Smooth Stop	Direction (Velocity Mode)	Incremental	Undefined	Load Data / Start Profile
1	Block #							
2	Command Axis Number			Command Message Type				
3	Response Axis Number			Response Message Type				
4	Homing Type							
5	0x00							
6	0x00							
7	0x00							

Table 9.12: Start Homing Command Message (Type 12 Hex)

Position Controller Supervisor Attribute:

This command will set the following attributes without using explicit messaging:

0x24-103: Alarm Clear
0x24-111: Enable NVM Storage

All data in the command message must be valid or the response assembly will be the Error Response. The transition of attribute 0x25 – 11 (Load Data/Profile) from 0 to 1 will set the above attributes.

Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
0	Enable	Undefined	Hard Stop	Smooth Stop	Direction (Velocity Mode)	Incremental	Undefined	Load Data / Start Profile
1	Position Controller Supervisor Attribute to Get							
2	Command Axis Number			Command Message Type				
3	Position Controller Supervisor Attribute to Set							
4	Position Controller Supervisor Attribute Value Low Byte							
5	Position Controller Supervisor Attribute Value Low Middle Byte							
6	Position Controller Supervisor Attribute Value High Middle Byte							
7	Position Controller Supervisor Attribute Value High Byte							

Table 9.13: Position Controller Supervisor Attribute Command Message (Type 1A Hex)

Example:

This command assembly will get attribute 0x24-68 and set attribute 0x24-67. The set occurs when the Load/ Start Profile bit transitions from 0 to 1.

Byte 0	Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7
80	68	3A	67	00	00	00	00
81	68	3A	67	00	00	00	00

Table 9.14: Example of Position Controller Supervisor Attribute

Position Controller Attribute:

This command will set the following attributes without using explicit messaging:

0x25-52: Soft Limit Enable
0x25-53: Soft Limit Action
0x25-54: Positive Software Limit Position
0x25-55: Negative Software Limit Position
0x25-110: Initial Velocity

All data in the command message must be valid or the response assembly will be the Error Response. The transition of attribute 0x25 – 11 (Load Data/Profile) from 0 to 1 will set the above attributes.

Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
0	Enable	Undefined	Hard Stop	Smooth Stop	Direction (Velocity Mode)	Incremental	Undefined	Load Data / Start Profile
1	Position Controller Attribute to Get							
2	Command Axis Number			Command Message Type				
3	Position Controller Attribute to Set							
4	Position Controller Attribute Value Low Byte							
5	Position Controller Attribute Value Low Middle Byte							
6	Position Controller Attribute Value High Middle Byte							
7	Position Controller Attribute Value High Byte							

Table 9.15: Position Controller Attribute Command Message (Type 1B Hex)

Example:

This command assembly will get attribute 0x25-110 and set attribute 0x25-110. The set occurs when the Load/Start Profile bit transitions from 0 to 1.

Byte 0	Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7
80	6E	3B	6E	00	00	00	00
81	6E	3B	6E	00	00	00	00

Table 9.16: Example of Position Controller Attribute

Poll IO Response Format

Actual Position:

Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
0	Enable	Undefined	Home Level	Current Direction	General Fault	On Target Position	Undefined	Profile In Progress
1	Undefined							
2	Load Complete	Undefined	Following Error	Negative Software Limit	Positive Software Limit	CCW Limit	CW Limit	Fault Input
3	Response Axis Number			Response Message Type				
4	Actual Position Low Byte							
5	Actual Position Low Middle Byte							
6	Actual Position High Middle Byte							
7	Actual Position High Byte							

Table 9.17: Actual Position Response Message (Type 01 Hex)

Commanded Position:

Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
0	Enable	Undefined	Home Level	Current Direction	General Fault	On Target Position	Undefined	Profile In Progress
1	Undefined							
2	Load Complete	Undefined	Following Error	Negative Software Limit	Positive Software Limit	CCW Limit	CW Limit	Fault Input
3	Response Axis Number			Response Message Type				
4	Command Position Low Byte							
5	Command Position Low Middle Byte							
6	Command Position High Middle Byte							
7	Command Position High Byte							

Table 9.18: Commanded Position Response Message (Type 02 Hex)

Actual Velocity:

Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
0	Enable	Undefined	Home Level	Current Direction	General Fault	On Target Position	Undefined	Profile In Progress
1	Undefined							
2	Load Complete	Undefined	Following Error	Negative Software Limit	Positive Software Limit	CCW Limit	CW Limit	Fault Input
3	Response Axis Number			Response Message Type				
4	Actual Velocity Low Byte							
5	Actual Velocity Low Middle Byte							
6	Actual Velocity High Middle Byte							
7	Actual Velocity High Byte							

Table 9.19: Actual Velocity Response Message (Type 03 Hex)

Command/Response Error:

Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
0	Enable	Undefined	Home Level	Current Direction	General Fault	On Target Position	Undefined	Profile In Progress
1	Reserved = 0							
2	Load Complete	Undefined	Following Error	Negative Software Limit	Positive Software Limit	CCW Limit	CW Limit	Fault Input
3	Response Axis Number			Response Message Type				
4	General Error Code							
5	Additional Code							
6	Copy of Command Message Byte 2							
7	Copy of Command Message Byte 3							

Table 9.20: Command/Response Error Response Message (Type 14 Hex)

Position Controller Supervisor Attribute:

This command will get the following attributes without using explicit messaging:

0x24-103: Alarm Clear
0x24-104: Alarm Code
0x24-111: Enable NVM Storage

Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
0	Enable	Undefined	Home Level	Current Direction	General Fault	On Target Position	Undefined	Profile In Progress
1	Position Controller Supersor Attribute to Get							
2	Load Complete	Undefined	Following Error	Negative Software Limit	Positive Software Limit	CCW Limit	CW Limit	Fault Input
3	Response Axis Number			Response Message Type				
4	Position Controller Supervisor Attribute Value Low Byte							
5	Position Controller Supervisor Attribute Value Low Middle Byte							
6	Position Controller Supervisor Attribute Value High Middle Byte							
7	Position Controller Supervisor Attribute Value High Byte							

Table 9.21: Position Controller Supervisor Attribute Response Message (Type 1A Hex)

Example:

All data in the command message must be valid or the response assembly will be the Error Response. This command assembly will get attribute 0x24-68.

Byte 0	Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7
80	68	3A	67	00	00	00	00

Table 9.22: Example of Position Controller Supervisor Attribute

Position Controller Attribute:

This command will get the following attributes without using explicit messaging:

0x25-52: Soft Limit Enable
0x25-53: Soft Limit Action
0x25-54: Positive Software Limit Position
0x25-55: Negative Software Limit Position
0x25-110: Initial Velocity

Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
0	Enable	Undefined	Home Level	Current Direction	General Fault	On Target Position	Undefined	Profile In Progress
1	Position Controller Attribute to Get							
2	Load Complete	Undefined	Following Error	Negative Software Limit	Positive Software Limit	CCW Limit	CW Limit	Fault Input
3	Response Axis Number			Response Message Type				
4	Position Controller Attribute Value Low Byte							
5	Position Controller Attribute Value Low Middle Byte							
6	Position Controller Attribute Value High Middle Byte							
7	Position Controller Attribute Value High Byte							

Table 9.23: Position Controller Attribute Response Message (Type 1B Hex)

Example:

All data in the command message must be valid or the response assembly will be the Error Response. This command assembly will get attribute 0x25-110.

Byte 0	Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7
80	6E	3B	6E	00	00	00	00

Table 9.24: Example of Position Controller Attribute

Poll IO Message Example

Set Variables and Flags:

This example is shown using a 1.8° stepping motor, a 500 line encoder with encoder feedback enabled. Assumes all controller variables and flags are set to factory default.

The following Variables and Flags will be set as shown.

MicroLYNX Command	Attribute
VM = 30,000	0x25 - 7
VI = 39	0x25 - 110
ACCL = 30,000	0x25 - 8
DECL = 30,000	0x25 - 9
Home Fast VEL = 3,000	0x25 - 198
Home Slow VEL = 39	0x25 - 199
Feedback Enable = ON	0x25 - 39
Max. Correction Velocity = 400	0x25 - 43

Table 9.25: Example of Set Variables and Flags

Commands:

Byte 0	Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7
80	00	32	21	01	00	00	00
81	00	32	21	01	00	00	00

Table 9.26: Start Homing Sequence to Home Switch, Return to Current Position

Byte 0	Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7
80	00	31	21	00	75	00	00
81	00	31	21	00	75	00	00

Table 9.27: Continuous Velocity in the CCW Direction

Byte 0	Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7
90	00	31	21	00	75	00	00

Table 9.28: Smooth Stop, Restore Mode 1

Byte 0	Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7
85	00	21	21	D0	07	00	00

Table 9.29: Target Position = 1 Revolution

Byte 0	Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7
88	00	31	21	40	9C	00	00
89	00	31	21	40	9C	00	00

Table 9.30: Continuous Velocity in the CW Direction

Byte 0	Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7
90	00	31	21	40	9C	00	00

Table 9.31: Smooth Stop, Restore Mode 2

Homing

C:0x24 A:101	Home Type
C:0x24 A:11	Home Active Level
C:0x24 A:12	Home Arm
C:0x24 A:16	Home Input Level
C:0x25 A:197	Home Direction
C:0x25 A:198	Home Fast Velocity
C:0x25 A:199	Home Slow Velocity

Homing will move in the direction specified, at the programmed acceleration/deceleration and Home Fast Velocity. When the home switch changes states, direction will reverse and the motor will move off the home switch at the Home Slow Velocity. Once the home switch changes state again, the motor will decelerate to a stop. Homing is now complete.

Description of GO and Moving Bit

The DeviceNet MicroLYNX is designed to conform to ODVA. The GO command will be implemented through Command Message, Byte 0, bit 0 – Load Data/Start Profile. The Moving Bit will be implemented through the Response Message, Byte 0, bit 0 – Profile in Progress.

Motion

When the encoder is not enabled, the MicroLYNX will move in microsteps. When the encoder is enabled, the MicroLYNX will move in encoder steps. This is fixed at (number of lines * 4) / revolution.

Alarm Codes

Alarm Code	MS Led	NS Led	Alarm Description
0x20		Solid Red	Duplicate MAC ID
0x21		Solid Red	Bus Off
0x044C	Solid Red		Drive Error
0x1771	Flash Red		Reached +Limit Switch
0x1772	Flash Red		Reached - Limit Switch
0x1B59	Flash Red		Stall
0x1B5B	Flash Red		Moved Out of Deadband
0x4E21	Flash Red		Reached + Software Limit
0x4E22	Flash Red		Reached - Software Limit

Table 9.32: Alarm Codes

Soft Limits

The soft limits need to be configured prior to being enabled. The soft limit commands must be issued in the following order:

0x25-54, 0x25-55, 0x25-53

Once configured, they may be enabled with 0x25-52.

Encoder Configuration Example

Step 1:

Shown using a 1.8° motor, 500-line encoder, starting with DeviceNet MicroLYNX in the factory default state.

Service	Class	Instance	Data (Hex)	Note
0x10	0x25	1	28 D0 07 00 00	500 X 4 = 2000
0x10	0x25	1	27 01	
0x10	0x25	1	6E 27 00 00 00	
0x10	0x25	1	07 30 75 00 00	
0x10	0x25	1	08 96 98 00 00	
0x10	0x25	1	09 96 98 00 00	
0x10	0x25	1	2D 90 01 00 00	

Table 9.33: Encoder Configuration

Note: C: 0x25, I: 1, A: 41 Default is 200.

Step 2:

Power down the DeviceNet MicroLYNX.

Step 3:

Send IO message (hex): 85 00 21 21 D0 07 00 00
On transition of start trajectory bit from low to high, motor will turn 1 revolution.

Note: All motion is in encoder counts.

DeviceNet Programmer

Introduction and Description

The DeviceNet Programmer is a cable that consists of a powered RS-232 converter with a DB-9F plug on one end to connect to the customer PC Comm port and a 5 Pin DeviceNet Port connector on the other to connect to the DeviceNet MicroLYNX. This cable is used for the sole purpose of communicating with, and configuring the DeviceNet MicroLYNX.

Figure 9.7: DeviceNet Programmer

The length of the cable is approximately 39.37 inches (1 meter). The DeviceNet Programmer has a power jack for the user to connect an external power source. The operating voltage is +24 VDC. You may order the DeviceNet Programmer from IMS under Part Number **MX-CC600-000.**

The DeviceNet Programmer is used to communicate with a single DeviceNet MicroLYNX. It is not designed for, and **must not be used** as an interface cable for the DeviceNet Bus.

Figure 9.8: DeviceNet MicroLYNX

Dimensions in Inches (mm)

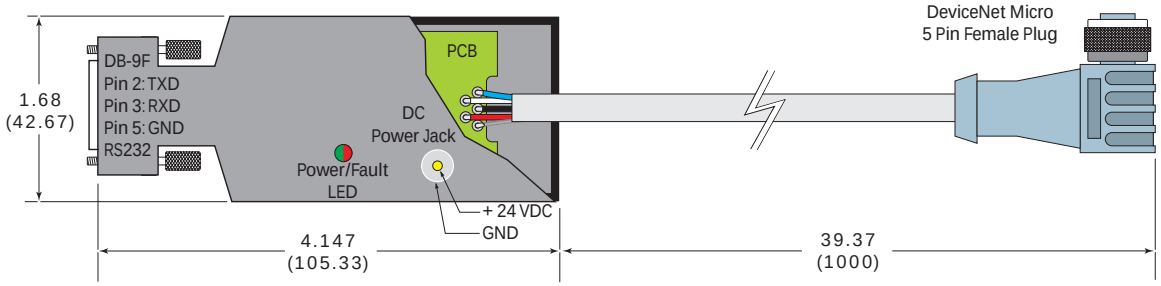

Figure 9.9: MX-CC600-000 DeviceNet Programmer Details

Using the DeviceNet Programmer

- Disconnect the DeviceNet MicroLYNX from the DeviceNet Buss.
- Connect the DeviceNet Programmer to the Comm Port on your PC.
- Connect the 5 Pin Micro Plug to the DeviceNet Jack on the MicroLYNX.
- Connect a +24 VDC supply to the DeviceNet Programmer.
- Establish communication and configure or update the DeviceNet MicroLYNX as required.

WARNING! The DeviceNet Programmer may only be used on a single DeviceNet MicroLYNX for communication purposes. It is **NOT** intended to be used as an interface with DeviceNet. **NEVER** connect the DeviceNet Programmer to the DeviceNet Buss or damage may occur to the DeviceNet system.