

# DeviceNet Class 5

## Animatics Part Number Suffix:

**SMxx165 – Standard Class 5**

**SMxx195 – Integrated CAN and 24Volt IO Class 5**

**SMxx165M – Integrated CAN and 24Volt IO Class 5**

## DeviceNet Firmware Versions:

**5.16.x.x : For SMxx165-DN Motors.**

**5.96.x.x : For SM34195.**

**5.97.x.x : For SMxx165M-DN.**

### HISTORY

Revision 0	03/17/2010	SM
Revision 1.001	03/24/2010	SM
Revision 1.003	05/19/2010	SM
Revision 1.005	06/28/2010	SM
	1) Added further descriptions for 2.4.4 IO Assembly.	
Revision 1.006	08/16/2010	SM
	1) Added LED description	
Revision 1.007	09/03/2010	SM
	1) Added reference to SMxx165D and SMxx165DT motors, using 5.16.x.x firmware.	
Revision 1.008	02/21/2011	SM
	1) Added reference to SMxx165M motors and Firmware 5.97.x.x.	
Revision 1.009	02/25/2011	SM
	1) Changed CANCTL(2,x) for DeviceNet Power Ignore.	
	2) RCAN bit field updated.	

## 1.0 DeviceNet Class 5 Smart Motor discussion

Has been tailored to be very similar to the Animatics Class 4 DN2 Motor.

Appendix A: Discusses the user program commands that are pertinent to DeviceNet.

Appendix B: IO discussion.

### **1.1 DeviceNet Identity**

Product codes:

2 - Class 5 SMxx195

3 - Class 5 SMxx165

Device Name: Factory data in Non-Volatile EE memory, same as name plate.

Serial Number: Factory data in Non-Volatile memory EE, same as name plate number.

### **1.2 DeviceNet Major and Minor Version Numbers**

Initial Release is 1.001

### **1.3 Class 5 Non-Volatile (EEPROM) addresses of Importance(see also Appendix A)**

32465 Network Timeout Action 0 to 9, default to 0

32466 DeviceNet MacId: 0 to 63, default 63

32467 DeviceNet baud rate Index: 4=125, 3=250, 2=500, default to 125Kb

32512 DeviceNet Serial number

Note: Default values are considered the DeviceNet out of box configuration. DeviceNet Identity Object Reset Service 1 condition.

## **2.0 Class 5 DeviceNet Profile**

### **2.1 Position Controller Device Profile, Device Type 16(10hex) Instance 1**

#### **2.1.1 Class 5 Supported DeviceNet Objects List:**

CIP Common Objects: DeviceNet, Identity, Connection, Router.

Position Controller Supervisor

Position Controller

#### **2.2 Model Description**

**TBD**

#### **2.3 Objects Behavior**

CIP Common Objects:

Per ODVA Volume 3, DeviceNet Adaptation of CIP.

Position Controller Supervisor:

Handles faults, home and registration inputs, and also the meaning of IO data.

Position Controller:

Provides positioning control and manages interface to power amplifier.

## 2.4 I/O Connection Messages

### 2.4.1 General Message Types

**Table 2.4.1.1 Polled IO Consumed General Message format**

Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
0	Enable	Reg Arm(1)	H-Stop	S-Stop	Dir (V_mode)	Incrmntl	Start Blk(1)	Ld Data / Strt Profile
1	Block #							
2	Command Axis Number			Command Message Type				
3	Response Axis Number			Response Message Type				
4	Command Data Low byte							
5	Data middle low							
6	data middle high							
7	Command Data High Byte							

Notes:

- 1) Byte 0 bit 6 and bit 1 are not supported class 5.

**Table 2.4.1.2 Polled IO General Produced Message format**

Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
0	Enable	Reg Lvl(2)	Home Lvl(2)	C. Dir	General Fault	On T. Pos	Blk Extg(2)	Prf In Prg
1	Executing Block Number							
2	Ld Cmplt	Blk Fault(2)	FE Fault	Neg. Limit	Pos. Limit	Rev. Limit	Fwd Limit	Fault Input Fault(1)
3	Response Axis Number			Response Message Type				
4	Response Data Low byte							
5	Data middle low							
6	data middle high							
7	Response Data High Byte							

Notes:

- 1) Byte 2 bit 0 can be configured as the Servo Bus Voltage Okay status. See Appendix A CANCTL(99,x).
- 2) No supported.

**Table 2.4.1.3 General Message Types**

Message Type	Command Data	Response Data
1	Target Position	Actual Position
2	Target Velocity	Command Position
3	Acceleration	Actual Velocity
4	Deceleration	Command Velocity
5	Torque	Torque

## 2.4.2 Attribute GET/SET Command Types

**Table 2.4.2.1 Polled IO Consumed Message format**

Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
0	Enable	Reg Arm(1)	H-Stop	S-Stop	Dir (V_mode)	Incrmntl	Start Blk(1)	Ld Data / Strt Profile
1	Attribute Number to GET							
2	Command Axis Number			Command Message Type(0x1A or 0x1B)				
3	Attribute Number to SET							
4	Command(SET) Data Low byte							
5	Middle low byte							
6	Middle high byte							
7	Command Data High Byte							

Notes:

1) Byte 0 bit 6 and bit 1 are not supported class 5.

**Table 2.4.2.2 Polled IO Produced Message format**

Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
0	Enable	Reg Lvl(2)	Home Lvl(2)	C. Dir	General Fault	On T. Pos	Blk Extg(2)	Prf In Prg
1	GET Attribute Number for the Response Data							
2	Ld Cmplt	Blk Fault(2)	FE Fault	Neg. Limit	Pos. Limit	Rev. Limit	Fwd Limit	Fault Input Fault(1)
3	Response Axis Number			Response Message Type(0x1A or 0x1B)				
4	Response(GET) Data Low byte							
5	middle low byte							
6	middle high byte							
7	Response Data High Byte							

Notes:

1) Byte 2 bit 0 can be configured as the Servo Bus Voltage Okay status. See Appendix A CANCTL(99,x).

2) No supported.

**Table 2.4.2.3 Attribute Message Types**

Message Type	Class Number	Class Description	Command Data	Response Data
26(0x1A)	36(0x24)	Position Control Supervisor	Attribute Value to Set	Attribute Value to Get
27(0x1B)	37(0x25)	Position Controller	Attribute Value to Set	Attribute Value to Get

## 2.4.3 Error Response Message Type 0x14

**Table 2.4.3.1 Polled IO Produced Message format**

Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
0	Enable	Reg Lvl(2)	Home Lvl(2)	C. Dir	General Fault	On T. Pos	Blk Extg(2)	Prf In Prg
1	Reserved = 0							
2	Ld Cmplt	Blk Fault(2)	FE Fault	Neg. Limit	Pos. Limit	Rev. Limit	Fwd Limit	Fault Input Fault(1)
3	Response Axis Number			Response Message Type(always 0x14)				
4	General Error Code							
5	Additional Error Code							
6	Copy of Command message Byte 2							
7	Copy of Command Message Byte 3							

Notes:

- 1) Byte 2 bit 0 can be configured as the Servo Bus Voltage Okay status. See Appendix A CANCTL(99,x).
- 2) No supported.

**Table 2.4.3.2 Error Codes for Position Control Profile**

General Error Code	Additional Error Code	Error Description	Semantics
0x08	0x01	Service Not Supported	Command message type is not supported, this will take precedence over additional code 2
	0x02	Service Not Supported	Response message type not supported
0x05	0x01	Path Destination unknown	Consumed axis number was requested that does not exist.
	0x02	Path Destination unknown	Asked to produce data for a axis number that does not exist.
0x09	0xFF	Invalid Attribute Value	Value typically out of range
0x0E	0xFF	Attribute Not Settable	Requested to modify something not changeable.
0x13	0xFF	Not Enough Data	I/O Command message was less than 8 bytes
0x14	0xFF	Attribute Not Supported	Requested or specified attribute is not supported

## 2.4.4 IO Assembly Examples

These examples are meant for reference only they depict the Frame data on the bus over the Poll Connection for the Position Control Profile 16 IO Assembly. Examples may assume that for proper operation external IO states are to be satisfied to get desired result. Therefore to turn the Drive Stage ON for instance on a SM34195 motor the Drive Enable Input at the 12 Pin IO connector PIN 10 would have to be at 24Volts(Enabled).

Class 5 Smart Motors are a single axis, therefore the value of 0 or 1 may be used for the Axis Number in the IO assembly, examples may use 0 for easier reading. Also the symbol "0x??" is used to indicate that there are bits within the byte that are determined by present state of Motor. Further assumptions:

Motor sample rate is 8KHz, Motor Count per Rev is 4000, Motor is in Position mode.

### 2.4.4.1 Set Accel:

Command Frame: [ 0x01, 0x00, 0x23, 0x21, 0x7D, 0x01, 0x00, 0x00 ] Axis 1 AT=100  
 Response Frame: [ 0x??, 0x00, 0x8?, 0x21, 0x00, 0x00, 0x00, 0x00 ] Axis 1 at Position 0

Clear the Load Data, Power Stage ON:

Command Frame: [ 0x80, 0x00, 0x01, 0x01, 0x00, 0x00, 0x00, 0x00 ] Ask for position  
 Response Frame: [ 0x8?, 0x00, 0x0?, 0x01, 0x00, 0x00, 0x00, 0x00 ] Axis 1 ON, Position 0

### 2.4.4.1 Set Velocity leaving drive ON:

Command Frame: [ 0x8D, 0x00, 0x02, 0x01, 0xA0, 0x0F, 0x00, 0x00 ] Axis 1 VT=32768  
 Response Frame: [ 0x8?, 0x00, 0x8?, 0x01, 0x00, 0x00, 0x00, 0x00 ] Axis 1 at Position 0

Clear the Load Data:

Command Frame: [ 0x80, 0x00, 0x01, 0x01, 0x00, 0x00, 0x00, 0x00 ] Ask for position  
 Response Frame: [ 0x8?, 0x00, 0x0?, 0x01, 0x00, 0x00, 0x00, 0x00 ] Axis 1 ON, Position 0

### 2.4.4.1 Set Target Position and Start Profile:

Command Frame: [ 0x81, 0x00, 0x01, 0x01, 0x40, 0x1F, 0x00, 0x00 ] PT=8000 G  
 Response Frame: [ 0x81, 0x00, 0x8?, 0x01, 0x00, 0x00, 0x00, 0x00 ] Axis 1 at Position 0

Clear the Load Data, Assumes motor completed move:

Command Frame: [ 0x80, 0x00, 0x01, 0x01, 0x00, 0x00, 0x00, 0x00 ] Ask for position  
 Response Frame: [ 0x80, 0x00, 0x0?, 0x01, 0x40, 0x1F, 0x00, 0x00 ] Position 8000

### 2.4.4.0 Disable Hardware Limits(Class 37, Attribute 49(0x31)):

Command Frame: [ 0x01, 0x31, 0x1B, 0x31, 0xE0, 0x00, 0x00, 0x00 ]  
 Response Frame: [ 0x0?, 0x31, 0x8?, 0x1B, 0xE0, 0x00, 0x00, 0x00 ]

Clear the Load Data:

Command Frame: [ 0x00, 0x00, 0x01, 0x01, 0x00, 0x00, 0x00, 0x00 ] Ask for position  
 Response Frame: [ 0x0?, 0x00, 0x0?, 0x01, 0x00, 0x00, 0x00, 0x00 ] At Position 0

Note: Will turn the drive OFF if it had been ON.

### 3.0 DeviceNet Objects

Animatics Class 5 Smart Motor Profile supports the required objects of the DeviceNet Position Controller Profile number 16, see ODVA CIP specification Volume 1. Note the Set and Get Action columns also reference Animatics User program commands that can perform the same action.

#### 3.1 Position Controller Supervisor, Class 36 (decimal) Instance 1 Attribute Table:

Attribute ID	Access Rule	Name	DeviceNet Data Type	Description of Attribute	Get Action	Set Action
1	Get	Number of Attributes	USINT	Returns the total number of attributes supported by this object in this device	fixed	N/A
2	Get	Attribute List	Array of USINT	Returns an array with a list of the attributes supported by this object in this device	fixed	N/A
3	Get	Axis Number	USINT	Returns the axis number which is the same as the instance of the object	This will always return a 1	N/A
4				Reserved by DeviceNet		
5	Get	General Fault	BOOL	This bit is a logical OR of all fault condition attribute flags.	Is the inverse of the Class 5 internal Drive Ready status bit 0 of word 0. RB(0,0)	N/A
6	Get	Command Message Type	USINT	Sets the command message type that is being sent by the controlling device		N/A
7	Get	Response Message Type	USINT	Sets the response message that is returned to the controlling device		N/A
15	Set/Get	Index Arm	BOOL	Used to Arm the Index input		
18	Get	Index Position	DINT			
25	Set/Get	Follow Enable	BOOL			
27	Set/Get	Follow Divisor	DINT		a=MFDIV	MFDIV=nnn
28	Set/Get	Follow Mltplr	DINT		a=MF MUL	MF MUL=nnn
100	Set/Get	Follow Type	USINT			0=Step Dir MFR 1=AqB MSR

### 3.2 Position Controller, Class 37 (decimal) Instance 1 Attribute Table:

Attribute ID	Access Rule	Name	DeviceNet Data Type	Description of Attribute	Get Action	Set Action
1	Get	Number of Attributes	USINT	Returns the total number of attributes supported by this object in this device	fixed	N/A
2	Get	Attribute List	Array of USINT	Returns an array with a list of the attributes supported by this object in this device	fixed	N/A
3	Set/Get	Mode	USINT	Operating Mode	RMODE, P/R=1, V=3, T=4	0: MP 1: MV 2: MT
6	Set/Get	Target Position	DINT	Position value to set		absolute: PT=nnn incremental: PRT=nnn
7	Set/Get	Target Velocity	DINT	Velocity value to set	RVT	VT=nnn
8	Set/Get	Acceleration	DINT	Acceleration rate	RAT	AT=nnn
10	Set/Get	Incremental Position Flag	BOOL	0=absolute, 1=incremental		
11	Set/Get	Load Data/ Start Profile/ Profile in Progress	BOOL	On set, loads data and starts the current profile. On get, reports Profile in Progress	RW status bit 0	1: G 0: N/A
13	Set/Get	Actual Position	DINT	Actual absolute position. Set to redefine actual position.	RPA (or RPW)	O=nnn
14	Get	Actual Velocity	DINT	Reports actual velocity	RVA (only valid in Torque Mode)	N/A
15	Get	Commanded Position	DINT	The instantaneous calculated position	RPA (or RPW) + RPE	N/A
16	Get	Commanded Velocity	DINT	The instantaneous calculated velocity	RVC	N/A
17	Set/Get	Enable	BOOL	0=disable 1=enable On the enable edge commanded position is set to equal actual position.		1: G or MP D=0 G, allow G or MT 0: OFF
20	Set	Smooth Stop	BOOL	Smooth Stop motor	0	1: X
21	Set	Hard Stop	BOOL	Hard Stop motor	0	1: S
23	Set	Direction	BOOL	Instantaneous Direction 0=reverse, 1=forward	Position Mode (direction of move) Velocity Mode (sign of Velocity). Torque Mode, sign of Torque	V=+/-nnn G T=+/-nnn

Attribute ID	Access Rule	Name	DeviceNet Data Type	Description of Attribute	Get Action	Set Action
24	Set/Get	Reference Direction	BOOL	Shaft Direction forward facing shaft 0=CW, 1=CCW		
25	Set/Get	Torque	DINT	Output Torque	RT	T=nnn
29	Get	Wrap Around	BOOL	Position Wrap Around Indicator Flag	RW status bit 4	N/A
30	Set/Get	Kp	INT	Proportional Gain	RKP	KP=nnn F
31	Set/Get	Ki	INT	Integral Gain	RKI	KI=nnn F
32	Set/Get	Kd	INT	Derivative Gain	RKD	KD=nnn F
33	Set/Get	MaxKi	INT	Integration Limit	RKL	KL=nnn F
35	Set/Get	Velocity Feed Forward	INT	Velocity feed forward gain value	RKV	KV=nnn F
37	Get	Sample Rate	INT	Update sample rate in micro-seconds	RSP	N/A
40	Get	Feedback Resolution	DINT	Number of actual position feedback counts per revolution	RRES	N/A
41-44	No sup					
45	Set/Get	Max Dynamic Following Error	DINT	Maximum allowable following error when the motor is in motion	RE	E=nnn
47	Get	Following Error Fault	BOOL	Following error occurrence flag	RB(0,5)	N/A
48	Get	Actual Following Error	DINT	Actual Following error	RPE	N/A
49	Set	Hard Limit Action	USINT	Hard Limit Action code (applies to Soft Limit Action also) 0=Servo off 1=Hard Stop 2=Smooth Stop 224=Both Disabled	FSA	
50	Get	Forward Limit	BOOL	Forward Limit stop input status active	RBp or RB(0,14)	N/A
51	Get	Reverse Limit	BOOL	Reverse Limit stop input status active	RBm or RB(0,15)	N/A
52	Set/Get	Soft Limits Enable				
53	Set/Get	Soft Limit Action	USINT	Soft Limit Action Code (applies to Hard Limit Action Also) 0=Servo off 1=Hard Stop 2=Smooth Stop	RF, bit 0 0: F bit0==0 (F=0) 2: F bit0==1 (F=1)	0: clear F, bit0 (F=0) 2: set F, bit0 (F=1)
54	Set/Get	Positive Soft Limit Position	DINT	Soft limit positive boundary in counts, enable BOTH soft limits	y=SLP	SLD SLP=nnn SLE

Attribute ID	Access Rule	Name	DeviceNet Data Type	Description of Attribute	Get Action	Set Action
55	Set/Get	Negative Soft Limit Position	DINT	Soft limit negative boundary in counts, enable BOTH soft limits	y=SLN	SLD SLN=nnn SLE
56	Get	Positive Limit Triggered	BOOL	Hard or Soft limit forward limit occurrence flag	RBr Sw0 bit 12	
57	Get	Negative Limit Triggered	BOOL	Hard or Soft limit forward limit occurrence flag	RBI Sw0 bit 13	
58	Get	Load Data Complete	BOOL	valid data for a valid I/O command message type has been loaded into the position controller		N/A
100	Set	Current Limit	DINT	Current limit of motor 0 to 1023	RAMPS	AMPS=nnn
101	Set	Reset Motor Faults	BOOL	0 = no action 1 = reset faults		ZS
102	Set	Reset Motor	BOOL	0=no action 1=reset motor		Z
103	Get Set	Overheat Setpoint	USINT	Overheat setpoint 0-70 or 0-85 degrees C	y=TH Ry	TH=nn
104	Get	Temperature	INT	Real time temperature	y=TEMP Ry	
105	Get Set	Variable u	DINT	Motor user variable u	Ru	u=nnn
106	Get Set	Variable v	DINT	Motor user variable v	Rv	v=nnn
107	Get Set	Variable w	DINT	Motor user variable w	Rw	w=nnn
108	Get Set	Variable x	DINT	Motor user variable x	Rx	x=nnn
109	Set	GOSUBnnn	UINT	Motor user program command GOSUBnnn		GOSUBnnn
110	Get	Loss of Network Action	USINT	Action if DeviceNet network heartbeat lost 0=Servo off 1=Smooth stop 2=Hard stop 3=Motor reset 4=no action 5 to 9=GOSUBn		
111	Get	Status Word	UINT	Motor status word	RW(0)	

## 4.0 Vender Specific Objects

### 4.1 Class 112(0x70) Smart Motor IO Object

Same as Class 4 DN2 as of 5/18/2010. Except that Instance 1 is Input 0 for the User Program commands a=IN(0), OS(0), OR(0) in the Animatics Language.

#### Attribute Table(Instance 0):

Attr ID	Access Rule	Name	DeviceNet Data Type	Description of Attribute	Get Action	Set Action
1	Get	IO Word State	WORD	Return the value of first 16 IO points, bit 0 is IO Zero	a=IN(W,0)	N/A

#### Attribute Table(One instance per IO pin, see below):

Attr ID	Access Rule	Name	DeviceNet Data Type	Description of Attribute	Get Action	Set Action
1	Set/Get	IO Direction	BOOL			0=Output 1=Input EIGN(x)
2	Set/Get	Set Output State.	BOOL			0=OFF OR(x) 1=ON OS(x)
3	Get	IO State	BOOL	Returns present State of the IO either ON or OFF.	0=OFF 1=ON a=IN(x)	N/A
4	Get	Analog Raw Value	INT	Hardware dependent	a=INA(A,x)	N/A

Instance	Standard series	IP series
1	0 A enc	IO - 0
2	1 B enc	IO - 1
3	2 C positive limit	IO - 2
4	3 D negative limit	IO - 3 (Neg Limit)
5	4 E RS485 IIC	IO - 4 (Pos Limit)
6	5 F RS485 IIC	IO - 5
7	6 G Index capture	IO - 6 (Go)
8	7 virtual bit	IO - 7
9	No Support	IO - 8 (External Brake)
10	No Support	IO - 9
11	No Support	IO - 10
12	No Support	Output - 11 (Not Faulted)
13	No Support	Input - 12 (Drive Enable)
...		
17	Ext 0	No Support
18	Ext 1	"
19	Ext 2	"
20	Ext 3	"
21	Ext 4	"
22	Ext 5	"
23	Ext 6	"
24	Ext 7	"
25	Ext 8	"
26	Ext 9	"

## 5.0 DeviceNet Indicators(LEDs)

Module Status LED:

OFF	Power is Off or not applied correctly.
Green Solid	Device is Operating in Normal Condition.
Red Solid	Device is in Unrecoverable fault, needs factory support.
Red Flashing	Recoverable Fault.
Green Flashing	Configuration Missing.
Flashing Red Green	Self test.

Network Status LED:

OFF	Device is not Online. Missing network power or yet to complete Dup Mac successfully.
Green Flashing	Device is On-Line but yet to be connected and is not allocated to a master.
Green Solid	The device is On-Line and has at least one connection and is allocated to a master.
Red Flashing	One or more IO connections are in the timed out state.
Red Solid	Failed Communications. Possible Mac-ID conflict or errors across network has rendered device incapable of communicating and has gone Bus-OFF.

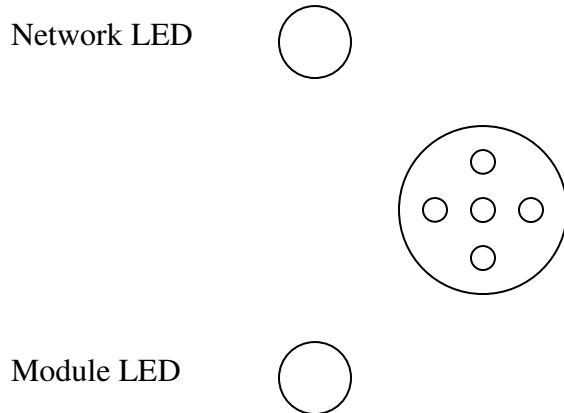


Figure 1: CAN LED locations as seen from the back of the Smart Motor.

## **Appendix A**

### **A1.0 Application Modifications Necessary For Version DN2 Class 4 Users Migrating to Class 5**

If you are a DN Class 4 user and haven't upgraded to DN2 Class 4 you most first read Manual DN2 Extensions.

## **A2.0 CAN User Program Commands**

The only user settable options are the baud rate and node ID. These options are persistent in EE, and the motor must be rebooted for them to take effect if changed.

**CADDR=number**

Where Number may be from 1-to 127

**CBAUD=number**

Where Number may be one of the following:

1000000,800000,500000,250000,125000,100000,50000,20000,10000

**RCBAUD or x=CBAUD** reports the can baud rate as one of the values show above.

**RCADDR or x=CADDR** reports the node ID.

**RCAN or x=CAN**

The report from RCAN is a bit map of errors that CAN happen over the CANBus. And where the return into x, or the report, has the following bit define:

Bit	Description
0	CAN Bus Power Okay(1)
1	DeviceNet is OFF line and Faulted, most likely a DupMac failure or CAN MAC Bus-OFF.
2	DeviceNet Network Power status ignore feature enabled (see CANCTL(2,x) ).
3	Reserved
4	User attempted to do Combitronics read from broadcast address
5	Combitronics debug, internal issue.
6	Timeout (Combitronics Client)
7	Combitronics server ran out of buffer slots.
8	Errors reached warning level
9	Receive Errors reached warning level
10	Transmit Errors reached warning level
11	Receive Passive Error
12	Transmit Passive Error
13	Bus Off Error
14	RX buffer 1 overflowed
15	RX buffer 0 overflowed

Notes:

1) Not all hardware can support this.

**CANCTL(action, value)**

Command executes commands based on the action argument to control CAN Network functions, Note that DeviceNet is only one protocol a Smart motor can support over the CAN network. Some settings are non-volatile and saved in EE to maintain behavior from one power-up to the next.

Action = 0: Network Timeout Action. Setting is non-volatile.

Where: Value is 0-9

0=servo off

1=smooth stop

2=hard stop

3=motor reset

4=no action

5 to 9= GOSUBn

Action = 1: Is reset the CAN MAC and all errors. Resets CANOpen stack or DeviceNet stack depending on firmware type.

Where: Value is ignored.

Action = 2: DeviceNet Power Status Over-ride. If **value** is ever set to a one (1) then the Network access state machine attempts to go online even if the DeviceNet power across the network is missing. Also has the effect if once online will not drop connections if power across the network is removed. If value is anything but one(1) will but the behavior back to default, and the DeviceNet Access State Machine behaves per ODVA specification. Setting is non-volatile and remembered from one power-up to the next.

Action = 3: Reset the CANOpen interpolation buffer via user command.

Where: Value is ignored.

Action = 4: Force entry into CANOpen interpolation mode via user command.

Where: Value is 7 to force interpolation mode mode.

Action = 5: Set timeout for Combitronics.

Where: Value is in milliseconds, and defaults to 30 for 30 milliseconds.

Action = 99: Change Behavior.

Where:

Value is 0 to resume default behavior.

Value is 1 to override the Drive Enable Input (if equip'd, see note below).

Drive can be enabled assuming there are no faults.

Value is 2 Change Fault Input bit in IO Assembly response to be the Servo Bus Voltage Status.

Value is 99 to override the Drive Enable Input feature and enable the report of bus voltage status via DeviceNet.

NOTE: Only Class 5 IP motors using Firmware 5.97.x.x and 5.96.x.x are equipped with a drive Enable hardware Input.