

FUSION DEVICENET USER'S MANUAL



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WARNING: The Control Concepts, Inc. power controllers use power thyristors to switch voltage to the connected load. Line voltage must be assumed at the output terminals at all times, even when the control signal has been removed and the load voltage appears to be off. It has been mandated by the National Electrical Code and the Occupational Safety and Health Act of 1970 that a physical disconnect be opened ahead of all remotely actuated controls before performing any maintenance work on the controller or its connected load.

PROPRIETARY DATA

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TABLE OF CONTENTS

1. OVERVIEW	1
1.1 DeviceNet Features	1
1.2 DeviceNet Part Number	1
1.3 Certifications	1
2. PHYSICAL LAYER	2
2.1 Data Rates / Cable Length / Cable Thickness	3
2.2 Wiring	3
3. PROFILE	4
3.1 Communications Adapter Device	4
3.1.1 Object Model	4
3.1.2 How Objects Effect Behavior	4
3.1.3 Object Interfaces	5
3.1.4 I / O Assembly Instances	5
3.2 Format of I / O Assembly Data, Attribute 4 - Default	5
3.2.1 Instance #1 (Parameter Write)	5
3.2.2 Instance #2 (Parameter Read)	6
3.3 Identify Object	6
3.3.1 Common Services	7
3.3.2 Reset Service (05)	7
3.4 Message Router	7
3.5 DeviceNet Object	7
3.5.1 Baud Rate Attribute Values (Attribute ID 2)	8
3.5.2 BOI Attribute Values (Attribute ID 3)	8
3.5.3 Allocation Information Value (Attribute ID 5)	8
3.5.4 Instance Services	8
3.5.5 Class Specific Services	8
3.5.6 Request Service Data Field Parameter Value	8
3.6 Connection Object	9
3.6.1 Explicit Message Connection (Instance #1)	9
3.6.2 Watchdog Timeout Action (Attribute ID 12)	9
3.6.3 I / O Poll Message Connection (Instance #2)	10
3.6.4 State Attribute Values (Attribute ID 1)	11
3.6.5 Watchdog Timeout Action (Attribute ID 12)	11
3.6.6 Common Instance Services	11
3.6.7 Behavior	11
3.7 Assembly Object	12
3.7.1 Output Assembly (Instance #1)	12

3.7.2 Member Mask, Attribute 2 - BYTE Data Type	12
3.7.3 Member List, Attribute 3 - UINT [8] Data Type	13
3.7.4 Member Data, Attribute 4 - UINT [8] Data Type	13
3.7.5 Input Assembly (Instance #2)	13
3.7.6 Member Mask, Attribute 2 - WORD Data Type	13
3.7.7 Member List, Attribute 3 - UINT [16] Data Type	13
3.7.8 Member Data, Attribute 4 - UINT [16] Data Type	13
3.7.9 Instance Services	13
3.8 Parameter Link Object	14
3.8.1 Error Code Values (Attribute ID 2)	14
3.8.2 Descriptor Values (Attribute ID 4)	15
3.8.3 Data Type Values (Attribute ID 5)	15
3.8.4 Instance Services	15
3.9 Default Settings	15
3.9.1 Consumed Data	15
3.9.2 Produced Data	16
3.10 Specific Parameter Definitions	16
3.10.1 Table 1: Dig Sys Cmd - Parameter 129	16
3.10.2 Table 2: Zone Status - Parameter 344	17
3.11 Parameter Link Object - Default Parameter Code Values	18
4. SETUP	19
4.1 Indicator LEDs	19
4.2 Electronic Data Sheet (EDS)	19
4.3 FUSION Control Panel Software	20
4.3.1 DeviceNet	20
4.3.2 Network Timeout	21
4.3.3 Param Link	22
5. TROUBLESHOOTING	23

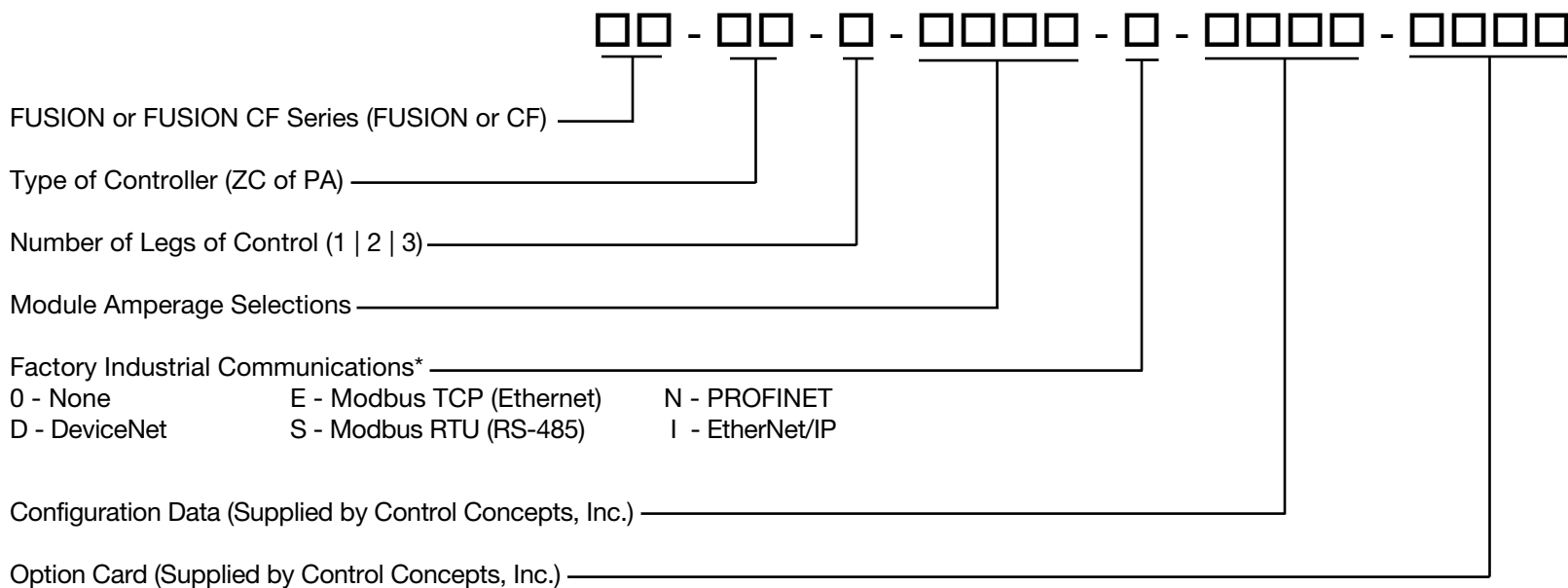
1. OVERVIEW

DeviceNet is an optional digital communication interface available on the FUSION series power controllers. The digital communication interface is a sealed 5 pin micro-style (12mm) male connector that is installed at the factory, which changes the overall depth of the controller. The Installation and Maintenance manual shows the dimension of the controller with and without the DeviceNet connector installed. Control Panel software comes with every FUSION controller which is a Control Concepts, Inc. software that allows quick and easy setup. This software has a special screen for DeviceNet communications for setup, monitoring, and troubleshooting.

1.1 DeviceNet Features

- Protection from wiring errors
- Selectable data rates: 125 | 250 | 500 kbps
- Uses a sealed connector
- Optically-isolated from other devices (1500 Vrms minimum)
- Network-powered
- Predefined Master/ Slave connection set - Group 2-only server device

1.2 DeviceNet Part Number

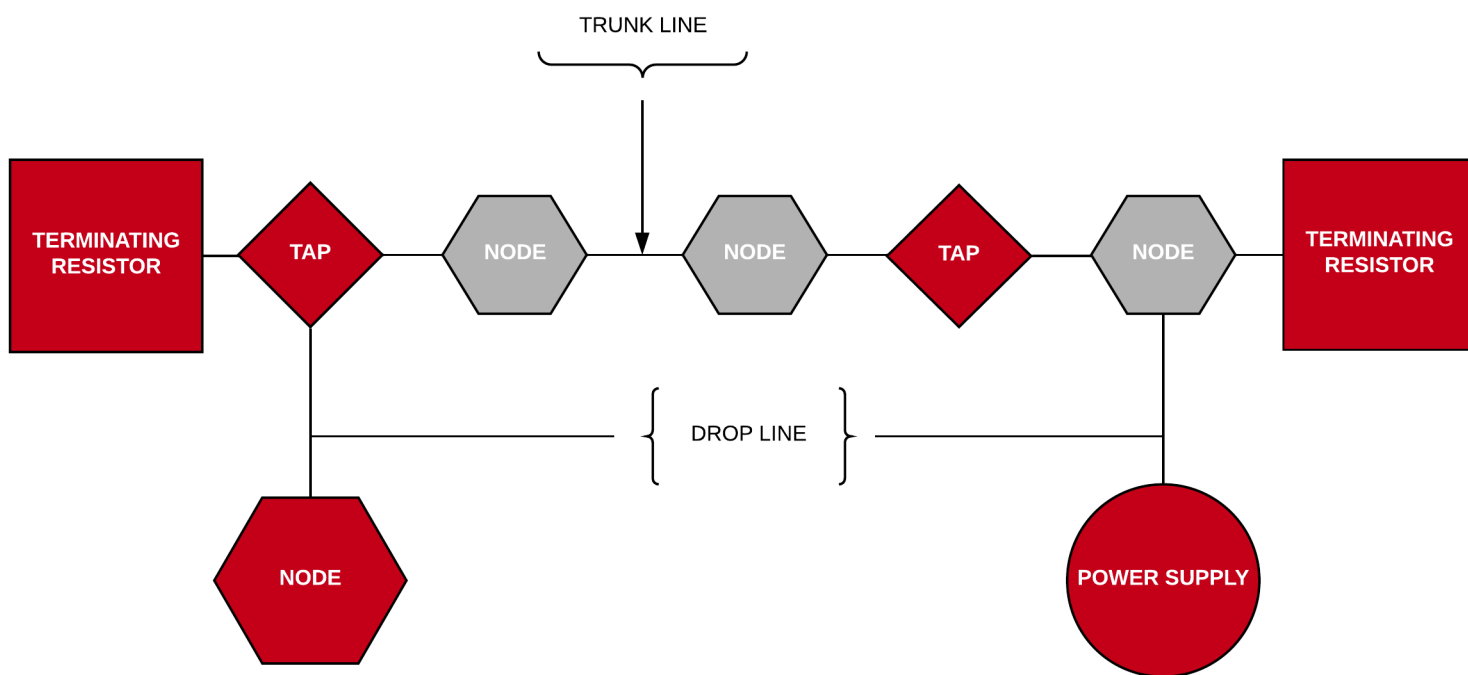


1.3 Certifications

Control Concepts, Inc. is a registered vendor with Open DeviceNet Vendor Association (ODVA). The FUSION power controllers have undergone in-house product compliance testing and has been sent to ODVA test lab for independent verification.



2. PHYSICAL LAYER



Item	Description
Trunk Line	The network line between the 2 terminating resistors. This can support up to 64 nodes.
Terminating Resistor	A 121 Ohm 1% 1/4 Watt resistor must be placed on each end of the trunk line. Each resistor is placed across CAN_H and CAN_L.
Drop Line	This is a network cable attaching a node to the trunk line.
Node	Any device containing communication circuitry.
Tap	A branch from the trunk line. This can have multiple nodes connected to the trunk line.
Power Supply	This powers the network with 24 Vdc.

A power supply is required on the network when using DeviceNet for the FUSION series power controllers. The DeviceNet connection is opto-isolated from other devices.

Note: ODVA goes into great detail describing different components, wiring, and connections to the truck line. See the references section of this manual for references and links to relevant web sites.

2.1 Data Rates / Cable Length / Cable Thickness

The length of cable that can be run for the trunk line is determined by the data rate and cable thickness. Use the following chart (determined by ODVA) to determine what type of cable is best for the speed and length needed for your system.

Data Rate	Maximum Distance			
	Flat Cable	Thick Cable	Mid Cable	Thin Cable
125 Kbps	380 m (1250 ft)	500 m (1640 ft)	300 m (984 ft)	100 m (328 ft)
250 Kbps	200 m (656 ft)	250 m (820 ft)	250 m (820 ft)	100 m (328 ft)
500 Kbps	75 m (246 ft)	100 m (328 ft)	100 m (328 ft)	100 m (328 ft)

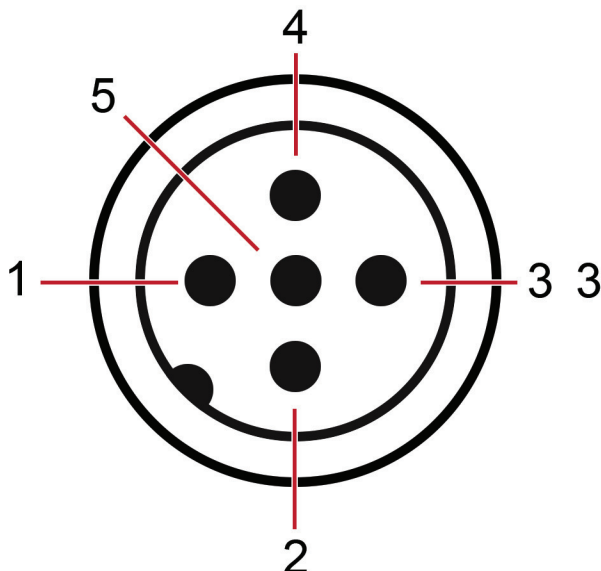
The maximum distance is determined to be the maximum distance between any two devices. In most cases this is measured from terminating resistor to terminating resistor. In some cases a drop length may need to be added depending on the location of the drop line.

Data Rate	Maximum Drop Length	Cumulative Drop Length
125 kbps	6 m (20 ft)	156 m (512 ft)
250 Kbps	6 m (20 ft)	78 m (256 ft)
500 Kbps	6 m (20 ft)	39 m (128 ft)

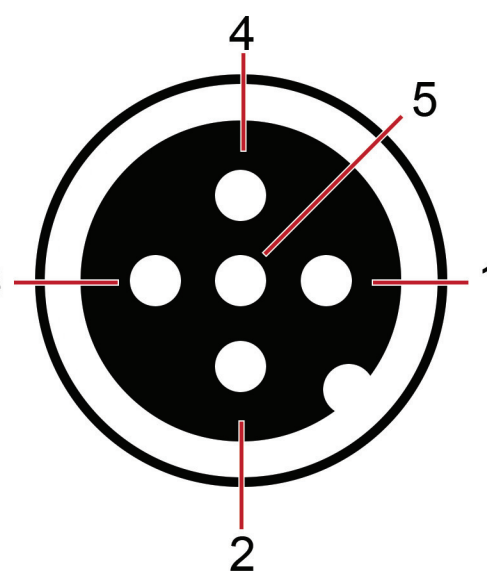
2.2 Wiring

The FUSION series power controller uses a sealed 5 pin micro-style (12 mm) male connector. A sealed micro-style connector attaches only to thin cable and has a reduced current rating. The connector attaches to a cable with a threaded connector to hold it in place.

Micro Male Pin Diagram



Micro Female Pin Diagram



Pin	Designation
1	Drain
2	V+
3	V-
4	CAN_H
5	CAN_L

3. PROFILE

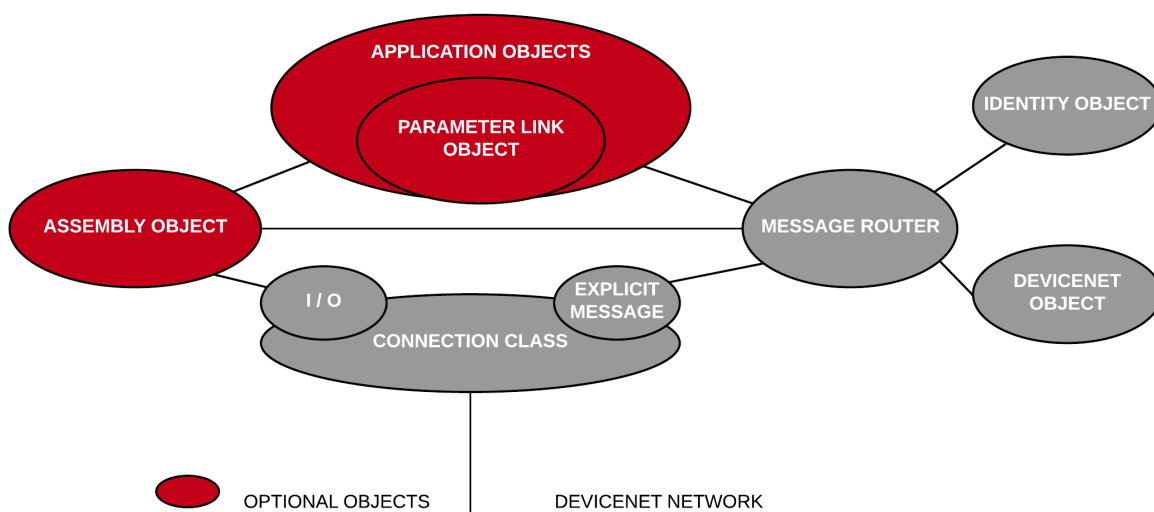
3.1 Communications Adapter Device

Device Type: 0C_{hex}

3.1.1 Object Model

Class Code	Object Class	Optional / Required	# of Instances
1	Identity	Required	1
2	Message Router	Required	1
3	DeviceNet	Required	1
5	Connection	Required	2(1 Explicit, I/O)
100	Assembly	Optional	2
102	Parameter Link	Optional	36

DeviceNet Object Model



3.1.2 How Objects Effect Behavior

Object	Effect on Behavior
Identity	Supports the Reset Service
Message Router	No Effect
DeviceNet	Configures port attributes (node address, data rate, and BOI)
Connection	Contains the number of logical ports into and out of the device
Assembly	Defines input / output data format
Parameter Link	Provides a public interface to the device's configuration data

3.1.3 Object Interfaces

Object	Interface
Identity	Message Router
Message Router	Explicit Messaging Connection Instance
DeviceNet	Message Router
Connection	Message Router
Assembly	Message Router or I / O Connection
Parameter Link	Message Router

3.1.4 I / O Assembly Instances

Number	Type	Name
1	Output	Parameter Write
2	Input	Parameter Read

3.2 Format of I / O Assembly Data, Attribute 4 - Default

3.2.1 Instance #1 (Parameter Write)

Byte	Format	MAP to Class	MAP to Instance	MAP to Attribute
0	Data Value 1 [LSB]	102	1	1
1	Data Value 1 [MSB]	102	1	1
2	Data Value 2 [LSB]	102	2	1
3	Data Value 2 [MSB]	102	2	1
4	Data Value 3 [LSB]	102	3	1
5	Data Value 3 [MSB]	102	3	1
6	Data Value 4 [LSB]	102	4	1
7	Data Value 4 [MSB]	102	4	1
8	Data Value 5 [LSB]	102	5	1
9	Data Value 5 [MSB]	102	5	1

Assembly Object, Instance 1, Attribute 2 (Member Mask) value defaults to $00011111_b = 1F_h = 31$

3.2.2 Instance #2 (Parameter Read)

Byte	Format	MAP to Class	MAP to Instance	MAP to Attribute
0	Data Value 1 [LSB]	102	9	1
1	Data Value 1 [MSB]	102	9	1
2	Data Value 2 [LSB]	102	10	1
3	Data Value 2 [MSB]	102	10	1
4	Data Value 3 [LSB]	102	11	1
5	Data Value 3 [MSB]	102	11	1
6	Data Value 4 [LSB]	102	12	1
7	Data Value 4 [MSB]	102	12	1
8	Data Value 5 [LSB]	102	13	1
9	Data Value 5 [MSB]	102	13	1
10	Data Value 6 [LSB]	102	14	1
11	Data Value 6 [MSB]	102	14	1
12	Data Value 7 [LSB]	102	15	1
13	Data Value 7 [MSB]	102	15	1
14	Data Value 8 [LSB]	102	16	1
15	Data Value 8 [MSB]	102	16	1
16	Data Value 9 [LSB]	102	17	1
17	Data Value 9 [MSB]	102	17	1

Assembly Object, Instance 2, Attribute 2 (Member Mask) value defaults to $0000000111111111_b = 01FF_h = 511$

3.3 Identify Object

Class Code

Class Code: 01*

Class Attributes

None supported.

Instance Attributes

Only one instance of this class is supported.

* = Provides identification of general information about the device.

Attribute ID	Access Rule	Name	Data Type	Value
1	Get	Vendor ID	UINT	1188
2	Get	Product Type	UINT	12 (000C _h)
3	Get	Product Code	UINT	4660 (1234 _h) TBD
4	Get	Revision	STRUCT OF:	2.02
		Major Revision	USINT	2
		Minor Revision	USINT	2
5	Get	Status	WORD	REF DeviceNET Spec 6 - 2.2
6	Get	Serial Number	UDINT	Unique per device
7	Get	Product Name	SHORT_STRING	FUSION Series

3.3.1 Common Services

Service Code	Service Name
0E	Get_Attribute_Single
05	Reset
17	No - Op (NOP)

3.3.2 Reset Service (05)

Name	Data Type	Description	Value	Definition
Type	USINT	Type of Reset	0	Emulate a power cycle
			1	Return to "out-of-box" configuration, Emulate a power cycle.

3.4 Message Router

Class Code

Class Code: 02*

Class Attributes

None supported.

Instance Attributes

None supported

* = There is no externally visible interface to the message router object. The message router object supports no class or instance attributes or service.

3.5 DeviceNet Object

Class Code

Class Code: 03*

* = There is no externally visible interface to the message router object. The message router object supports no class or instance attributes or service.

Class Attributes

Attribute ID	Access Rule	Name	Data Type	Value
1	Get	Revision	UINT	2

Class Services

Service Code	Service Name
0E	Get_Attribute_Single

Instance Attributes

Only one instance of this class is supported.

Attribute ID	Access Rule	Name	Data Type	Value
1	Get / Set	MAC ID	USINT	Range 0 - 63 (Default: 63)
2	Get / Set	Baud Rate	USINT	Range 0 - 2 (Default: 0)
3	Get / Set	BOI	BOOL	Range 0 - 1 (Default: 0)
4	Get / Set	Bus - Off Counter	USINT	Range 0 - 255 (Set 0 only)
5	Get	Allocation Information	STRUCT of:	REF DeviceNet Spec 5.5.3
		Choice	BYTE	REF DeviceNet Spec 5.5.4
		Master MAC ID	USINT	Range 0 - 63 (255 if not allocated)

3.5.1 Baud Rate Attribute Values (Attribute ID 2)

Value	Meaning
0	125 Kbps (Default)
1	250 Kbps
2	500 Kbps

3.5.2 BOI Attribute Values (Attribute ID 3)

Value	Meaning
0	Hold in bus-off (reset) state upon detection of a bus-off indication
1	Fully reset to on-line upon detection of a bus-off indication

3.5.3 Allocation Information Value (Attribute ID 5)

BIT	7 thru 4	3	2	1	0
Meaning	Reserved = 0	Reserved = 0	0	Polled	Explicit

3.5.4 Instance Services

Service Code	Service Name
0E	Get_Attribute_Single
10	Set_Attribute_Single

3.5.5 Class Specific Services

Service Code	Service Name
4B	Allocate_Master/Slave_Connection_Set
4C	Release_Master/Slave_Connection_Set

3.5.6 Request Service Data Field Parameter Value

Refer to choice byte definition above.

3.6 Connection Object

Class Code

Class Code: 05. The Connection Class allocates and manages the internal resources associated with both I / O and Explicit Messaging Connections.

Class Attributes

None Supported.

Instance Attributes

This device supports only the Predefined Master/Slave Connection set. There are two instances of the Connection Object:

1. Explicit Message Connection.
2. I / O Poll Connection

3.6.1 Explicit Message Connection (Instance #1)

Attribute ID	Access Rule	Name	Data Type	Value
1	Get	State	USINT	Range 0 - 4
2	Get	Instance Type	USINT	0 (Explicit Message)
3	Get	Transport Class Trigger	USINT	0x83
4	Get	Produced Connection ID	UINT	Range 0x40B to 0x5fB
5	Get	Consumed Connection ID	UINT	Range 0x40C to 0x5FF
6	Get	Initial Comm. Char.	USINT	0x21
7	Get	Produced Connection Size	UINT	32
8	Get	Consumed Connection Size	UINT	16
9	Get/Set	Expected Packet Rate	UINT	(Default 2500 ms)
12	Get/Set	Watchdog Timeout Action	USINT	Default = 1 (Auto Delete)
13	Get	Prod. Connection Path Length	UINT	0
14	Get	Prod. Connection Path	NULL	None
15	Get	Cons. Connection Path Length	UINT	0
16	Get	Cons. Connection Path	NULL	none
17	Get	Production Inhibit Time	UINT	0

3.6.2 Watchdog Timeout Action (Attribute ID 12)

Value	Meaning
1	Auto Delete
3	Deferred Delete

3.6.3 I / O Poll Message Connection (Instance #2)

Attribute ID	Access Rule	Name	Data Type	Value
1	Get	State	USINT	Range 0 - 4
2	Get	Instance Type	USINT	1 (I / O Connection)
3	Get	Transport Class Trigger	USINT	0x82
4	Get	Produced Connection ID	UINT	Range 0x3C1 to 0x3FF
5	Get	Consumed Connection ID	UINT	Range 0x40D to 0x5FD
6	Get	Initial Comm. Char.	USINT	0x01
7	Get	Produced Connection Size	UINT	(Max = 32) ¹
8	Get	Consumed Connection Size	UINT	(Max = 16) ¹
9	Get/Set	Expected Packet Rate	UINT	(Default 0)
12	Get/Set	Watchdog Timeout Action	USINT	Default = 0 (Transition To Timed-out)
13	Get	Prod. Connection Path Length	UINT	6
14	Get	Prod. Connection Path	USINT [6]	
		Segment Type	USINT	0x20
		Class ID	USINT	100
		Segment Type	USINT	0x24
		Instance ID	USINT	2
		Segment Type	USINT	0x30
		Instance ID	USINT	2
		Segment Type	USINT	0x30
		Attribute ID	USINT	4
15	Get	Cons. Connection Path Length	UINT	6
16	Get	Cons. Connection Path	USINT [6]	
		Segment Type	USINT	0x20
		Class ID	USINT	100
		Segment Type	USINT	0x24
		Instance ID	USINT	2
		Segment Type	USINT	0x30
		Attribute ID	USINT	4
17	Get	Production Inhibit Time	UINT	0

¹ The connection size value corresponds to the number of bits that are set to 1 in the appropriate mask for each instance of Assembly object. There will be two (2) bytes for each Parameter Link object that is include in the corresponding instance of the Assembly object according to its mask. (See the Assembly object [Class:100] definition.)

3.6.4 State Attribute Values (Attribute ID 1)

Value	Meaning
0	Non-Existent
1	Configuring
2	Waiting for Connection ID
3	Established
4	Timed Out
5	Deferred Delete

3.6.5 Watchdog Timeout Action (Attribute ID 12)

Value	Meaning
0	Transition to Timed-Out
2	Auto Reset

3.6.6 Common Instance Services

Service Code	Service Name
0E	Get_Attribute_Single
10	Set_Attribute_Single
5	Reset Inactivity / Watchdog Timer

3.6.7 Behavior

A. Delete - POLL connection is deleted or transitions to Timed Out

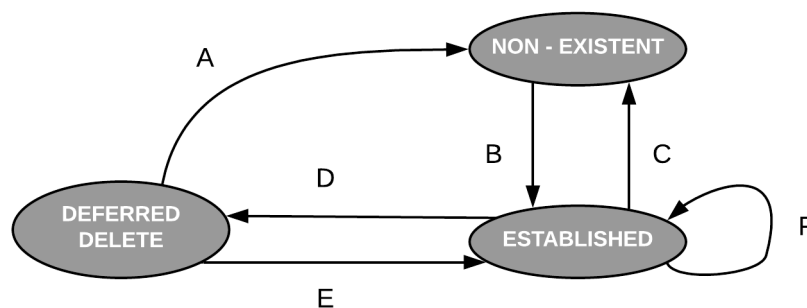
B. Explicit Messaging Connection is allocated by a Master device

C. Delete - Inactivity/Watchdog Timeout, watchdog_timeout_action = Auto Delete, or this attribute is set to Deferred Delete and the POLL connection is not in the Established state

D. Inactivity/Watchdog Timeout and watchdog_timeout_action = Deferred Delete and the POLL connection is in the Established state

E. Receive Data / Reset

F. Get_Attribute, Set_Attribute, Reset



EXPLICIT MESSAGING CONNECTION OBJECT STATE
TRANSITION DIAGRAM

3.7 Assembly Object

Class Code

Class Code: 64 (100). Vendor Specific Object binds attributes of multiple Parameter Link objects, which allows data to or from each object to be send and received over a single communication.

Class Attributes

Attribute ID	Access Rule	Name	Data Type	Value
1	Get	Revision	UINT	1
2	Get	Max Instance	UINT	2

Class Services

Service Code	Service Name
0E	Get_Attribute_Single

Instance Attributes

There are two instances of the Assembly Object:

1. Output Assembly
2. Input Assembly

3.7.1 Output Assembly (Instance #1)

Attribute ID	Access Rule	Name	Data Type	Value
1	Get	Max # of Members	UINT	8
2	Get/Set*	Member Mask	BYTE	Range 0 - 255 (Table Below)
3	Get	Member List	UINT [8]	Attribute 3 value of Active Parameter Link Instances
4	Get	Member Data	UINT [8]	Attribute 1 value of Active Parameter Link Instances

* = Member Mask may not be set/alterd while an I / O Poll connection exists.

3.7.2 Member Mask, Attribute 2 - BYTE Data Type

Bit	Description
0	Active Parameter Link Object Instance #1 as a member of the output assy, Inst 1
1	Active Parameter Link Object Instance #2 as a member of the output assy, Inst 1
2	Active Parameter Link Object Instance #3 as a member of the output assy, Inst 1
3	Active Parameter Link Object Instance #4 as a member of the output assy, Inst 1
4	Active Parameter Link Object Instance #5 as a member of the output assy, Inst 1
5	Active Parameter Link Object Instance #6 as a member of the output assy, Inst 1
6	Active Parameter Link Object Instance #7 as a member of the output assy, Inst 1
7	Active Parameter Link Object Instance #8 as a member of the output assy, Inst 1

3.7.3 Member List, Attribute 3 - UINT [8] Data Type

A Get_Attribute_Single service request of a Member List (Attribute 3) will return the Parameter Codes (Attribute 3) of the ACTIVE Parameter Link objects; a value of zero (0) will be returned for inactive Parameter Link objects.

3.7.4 Member Data, Attribute 4 - UINT [8] Data Type

A Get_Attribute_Single service request of a Member Data (Attribute 4) will return the Parameter Values (Attribute 1) of the ACTIVE Parameter Link objects; a value of zero (0) will be returned for INACTIVE Parameter Link objects.

3.7.5 Input Assembly (Instance #2)

Attribute ID	Access Rule	Name	Data Type	Value
1	Get	Max #	UINT	16
2	Get/Set *	Member Mask	WORD	Range 0 to 65535 (Table Below)
3	Get	Member List	UINT [16]	Attribute 3 value of Active Parameter Link Instances
4	Get	Member Data	UINT [16]	Attribute 1 value of Active Parameter Link Instances

* = Member Mask may not be set/alterd while an I / O Poll connection exists.

3.7.6 Member Mask, Attribute 2 - WORD Data Type

Bit	Description
0	Active Parameter Link Object Instance #9 as a member of the input assy, Inst 2
1	Active Parameter Link Object Instance #10 as a member of the input assy, Inst 2
...	...
15	Active Parameter Link Object Instance #24 as a member of the input assy, Inst 2

3.7.7 Member List, Attribute 3 - UINT [16] Data Type

A Get_Attribute_Single service request of the Member List (Attribute 3) will return the Parameter Codes (Attribute 3) of the ACTIVE Paramter Link objects; a value of zero (0) will be returned for INACTIVE Parameter Link objects.

3.7.8 Member Data, Attribute 4 - UINT [16] Data Type

A Get_Attribute_Single service request of the Member Data (Attribute 4) will return the Parameter Values (Attribute 1) of the ACTIVE Paramter Link objects; a value of zero (0) will be returned for INACTIVE Parameter Link objects.

3.7.9 Instance Services

Service Code	Instance #1	Instance #2	Service Name
0E	YES	YES	Get_Attribute_Single
10	YES	YES	Set_Attribute_Single

3.8 Parameter Link Object

Class Code

Class Code: 66 (102) Vendor Specific. This object provides access to the parameters in the FUSION power controller.

Class Attributes

Attribute ID	Access Rule	Name	Data Type	Value
1	Get	Revision	UINT	1
2	Get	Max Instance	UINT	36

Class Services

Service Code	Service Name
0E	Get_Attribute_Single

Instance Attributes

Attribute ID	Access Rule	Name	Data Type	Value
1	Get / Set	Value	4	Actual value of the parameter (read-only if bit 2 of Attr. 4 is set)
2	Get	Status	USINT	Error Code (see table below)
3	Get / Set	Parameter Code	UINT	Product specific parameter code table number
4	Get	Descriptor	WORD	Parameter Description
5	Get	Data Type	USINT	Data type code (see table below)
6	Get	Data Size	USINT	2 (Number of bytes in the parameter's value)

3.8.1 Error Code Values (Attribute ID 2)

Value	Definition
0	OK
1	Data value is greater than maximum allowed
2	Data value is less than minimum allowed
3	Parameter is locked, value entry is not allowed
4	None, Not Used
5	None, Not Used
6	None, Not Used
7	None, Not Used
8	Invalid parameter code number, access denied
9	Invalid parameter code number, parameter undefined
10	Parameter code number / data out of range

3.8.2 Descriptor Values (Attribute ID 4)

Bit	Definition	Meaning
0	None, Not used	
1	Setable Parameter	Indicates that the value attribute can be read and set
2	Read Only Parameter	Indicates that the value attribute can only be read and not set
3	Monitor Parameter	Indicates that the value attribute is updated in real time by the device
4	None, Not Used	
5	None, Not Used	
6	None, Not Used	
7	None, Not Used	

3.8.3 Data Type Values (Attribute ID 5)

Value	Definition	Meaning
1	WORD	16-Bit Word
2	UINT	16-Bit Unsigned Integer
3	INT	16-bit signed integer

3.8.4 Instance Services

Service Code	Service Name
0E	Get_Attribute_Single
10	Set_Attribute_Single

3.9 Default Settings

I / O Poll Message Data Map [See: Connection object (0x05) Instance #2 (Section 3.6.3)]

3.9.1 Consumed Data

Byte	Format	MAP to Class	MAP to Instance	Map to Attribute	Parameter Number	Parameter Title	Description
0	Data Value 1 [LSB]	102	1	1	100	Dig Setpoint 1	Zone 1, Setpoint 1
1	Data Value 1 [MSB]						
2	Data Value 2 [LSB]	102	2	1	102	Dig Setpoint 3	Zone 2, Setpoint 1
3	Data Value 2 [MSB]						
4	Data Value 3 [LSB]	102	3	1	104	Dig Setpoint 5	Zone 3, Setpoint 1
5	Data Value 3 [MSB]						
6	Data Value 4 [LSB]	102	4	1	106	Dig Setpoint 7	Zone 4, Setpoint 1
7	Data Value 4 [MSB]						
8	Data Value 5 [LSB]	102	5	1	129	Dig Sys Cmd	See Section 3.10.1 Table 1
9	Data Value 5 [MSB]						

3.9.2 Produced Data

Byte	Format	MAP to Class	MAP to Instance	Map to Attribute	Parameter Number	Parameter Title	Description
0	Data Value 1 [LSB]	102	9	1	350	Load V Z1 %	% Voltage Zone 1
1	Data Value 1 [MSB]						
2	Data Value 2 [LSB]	102	10	1	351	Load I Z1 %	% Current Zone 1
3	Data Value 2 [MSB]						
4	Data Value 3 [LSB]	102	11	1	355	Load V Z2 %	% Voltage Zone 2
5	Data Value 3 [MSB]						
6	Data Value 4 [LSB]	102	12	1	356	Load I Z2 %	% Current Zone 2
7	Data Value 4 [MSB]						
8	Data Value 5 [LSB]	102	13	1	360	Load V Z3 %	% Voltage Zone 3
9	Data Value 5 [MSB]						
10	Data Value 6 [LSB]	102	14	1	361	Load I Z3 %	% Voltage Zone 3
11	Data Value 6 [MSB]						
12	Data Value 7 [LSB]	102	15	1	365	Load V Z4 %	% Current Zone 4
13	Data Value 7 [MSB]						
14	Data Value 8 [LSB]	102	16	1	366	Load I Z4 %	% Voltage Zone 4
15	Data Value 8 [MSB]						
16	Data Value 9 [LSB]	102	17	1	344	Zone Status	See Table 2
17	Data Value 9 [MSB]						

3.10 Specific Parameter Definitions

3.10.1 Table 1: Dig Sys Cmd - Parameter 129

Byte	Description	Value	Affect on Behavior
0	State Request Zone 1	0	Zone 1 State transition to STOP [Default]
		1	Zone 1 State transition to RUN *
1	State Request Zone 2	0	Zone 2 State transition to STOP [Default]
		1	Zone 2 State transition to RUN*
2	State Request Zone 3	0	Zone 3 State transition to STOP [Default]
		1	Zone 3 State transition to RUN*
3	State Request Zone 4	0	Zone 4 State transition to STOP [Default]
		1	Zone 4 State transition to RUN*
4 - 7	Reserved	0	
		1	None

3.10.2 Table 2: Zone Status - Parameter 344

Byte	Description	Value	Affect on Behavior
0	Zone 1 Control Status	0	Normal = OK
		1	Fault
1	Zone 2 Control Status	0	Normal = OK
			Fault
2	Zone 3 Control Status	0	Normal = OK
		1	Fault
3	Zone 4 Control Status	0	Normal = OK
		1	Fault
4	Zone 1 Output Status	0	NOT at Setpoint*
		1	At Setpoint
5	Zone 2 Output Status	0	NOT at Setpoint*
		1	At Setpoint
6	Zone 3 Output Status	0	NOT at Setpoint*
		1	At Setpoint
7	Zone 4 Output Status	0	NOT at Setpoint*
		1	At Setpoint
8	Fuse A	0	Fuse is OK
		1	Fuse is “blown” open
9	Fuse B	0	Fuse is OK
		1	Fuse is “blown” open
10	Fuse C	0	Fuse is OK
		1	Fuse is “blown” open
11	Fuse D	0	Fuse is OK
		1	Fuse is “blown” open

3.11 Parameter Link Object - Default Parameter Code Values

Class ID 102, Attribute ID 3

INST	Value	Description
1*	100	Setpoint 1, Zone 1
2*	102	Setpoint 1, Zone 2
3*	104	Setpoint 1, Zone 3
4*	106	Setpoint 1, Zone 4
5*	129	Digital System Command
6*	11	Voltage Limit, Zone 1
7*	12	Current Limit, Zone 1
8*	15	Power Limit, Zone 1
9*	350	Load Voltage %, Zone 1
10*	351	Load Current %, Zone 1
11*	355	Load Voltage %, Zone 2
12*	356	Load Current %, Zone 2
13*	360	Load Voltage %, Zone 3
14*	361	Load Current %, Zone 3
15*	365	Load Voltage %, Zone 4
16*	366	Load Current %, Zone 4
17*	344	Zone Status
18*	210	Inhibit Alarm

INST	Value	Description
19*	256	Warning Alarm, Zone 1
20*	271	Warning Alarm, Zone 2
21*	286	Warning Alarm, Zone 3
22*	301	Warning Alarm, Zone 4
23*	331	Software ID
24*	332	Software Revision
25	8	Full Scale Voltage, Zone 1
26	9	Full Scale Current, Zone 1
27	10	Full Scale Power, Zone 1
28	28	Full Scale Voltage, Zone 2
29	29	Full Scale Current, Zone 2
30	30	Full Scale Power, Zone 2
31	48	Full Scale Voltage, Zone 3
32	49	Full Scale Current, Zone 3
33	50	Full Scale Power, Zone 3
34	68	Full Scale Voltage, Zone 4
35	69	Full Scale Current, Zone 4
36	70	Full Scale Power, Zone 4

4. SETUP

The Control Panel software is the easiest way to configure the controller. This software works with all FUSION and Compact FUSION controllers. See the Control Panel manual and the FUSION Operator manual for instructions on how to use other features of the software. In addition to the Control Panel software, an electronic data sheet file (.EDS) is available for DeviceNet Configuration.

4.1 Indicator LEDs

LED	Color	Description
INPUT PWR		
	OFF	Input Power is not present
	Green	Input Power is present
LINE		
	OFF	Line power is not present (no phase lock)
	Green	Line and Line Reference has been connected and power is applied, all phases are present and the controller achieves phase lock. (Input Power must also be supplied)
STATUS		
	OFF	Controller is ready for operation but is not in a RUN State
	Green	Controller is in a RUN State
	Red	Controller has an Inhibit Alarm (output is OFF)
	Flashing Orange	Controller has a Warning Alarm
NETWORK		
	OFF	Network power is OFF or not connected
	Flashing Green	The device is "online" but not allocated
	Green	The device has established connection
	Flashing Red	I / O Poll connection timeout
	Red	Critical Link failure (duplicate MAC ID, Bus is off)
MODULE		
	OFF	Network power is OFF
	Green	Device is operational



- When configuring the controller, only the Input Power is required.
- Line reference is for Single Phase, Three Phase 2-Leg, and Three Phase 4-wire wye controllers only.

4.2 Electronic Data Sheet (EDS)

The .EDS file provides information for the master scanner about each device that is connect to the network. This file may provide data context, content and formatting. This may be used to guide a user through the necessary steps to configure the device. The .EDS file is available on the CD that is shipped with the controller or by contacting Control Concepts, Inc.

4.3 FUSION Control Panel Software

Use Control Panel and the USB connection to setup the DeviceNet settings for the controller. After connecting to Control Panel, select the device and open the “Communication” category.

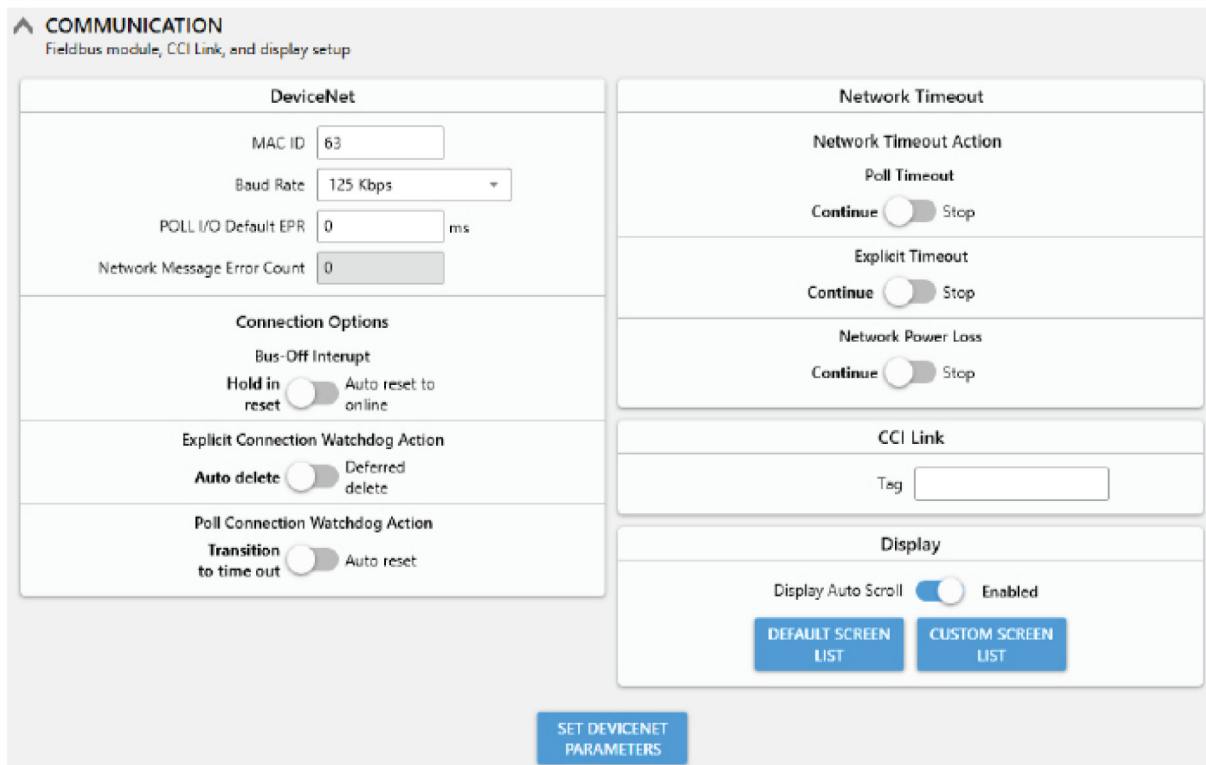


Figure 4.00: Use Control Panel to adjust the DeviceNet settings for the power controller.

4.3.1 DeviceNet

MAC ID [SP 118]

The DeviceNet network address of the controller. The valid entry range 0 - 63 with 63 being the default value.

Baud Rate [SP 119]

The baud rate that the controller is using.

Selections: 125, 250, or 500 Kbps

Default: 0

Poll I / O Default EPR [SP 198]

The default value of the expected packet rate (EPR) for the I / O Poll connection.

Minimum: 0

Maximum: 65535

Default: 0

DeviceNet Connection Options [SP 199]

- Bus-Off Interrupt -

The bus-off interrupt occurs when a node is logically disconnected from the network (controller stops communicating).

Setting	Description
Hold in Reset*	CAN chip is held in the buss-off reset state.
Auto Reset to Online	CAN chip performs a soft reset and returns to the online un-allocated state. The duplicated MAC ID detection is performed to regain access to the network.

* = Default

- Explicit Connection Watchdog Action -

The explicit connection watchdog action occurs when the communications timer expires while waiting for the explicit message.

Setting	Description
Auto Delete*	When the inactivity timer times out the connection is deleted.
Deferred Delete	Checks the state of the I / O Poll connection. If the I / O Poll connection is not established the explicit connection is deleted. Refer to the Section 3.6.7 for a reference diagram

* = Default

- Poll Connection Watchdog Action -

The poll connection watchdog action occurs when the communication timer expires while waiting for a Poll command message.

Setting	Description
Transition to Timed Out*	The I / O Poll connection transitions to the timed out state.
Auto Reset	If the inactivity timer expires, the timer is reset (does not time out).

* = Default

4.3.2 Network Timeout

Network Timeout Action [SP 128]

The network timeout action specifies the behavior that should occur when a communication timeout occurs. A DeviceNet controller allows a timeout action to be set for three different communication loss events.

Action	State	Description
Poll Timeout Action		
	Continue*	No Action taken
	Stop	Controller transitions to a fault state (Inhibit Alarm)
Explicit Timeout Action		
	Continue*	No Action Taken
	Stop	Controller transitions to a fault state (Inhibit Alarm)
Network Power Loss		
	Continue*	No action taken
	Stop	Controller transitions to a fault state (Inhibit Alarm)

* = Default

An additional option is to have the controller notify an external signaling device, such as a light tower or alarm system, when a network timeout occurs.

- Locate Relay 1 and Relay 2 alarms in the “Alarm Relays” category in Control Panel. Check “Communications Error” in the “System Relay Mask” section to receive notifications in the event of a digital communication failure.
- To restore communication when a network timeout occurs and the controller enters the warning or inhibit state (based on the Network Timeout Action setting), address the problem and confirm communication between the PLC and the controller. After communication has been reestablished, cycle run/reset on P1 to clear the fault. These two steps must occur in sequence.

4.3.3 Param Link

By default, the FUSION Fieldbus interface exposes parameters that are most commonly used. It is possible to customize the FUSION parameters assigned to the Parameter Link Objects and define which parameters are included in the Member List for the Assembly Object for the DeviceNet interface. Click the “SET DEVICENET PARAMETERS” button to open the dialog shown in Figure 4.00.

Drag available parameters from the list on the left to the desired location in the “Field Parameter Links” on the right. A parameter assigned to a link can also be moved from one location to another by dragging.

There are 36 static instances of the Parameter Link Object.

- Instances 1 - 8 may be assigned to the Member List of the Output Assembly (Instance #1) of the Assembly Object.
- Instances 9 - 24 may be assigned to the Member List of the Input Assembly (Instance #2) of the Assembly Object.
- Instances 25 - 36 provide access to parameters that are not included in the Assembly Object.

Use the check box next to the parameter name in the “ASSY” column to assign an Instance to the Member List.

When complete, click the “PROGRAM” button to save the changes to the FUSION. All links must have an assigned parameter in order to “PROGRAM” the controller.



Figure 4.00: Use Control Panel to customize the FUSION parameters that are exposed via the DeviceNet interface.

FUSION controllers contain nonvolatile EEPROMs, and writing too frequently to an individual parameter may wear out the EEPROM and cause the controller to fail.

Control Concepts, Inc. recommends allowing an average of five minutes between consecutive writes to an individual parameter within the range of 1 - 199, with the exception of digital setpoint commands 100 -107 and the digital system command 129. Digital setpoints and digital system commands may be written continually.

5. TROUBLESHOOTING

This troubleshooting section is for DeviceNet problems only. For information regarding controller operation see the FUSION Operator's Manual, Chapter 8. Troubleshooting.

Indicator LEDs

The indicator LEDs provide information about the DeviceNet status. See the Indicator LEDs section of this manual for definitions of the LED states.

Network Status

The Network Status parameter on the keypad display is provided to assist during troubleshooting. The parameter will display as an 8 bit binary number.

	Bit	Description
MSB	7	I / O Poll Connection Timeout
	6	Explicit Connection Timeout
	5	Duplicate MAC ID Detected
	4	Bus in OFF state
	3	Passive Error State
	2	I / O Poll connection established
	1	Explicit connection established
LSB	0	Network Power is ON

Baud Rate

The Baud Rate parameter on the keypad display is provided to assist during troubleshooting. Check to make sure that the baud rate of the controller matches the network baud rate.

MAC ID

The MAC ID parameter on the keypad display is provided to assist during troubleshooting. Check to make sure that the MAC ID of the controller is correct.

ODVA DeviceNet

There is a ODVA DeviceNet Plant Floor Troubleshooting guide available as a reference to assist during network problems, which can be found on the ODVA website - reference code: PUB00147R0.