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SE-330/SE-330AU/SE-330HV DEVICENET INTERFACE

March 15, 2010

Revision 1

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Publication: 330DeviceNet-M
Document:
Printed in Canada.

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1. General

This document describes the Anybus DeviceNet features supported by the SE-330/SE-330AU/SE-330HV. The DeviceNet module supports Explicit, Polled I/O, Bit-Strobe, and Change-of-State messages of predefined master/slave connection set. It does not support the Unconnected Message Manager (UCMM).

2. DeviceNet Configuration

2.1 DeviceNet Connections

TABLE 2.1 SE-330/SE-330AU/SE-330HV DeviceNet Connections

SE-330/SE-330AU/SE-330HV Terminal	Description
1	V -
2	CAN_L
3	SHIELD/DRAIN
4	CAN_H
5	V +

2.2 Configuration Settings

A DIP switch is used to set the baud rate and DeviceNet MAC ID. Both must be set prior to applying supply voltage.

2.2.1 Baud Rate

Three baud rates are supported by DeviceNet and selected using SW1 and SW2 on the communication module.

TABLE 2.2 Baud-Rate Settings

Baud Rate	SW1	SW2
125 k	OFF	OFF
250 k	OFF	ON
500 k	ON	OFF
RESERVED	ON	ON

2.2.2 MAC ID

SW3 to SW8 are used to set the node address. SW3 is the most-significant bit and SW8 is the least-significant bit. Address selection is in binary.

TABLE 2.3 Node-Address Settings

Address	SW3	SW4	SW5	SW6	SW7	SW8
0	OFF	OFF	OFF	OFF	OFF	OFF
1	OFF	OFF	OFF	OFF	OFF	ON
.	.	.	.	.	.	.
.	.	.	.	.	.	.
63	ON	ON	ON	ON	ON	ON

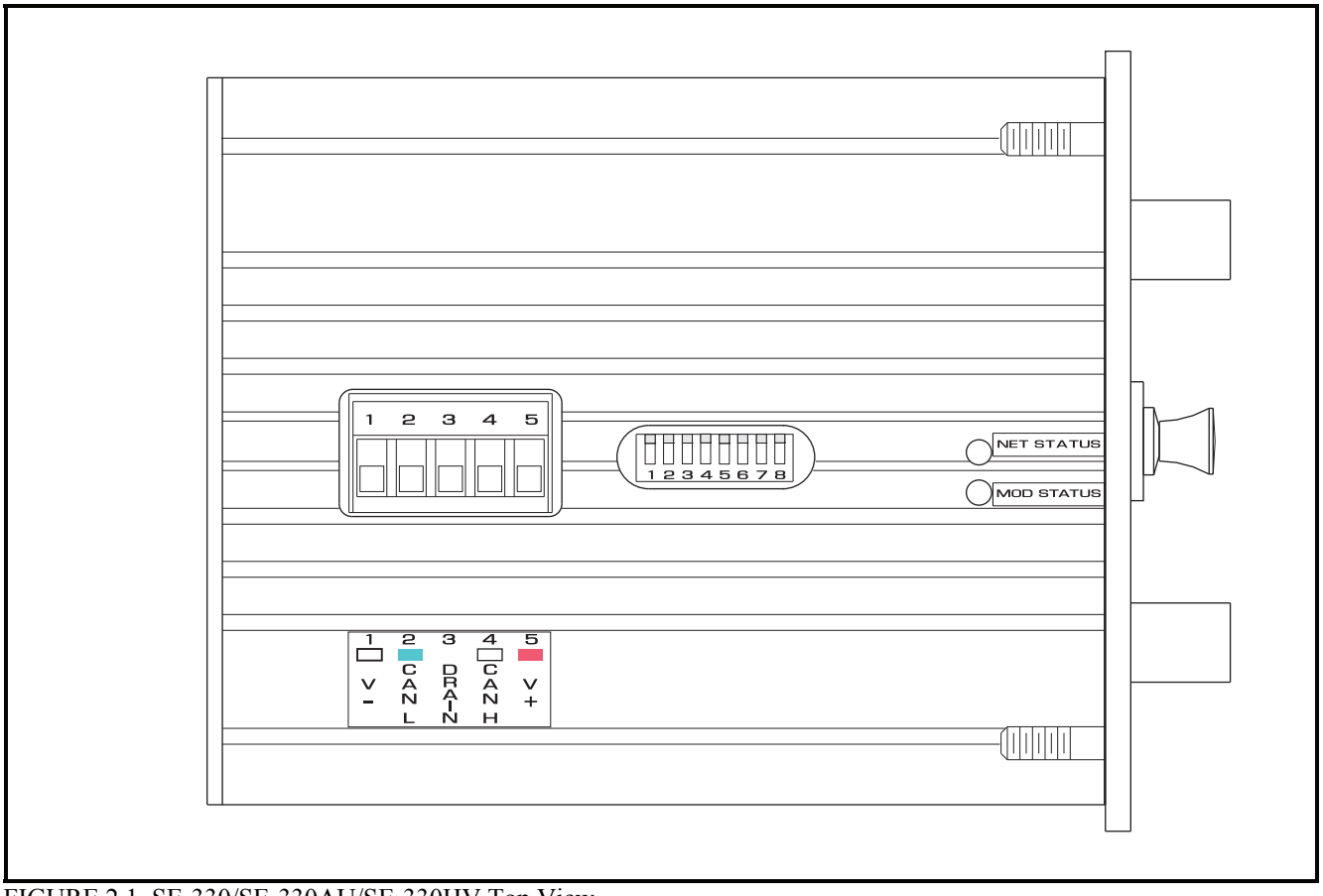


FIGURE 2.1 SE-330/SE-330AU/SE-330HV Top View

2.3 LED INDICATION

The module contains two LED indicators.

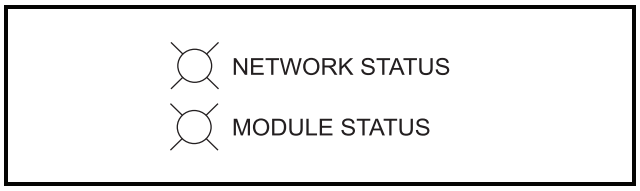


FIGURE 2.2 LED Indicators.

TABLE 2.4 MODULE STATUS LED

NETWORK STATUS LED	DESCRIPTION
Off	Not Powered/Not On Line
Steady Green	Link OK/On line/Connected
Steady Red	Link Failure
Flashing Green	On Line/Not Connected
Flashing Red	Connection Timed Out

TABLE 2.5 NETWORK STATUS LED

MODULE STATUS LED	DESCRIPTION
Off	No Power
Steady Red	Unrecoverable Fault
Steady Green	Device Operational
Flashing Red	Minor Fault

2.4 TERMINATION

DeviceNet requires a 120 Ω resistor at each end of the network.

2.5 POWER CONSUMPTION

The DeviceNet module requires 30 mA from the 24 Vdc supply to power the driver circuits.

2.6 EDS FILE

The eds file defines the parameters that are user accessible using a configuration tool such as RSNetWorx. Three eds files provide support for the standard SE-330, SE-330AU, and the SE-330HV. The eds file includes configuration information for I/O assemblies. The I/O assembly associated with each type of connection object can be selected by the configuration tool. These I/O assemblies are accessed using a DeviceNet master such as an A-B scanner module, see Section 3.5. I/O configuration parameters are stored in non-volatile memory.

Not all attributes listed in this document are defined by the eds file. Most attributes are part of the DeviceNet protocol, and do not need to be adjusted.

3. DEVICENET OBJECTS (In Order of Class Number)

The module supports the following objects:

TABLE 3.1 CLASS OBJECTS

CLASS	ATTRIBUTE
0x01	Identity
0x02	Message Router
0x03	DeviceNet
0x04	Assembly
0x05	Connection
0x2B	Acknowledge Handler
0xB0	Input Parameters
0xB1	Output Parameters

The following table contains the SE-330/SE-330AU/ SE-330HV attributes that are referenced in the sections dealing with the assembly and parameter classes.

SE-330 Attribute Definitions

ATTRIBUTE NAME	DESCRIPTION	DEFAULT, MINIMUM, MAXIMUM	DATA TYPE
Trip Status Pre-Trip Status	Bit string of fault bits Bit 0, EF/GF: 1 = Earth/Ground Fault Trip 0 = No Trip Bit 1, RF: 1 = Resistor Fault Trip 0 = No Trip Bit 2, CAL: 1 = Calibration Error (1) 0 = No Error Bit 3, ADC: 1 = A/D Error (1) 0 = No Error Bit 4, GRV: 1 = Voltage Trip 0 = No Trip Bit 5, EE: 1 = EEPROM Error 0 = No Error Bit 6, SYS: 1 = Internal Fault 0 = No Internal Fault (Will cause a EF/GF and RF trip) Bit 7, RMT: 1 = Remote Trip 0 = No Trip (Will cause a EF/GF and RF trip) (1) These bits do not activate the EF/GF indication relay.	0, 0, 255	BYTE

SE-330 Attribute Definitions (Continued)

ATTRIBUTE NAME	DESCRIPTION	DEFAULT, MINIMUM, MAXIMUM	DATA TYPE
Pending Trips	Bit string of status bits Bit 0, EF/GF: 1 = EF/GF Current > Set Point 0 = EF/GF Current < Set Point Bit 1, RF: 1 = NER/NGR Resistance Exceeding Limits 0 = NER/NGR Resistance Within Limits	0, 0, 3	BYTE
Relay Status	Bit string indicating the state of output relays Bit 1, K3: 1 = RF Indication Relay Energized 0 = Not Energized Bit 2, K2: 1 = EF/GF Indication Relay Energized 0 = Not Energized Bit 3, K1: 1 = Trip/Pulse Relay Energized 0 = Not Energized	N/A, 0, 15	BYTE
Switches	Bit string indicating the state of the configuration switches Bit 0, S4: 1 = RF Latch 0 = RF Not Latched Bit 1, S3: 1 = EF/GF Latched 0 = EF/GF Not Latched Bit 2, S5: 1 = 20 k Sensor (200 k for SE-330HV) 0 = 100 k Sensor Bit 3, S6: 1 = 50 Hz 0 = 60 Hz Bit 4, S2: 1 = Fail Safe Trip-Relay Operation 0 = Non Fail Safe Operation S2 not applicable to SE-330AU Bit 5, S1: 1 = Trip Configuration (K1) 0 = Pulsing Configuration (K1) S1 not applicable to SE-330HV and SE-330AU	N/A, 0, 255	BYTE
Record x (x = 0 to 9)	A trip record consists of the following: Trip Status (Data Type D1) Current (Data Type C6) Voltage (Data Type C6) Delta Ohms (Data Type C3)	N/A, N/A, N/A	STRUCT
Command	This value specifies the command. Command Request codes are as follows: Reset Command: Transition from 0 to 1 Remote Trip: Transition from 0 to 2 Clear Event Records: Transition from 0 to 4	0, 0, 2	USINT
EF/GF Trip Time	Positions on front-panel EF/GF Trip Time Selector. Position / SE-330/SE-330HV / SE-330AU 0 / 100 ms / 100 ms 1 / 200 ms / 120 ms 2 / 300 ms / 140 ms 3 / 400 ms / 160 ms 4 / 500 ms / 180 ms 5 / 700 ms / 200 ms 6 / 1 s / 250 ms 7 / 2 s / 300 ms 8 / 3 s / 350 ms 9 / 5 s / 400 ms 10 / 10 s / 500 ms	N/A, 0, 10	USINT

SE-330 Attribute Definitions (Continued)

<table>
<tr><th>Attribute Name</th><th>Description</th><th>Default, Minimum, Maximum</th><th>Data Type</th></tr>
<tr><td>EF/GF Level</td><td>Positions on front-panel EF/GF Trip Level Selector
<table><tr><th>Position</th><th>SE-330/SE-330HV</th><th>SE-330AU EFCT-x</th><th>SE-330AU CS30-x</th></tr><tr><td>0</td><td>2% CT Rating</td><td>125 mA</td><td>0.75 A</td></tr><tr><td>1</td><td>4% CT Rating</td><td>250 mA</td><td>1.5 A</td></tr><tr><td>2</td><td>6% CT Rating</td><td>300 mA</td><td>1.8 A</td></tr><tr><td>3</td><td>8% CT Rating</td><td>400 mA</td><td>2.4 A</td></tr><tr><td>4</td><td>10% CT Rating</td><td>500 mA</td><td>3.0 A</td></tr><tr><td>5</td><td>15% CT Rating</td><td>750 mA</td><td>4.5 A</td></tr><tr><td>6</td><td>20% CT Rating</td><td>1 A</td><td>6.0 A</td></tr><tr><td>7</td><td>40% CT Rating</td><td>2 A</td><td>12.0 A</td></tr><tr><td>8</td><td>60% CT Rating</td><td>3 A</td><td>18.0 A</td></tr><tr><td>9</td><td>80% CT Rating</td><td>4 A</td><td>24.0 A</td></tr><tr><td>10</td><td>100% CT Rating</td><td>5 A</td><td>30.0 A</td></tr></table></td><td>N/A, 0, 10</td><td>USINT</td></tr>
<tr><td>Pulse Time
(Not Applicable to SE-330HV or SE-330AU)</td><td>Positions on front-panel Pulse Period Selector
0 = 1.0 s
1 = 1.2 s
2 = 1.4 s
3 = 1.6 s
4 = 1.8 s
5 = 2.0 s
6 = 2.2 s
7 = 2.4 s
8 = 2.6 s
9 = 2.8 s
10 = 3.0 s</td><td>N/A, 0, 10</td><td>USINT</td></tr>
<tr><td>NER/NGR Current Pre-Trip Current</td><td>NER/NGR current reading in percent of CT Primary Rating</td><td>0, 0, 255</td><td>USINT</td></tr>
<tr><td>NER/NGR Voltage Pre-Trip Voltage</td><td>NER/NGR voltage reading in percent of Vn trip level setting on the front panel</td><td>0, 0, 255</td><td>USINT</td></tr>
<tr><td>NER/NGR Change Pre-Trip Change</td><td>Resistance deviation from calibrated setting</td><td>0, -32000, +32000</td><td>INT</td></tr>
<tr><td>Record Head</td><td>Pointer to the latest of 10 pre-trip records. 255 indicates no trips recorded.</td><td>0, 0, 255</td><td>USINT</td></tr>
<tr><td>Fault Reset</td><td>0 to 1 transition causes a reset</td><td>0, 0, 1</td><td>BOOL</td></tr>
<tr><td>Remote Trip</td><td>0 to 1 transition causes a remote trip</td><td>0, 0, 1</td><td>BOOL</td></tr>
<tr><td>Clear Event Records</td><td>0 to 1 transition causes a clear event records</td><td>0, 0, 1</td><td>BOOL</td></tr>
</table>

3.1 Identity Object

Identity Class (1), Instance (0) Attributes

Attribute Number	Attribute Name	Services	Description	Default, Minimum, Maximum	Data Type
1 0x01	Revision	Get_Attribute_Single	Revision of this object	1, 1, 1	UINT

Identity Class (1), Instance (1) Attributes

1 0x01	Vendor ID	Get_Attribute_Single	Identification of each vendor by number. Littelfuse Startco vendor number is 691	691	UINT
2 0x02	Device Type	Get_Attribute_Single	Indication of the general type of product. Generic product.	0	UINT
3 0x03	Product Code	Get_Attribute_Single	This is a code assigned by the vendor to describe the device.	SE-330 = 330 SE-330HV = 3301 SE-330AU = 3302	UINT
4 0x04	Revision	Get_Attribute_Single	Revision of the item the Identity Object represents.	0x0101	A2 02 C6 C6
5 0x05	Status	Get_Attribute_Single	Summary Status of the device.	0, 0, 255	WORD
6 0x06	Serial Number	Get_Attribute_Single	Serial Number of the device.	N/A, N/A, N/A	UDINT
7 0x07	Product Name	Get_Attribute_Single	Human readable identification.	"SE-330", "SE-330", "SE-330"	SHORT-STRING
9 0x09	Config. Consist Value	Get_Attribute_Single	Contents identify configuration of device.	N/A, N/A, N/A	UINT

3.2 MESSAGE ROUTER

Message Router Class (2), Instance (0) Attributes

ATTRIBUTE NUMBER	ATTRIBUTE NAME	SERVICES	DESCRIPTION	DEFAULT, MINIMUM, MAXIMUM	DATA TYPE
1 0x01	Revision	Get_Attribute_Single	Revision of this object	1, 1, 1	UINT

3.3 DEVICENET OBJECT

DeviceNet Class (3), Instance (0) Attributes

ATTRIBUTE NUMBER	ATTRIBUTE NAME	SERVICES	DESCRIPTION	DEFAULT, MINIMUM, MAXIMUM	DATA TYPE
1 0x01	Revision	Get_Attribute_Single	Revision of the DeviceNet object class. Definition upon which the implementation is based.	2, 2, 2	UINT

DeviceNet Class (3), Instance (1) Attributes

ATTRIBUTE NUMBER	ATTRIBUTE NAME	SERVICES	DESCRIPTION	DEFAULT, MINIMUM, MAXIMUM	DATA TYPE
1 0x01	MAC ID	Get_Attribute_Single	Node address	63, 0, 63	USINT
2 0x02	Baud Rate	Get_Attribute_Single	The baud rate of the device 0 – 125 k 1 – 250 k 2 – 500 k	0, 0, 2	USINT

3.4 ASSEMBLY OBJECT

Class 4 defines three INPUT and one OUTPUT assembly. Assemblies are accessed using a connection object (Explicit Messaging, Polling, Strobed, or COS). The assembly used by the specific connection is set using a configuration tool such as RSNetWorx. See section 3.5.

Assembly Class (4), Instance (0) Attributes

ATTRIBUTE NUMBER	ATTRIBUTE NAME	SERVICES	DESCRIPTION	DEFAULT, MINIMUM, MAXIMUM	DATA TYPE
1 0x01	Revision	Get_Attribute_Single	Revision of this object	1, 1, 1	UINT

Assembly Class (4), Instance (100), Attribute (3) – Input 1 (9 Bytes)

BYTE	BIT7	BIT6	BIT5	BIT4	BIT3	BIT2	BIT1	BIT0
0	Remote Trip	Internal Error	EEPROM Error	NER/NGR Volts	ADC Error	CAL Error	RF Trip	EF/GF Trip
1							RF Detect	EF/GF Detect
2	EF/GF Trip Time Selector (Position 0 to 10)							
3	EF/GF Trip Level Selector (Position 0 to 10)							
4	Pulse Period Selector (Position 0 to 10), Not Applicable to SE-330HV							
5	NER/NGR Current (% of CT Rating)							
6	NER/NGR Voltage (% of Setting)							
7	Delta Ohms (Low) (ohms)							
8	Delta Ohms (High) (ohms)							

Assembly Class (4), Instance (101), Attribute (3) – Input 2 (2 Bytes)

BYTE	BIT7	BIT6	BIT5	BIT4	BIT3	BIT2	BIT1	BIT0
0	Remote Trip	Internal Error	EEPROM Error	NER/NGR Volts	ADC Error	CAL Error	RF Trip	EF/GF Trip
1							RF Detect	EF/GF Detect

Assembly Class (4), Instance (102), Attribute (3) – Input 3 (51 Bytes)

BYTE	BIT7	BIT6	BIT5	BIT4	BIT3	BIT2	BIT1	BIT0
0	Record Head							
1	Remote Trip	Internal Error	EEPROM Error	NER/NGR Volts	ADC Error	CAL Error	RF Trip	EF/GF Trip
2	NER/NGR Current (% of CT Rating)							
3	NER/NGR Voltage (% of Setting)							
4	Delta Ohms (Low) (ohms)							
5	Delta Ohms (High) (ohms)							
6	Remote Trip	Internal Error	EEPROM Error	NER/NGR Volts	ADC Error	CAL Error	RF Trip	EF/GF Trip
7	NER/NGR Current (% of CT Rating)							
8	NER/NGR Voltage (% of Setting)							
9	Delta Ohms (Low) (ohms)							
10	Delta Ohms (High) (ohms)							
11	Remote Trip	Internal Error	EEPROM Error	NER/NGR Volts	ADC Error	CAL Error	RF Trip	EF/GF Trip
12	NER/NGR Current (% of CT Rating)							
13	NER/NGR Voltage (% of Setting)							
14	Delta Ohms (Low) (ohms)							
15	Delta Ohms (High) (ohms)							

Assembly Class (4), Instance (102), Attribute (3) – Input 3 (51 Bytes) (Continued)

BYTE	BIT7	BIT6	BIT5	BIT4	BIT3	BIT2	BIT1	BIT0
16	Remote Trip	Internal Error	EEPROM Error	NER/NGR Volts	ADC Error	CAL Error	RF Trip	EF/GF Trip
17	NER/NGR Current (% of CT Rating)							
18	NER/NGR Voltage (% of Setting)							
19	Delta Ohms (Low) (ohms)							
20	Delta Ohms (High) (ohms)							
21	Remote Trip	Internal Error	EEPROM Error	NER/NGR Volts	ADC Error	CAL Error	RF Trip	EF/GF Trip
22	NER/NGR Current (% of CT Rating)							
23	NER/NGR Voltage (% of Setting)							
24	Delta Ohms (Low) (ohms)							
25	Delta Ohms (High) (ohms)							
26	Remote Trip	Internal Error	EEPROM Error	NER/NGR Volts	ADC Error	CAL Error	RF Trip	EF/GF Trip
27	NER/NGR Current (% of CT Rating)							
28	NER/NGR Voltage (% of Setting)							
29	Delta Ohms (Low) (ohms)							
30	Delta Ohms (High) (ohms)							
31	Remote Trip	Internal Error	EEPROM Error	NER/NGR Volts	ADC Error	CAL Error	RF Trip	EF/GF Trip
32	NER/NGR Current (% of CT Rating)							
33	NER/NGR Voltage (% of Setting)							
34	Delta Ohms (Low) (ohms)							
35	Delta Ohms (High) (ohms)							
36	Remote Trip	Internal Error	EEPROM Error	NER/NGR Volts	ADC Error	CAL Error	RF Trip	EF/GF Trip
37	NER/NGR Current (% of CT Rating)							
38	NER/NGR Voltage (% of Setting)							
39	Delta Ohms (Low) (ohms)							
40	Delta Ohms (High) (ohms)							
41	Remote Trip	Internal Error	EEPROM Error	NER/NGR Volts	ADC Error	CAL Error	RF Trip	EF/GF Trip
42	NER/NGR Current (% of CT Rating)							
43	NER/NGR Voltage (% of Setting)							
44	Delta Ohms (Low) (ohms)							
45	Delta Ohms (High) (ohms)							
46	Remote Trip	Internal Error	EEPROM Error	NER/NGR Volts	ADC Error	CAL Error	RF Trip	EF/GF Trip
47	NER/NGR Current (% of CT Rating)							
48	NER/NGR Voltage (% of Setting)							
49	Delta Ohms (Low) (ohms)							
50	Delta Ohms (High) (ohms)							

Assembly Class (4), Instance (150), Attribute (3) – Output 1 (1 Byte)

BYTE	BIT7	BIT6	BIT5	BIT4	BIT3	BIT2	BIT1	BIT0
0						Clear Event Records	Remote Trip	Fault Reset

3.5 DEVICENET CONNECTION OBJECT

Attributes in Instance (0) are used to assign an Assembly Instance to an I/O connection. These attributes must be set prior to the corresponding connection being established.

The Anybus module supports six INPUT and OUTPUT assemblies, however only three INPUT assemblies and one OUTPUT assembly are supported. The INPUT or OUTPUT assembly is selected using a configuration tool and the corresponding parameter value is sent to the module. Parameters are stored in non-volatile memory and are retained on loss of control power. INPUT and OUTPUT assemblies are described in Section 3.4.

Input 1: Status, Settings, Meters
Assembly Class 4, Instance 100, Attribute 3
Byte size = 9
Parameter value 0 is Input 1
Input 1 is the default for Polled Production
Input 2: Status
Assembly Class 4, Instance 101, Attribute 3
Byte size = 2
Parameter value 1 is Input 2
Input 2 is the default for Strobed and COS Production
Input 3: Pre-Trip Values
Assembly Class 4, Instance 102, Attribute 3
Byte size = 51
Parameter value 2 is Input 3
Input 4, Input 5, Input 6: Not supported by SE-330.

Output 1: Commands
Assembly Class 4, Instance 150, Attribute 3
Byte size = 1
Parameter value 0 is Output 1
Output 1 is the default for Polled and Strobed Consumption
Output 2, Output 3, Output 4, Output 5, Output 6: Not supported by SE-330/SE-330AU/SE-330HV.

NOTE: The Anybus module supports six I/O assemblies and requires the EDS file to support six setting values, even though the SE-330/SE-330AU/SE-330HV does not support all six I/O assemblies.

3.5.1 RSNETWORX I/O CONFIGURATION

The DeviceNet interface module supports Polling, Bit Strobe, and Change of State. The Polling connection is the default. The I/O tab in RSNetWorx lists the configuration options with the default in bold. Each connection type has an associated INPUT and OUTPUT assembly. The I/O tab shows the default assembly for each connection type. The INPUT assembly type for a specific connection can be changed using parameters 1, 3, and 5. The OUTPUT assembly (parameter 2 and 4) cannot be changed and is fixed as OUTPUT1 with a byte size of 1. When the INPUT assembly for a specific connection is changed to a value other than the default, the scanner may indicate a configuration warning. Disregard the warning. Use "Edit I/O Parameters" to enable the required connection and adjust the byte size to match the INPUT assembly. The byte size for the OUTPUT must be set to 1.

DeviceNet Connection Class (5), Instance (0) Attributes

ATTRIBUTE NUMBER	ATTRIBUTE NAME	SERVICES	DESCRIPTION	DEFAULT, MINIMUM, MAXIMUM (2)	DATA TYPE	EDS PARAM
1 0x01	Revision	Get_Attribute_Single	Revision of this Connection Object Class. Definition upon which the implementation is based.	1, 1, 1	UINT	N/A
100 0x64	Polled Production	Get_Attribute_Single Set_Attribute_Single	Selects input assembly used for connection	0, 0, 2	USINT	1
101 0x65	Polled Consumption	Get_Attribute_Single Set_Attribute_Single	Selects output assembly used for connection	0, 0, 0	USINT	2
102 0x66	Strobed Production	Get_Attribute_Single Set_Attribute_Single	Selects input assembly used for connection (1)	1, 0, 2	USINT	3
103 0x67	Strobed Consumption	Get_Attribute_Single Set_Attribute_Single	Selects output assembly used for connection.	0, 0, 0	USINT	4
104 0x68	COS Production	Get_Attribute_Single Set_Attribute_Single	Selects input assembly used for connection	1, 0, 2	USINT	5

(1) A maximum of 8 bytes can be transferred across this connection.
(2) The module will return an error if parameter value exceeds the maximum.

DeviceNet Connection Class (5), Explicit Connection Instance (1) Attributes

ATTRIBUTE NUMBER	ATTRIBUTE NAME	SERVICES	DESCRIPTION	DEFAULT, MINIMUM, MAXIMUM	DATA TYPE
1 0x01	State	Get_Attribute_Single	State of the object 0 = Nonexistent 1 = Configuring 3 = Establishing 4 = Timed out 5 = Deferred Delete	1, 0, 5	USINT
2 0x02	Instance Type	Get_Attribute_Single	Indicates either I/O or messaging connection	0, 0, 0	USINT
3 0x03	Transport Class Trigger	Get_Attribute_Single	Defines behavior of the connection	0x83, 0x83, 0x83	BYTE
4 0x04	Produced Cnxn ID	Get_Attribute_Single	Placed in CAN Identifier field when the Connection Transmits	N/A, N/A, N/A	UINT
5 0x05	Consumed Cnxn ID	Get_Attribute_Single	CAN Identifier Field value that denotes message to be received	N/A, N/A, N/A	UINT
6 0x06	Initial Comm Characteristics	Get_Attribute_Single	Defines the Message Group(s) across which productions and consumptions associated with this Connection occur	N/A, N/A, N/A	BYTE
7 0x07	Produced Connection Size	Get_Attribute_Single	Maximum number of bytes transmitted across this Connection	512, 512, 512	UINT
8 0x08	Consumed Connection Size	Get_Attribute_Single	Maximum number of bytes received across this Connection	512, 512, 512	UINT
9 0x09	Expected Packet Rate	Get_Attribute_Single Set_Attribute_Single	Defines timing associated with this Connection. Resolution is 10 ms.	N/A, N/A, N/A	UINT
12 0x0C	Watchdog Timeout Action	Get_Attribute_Single Set_Attribute_Single	Defines how to handle inactivity/Watchdog timeouts 0 – Transition to time out 1 – Auto Delete 2 – Auto Reset 3 – Deferred Delete	N/A, N/A, N/A	USINT
13 0x0D	Produced Connection Path Length	Get_Attribute_Single	Number of bytes in the produced_connection_path length attribute	0, 0, 0	UINT
14 0x0E	Produced Connection Path	Get_Attribute_Single	Application Object producing data on this connection	{}, {}, {}	EPATH
15 0x0F	Consumed Connection Path Length	Get_Attribute_Single	Number of bytes in the consumed_connection_path length attribute	0, 0, 0	UINT
16 0x10	Consumed Connection Path	Get_Attribute_Single	Specifies the Application Object(s) that are to receive the data consumed by this Connection Object	{}, {}, {}	EPATH

DeviceNet Connection Class (5), Polled I/O Connection Instance (2) Attributes

Attribute Number	Attribute Name	Services	Description	Default, Minimum, Maximum	Data Type
1 0x01	State	Get_Attribute_Single	State of the object 0 = Nonexistent 1 = Configuring 3 = Establishing 4 = Timed out	1, 0, 4	USINT
2 0x02	Instance Type	Get_Attribute_Single	Indicates either I/O or messaging connection 0 = Explicit message 1 = I/O message	0, 0, 1	USINT
3 0x03	Transport Class Trigger	Get_Attribute_Single	Defines behavior of the connection	N/A, N/A, N/A	BYTE
4 0x04	Produced Cnxn ID	Get_Attribute_Single	Placed in CAN Identifier field when the Connection Transmits	N/A, N/A, N/A	UINT
5 0x05	Consumed Cnxn ID	Get_Attribute_Single	CAN Identifier Field value that denotes message to be received	N/A, N/A, N/A	UINT
6 0x06	Initial Comm Characteristics	Get_Attribute_Single	Defines the Message Group(s) across which productions and consumptions associated with this Connection occur	N/A, N/A, N/A	BYTE
7 0x07	Produced Connection Size	Get_Attribute_Single	Maximum number of bytes transmitted across this Connection	Defined by Connection Class 5, Instance 0, Attribute 100	UINT
8 0x08	Consumed Connection Size	Get_Attribute_Single	Maximum number of bytes received across this Connection	Defined by Connection Class 5, Instance 0, Attribute 101	UINT
9 0x09	Expected Packet Rate	Get_Attribute_Single Set_Attribute_Single	Defines timing associated with this Connection.	N/A, N/A, N/A	UINT
12 0x0C	Watchdog Timeout Action	Get_Attribute_Single	Defines how to handle inactivity/Watchdog timeouts 0 – Transition to time out 1 – Auto Delete 2 – Auto Reset	0, 0, 2	USINT
13 0x0D	Produced Connection Path Length	Get_Attribute_Single	Number of bytes in the produced_connection_path length attribute	6, 6, 6	UINT
14 0x0E	Produced Connection Path	Get_Attribute_Single Set_Attribute_Single	Application Object producing data on this connection	Defined by Connection Class 5, Instance 0, Attribute 100	EPATH
15 0x0F	Consumed Connection Path Length	Get_Attribute_Single	Number of bytes in the consumed_connection_path length attribute	3, 3, 3	UINT
16 0x10	Consumed Connection Path	Get_Attribute_Single	Specifies the Application Object(s) that are to receive the data consumed by this Connection Object	Defined by Connection Class 5, Instance 0, Attribute 101	EPATH

DeviceNet Connection Class (5), Bit-Strobe Connection Instance (3) Attributes

ATTRIBUTE NUMBER	ATTRIBUTE NAME	SERVICES	DESCRIPTION	DEFAULT, MINIMUM, MAXIMUM	DATA TYPE
1 0x01	State	Get_Attribute_Single	State of the object 0 = Nonexistent 1 = Configuring 3 = Establishing 4 = Timed out	1, 0, 4	USINT
2 0x02	Instance Type	Get_Attribute_Single	Indicates either I/O or messaging connection 0 = Explicit message 1 = I/O message	1, 0, 1	USINT
3 0x03	Transport Class Trigger	Get_Attribute_Single	Defines behavior of the connection	N/A, N/A, N/A	BYTE
4 0x04	Produced Cnxn ID	Get_Attribute_Single	Placed in CAN Identifier field when the Connection Transmits	N/A, N/A, N/A	UINT
5 0x05	Consumed Cnxn ID	Get_Attribute_Single	CAN Identifier Field value that denotes message to be received	N/A, N/A, N/A	UINT
6 0x06	Initial Comm Characteristics	Get_Attribute_Single	Defines the Message Group(s) across which productions and consumptions associated with this Connection occur	N/A, N/A, N/A	BYTE
7 0x07	Produced Connection Size	Get_Attribute_Single	Maximum number of bytes transmitted across this Connection	Defined by Connection Class 5, Instance 0, Attribute 102	UINT
8 0x08	Consumed Connection Size	Get_Attribute_Single	Maximum number of bytes received across this Connection	8, 8, 8	UINT
9 0x09	Expected Packet Rate	Get_Attribute_Single Set_Attribute_Single	Defines timing associated with this Connection.	0, 0, 65535	UINT
12 0x0C	Watchdog Timeout Action	Get_Attribute_Single	Defines how to handle inactivity/Watchdog timeouts 0 – Transition to time out 1 – Auto Delete 2 – Auto Reset	0, 0, 2	USINT
13 0x0D	Produced Connection Path Length	Get_Attribute_Single	Number of bytes in the produced_connection_path length attribute	6, 6, 6	UINT
14 0x0E	Produced Connection Path	Get_Attribute_Single Set_Attribute_Single	Application Object producing data on this connection	Defined by Connection Class 5, Instance 0, Attribute 102	EPATH
15 0x0F	Consumed Connection Path Length	Get_Attribute_Single	Number of bytes in the consumed_connection_path length attribute	6, 6, 6	UINT
16 0x10	Consumed Connection Path	Get_Attribute_Single	Specifies the Application Object(s) that are to receive the data consumed by this Connection Object	Defined by Connection Class 5, Instance 0, Attribute 103	EPATH

DeviceNet Connection Class (5), Change of State/Cyclic Connection Instance (4) - Acknowledged

Attribute Number	Attribute Name	Services	Description	Default, Minimum, Maximum	Data Type
1 0x01	State	Get_Attribute_Single	State of the object 0 = Nonexistent 1 = Configuring 3 = Establishing 4 = Timed out	1, 0, 4	USINT
2 0x02	Instance Type	Get_Attribute_Single	Indicates either I/O or messaging connection 0 = Explicit message 1 = I/O message	1, 0, 1	USINT
3 0x03	Transport Class Trigger	Get_Attribute_Single	Defines behavior of the connection	N/A, N/A, N/A	BYTE
4 0x04	Produced Cnxn ID	Get_Attribute_Single	Placed in CAN Identifier field when the Connection Transmits	N/A, N/A, N/A	UINT
5 0x05	Consumed Cnxn ID	Get_Attribute_Single	CAN Identifier Field value that denotes message to be received	N/A, N/A, N/A	UINT
6 0x06	Initial Comm Characteristics	Get_Attribute_Single	Defines the Message Group(s) across which productions and consumptions associated with this Connection occur	N/A, N/A, N/A	BYTE
7 0x07	Produced Connection Size	Get_Attribute_Single	Maximum number of bytes transmitted across this Connection	0, 0, N/A	UINT
8 0x08	Consumed Connection Size	Get_Attribute_Single	Maximum number of bytes received across this Connection	Defined by Connection Class 5, Instance 0, Attribute 104	UINT
9 0x09	Expected Packet Rate	Get_Attribute_Single Set_Attribute_Single	Defines timing associated with this Connection.	0, 0, 65535	UINT
12 0x0C	Watchdog Timeout Action	Get_Attribute_Single	Defines how to handle inactivity/Watchdog timeouts 0 – Transition to time out 1 – Auto Delete 2 – Auto Reset	0, 0, 2	USINT
13 0x0D	Produced Connection Path Length	Get_Attribute_Single	Number of bytes in the produced_connection_path length attribute	0, 0, 6	UINT
14 0x0E	Produced Connection Path	Get_Attribute_Single Set_Attribute_Single	Application Object producing data on this connection	Defined by Connection Class 5, Instance 0, Attribute 104	EPATH
15 0x0F	Consumed Connection Path Length	Get_Attribute_Single	Number of bytes in the consumed_connection_path length attribute	4, 4, 4	UINT
16 0x10	Consumed Connection Path	Get_Attribute_Single	Specifies the Application Object(s) that are to receive the data consumed by this Connection Object	20 28 24 01, 20 28 24 01, 20 28 24 01	EPATH

3.6 ACKNOWLEDGE HANDLER OBJECT

Acknowledge Class (43), Instance (0) Attributes

ATTRIBUTE NUMBER	ATTRIBUTE NAME	SERVICES	DESCRIPTION	DEFAULT, MINIMUM, MAXIMUM	DATA TYPE
1	Revision	Get_Attribute_Single	Revision of the DeviceNet Object Class Definition upon which the implementation is based	1, 1, 1	UINT
2	Max Instance	Get_Attribute_Single	Maximum Instance number of an object currently created in this class level of the device		UINT

Acknowledge Class (43), Instance (1) Attributes

ATTRIBUTE NUMBER	ATTRIBUTE NAME	SERVICES	DESCRIPTION	DEFAULT, MINIMUM, MAXIMUM	DATA TYPE
1	Acknowledge Timer	Get_Attribute_Single Set_Attribute_Single	Time to wait for acknowledge before resending. Range 1-65535 ms (0 invalid) default=16	16, 1, 65535	UINT
2	Retry Limit	Get_Attribute_Single Set_Attribute_Single	Number of Ack Timeouts to wait before informing the producing application of a Retry-Limit_Reached event. Range 0-255 default.	1, 0, 255	USINT
3	COS Producing Connection Instance	Get_Attribute_Single Set_Attribute_Single	Connection Instance which contains the path of the producing I/O application object which will be notified of Ack Handler evernts	N/A	UINT
4	Ack List Size	Get_Attribute_Single	Maximum number of members in Ack List. 0 = Dynamic > 0 Max number of members	N/A	BYTE
5	Ack List	Get_Attribute_Single	List of active connection instances which are receiving Acks. Number of members followed by list of Connection Instance ID.	N/A	BYTE Array of USINT
6	Data with Ack Path List Size	Get_Attribute_Single	Maximum number of members in Data with Ack Path List. 0 = Dynamic > 0 Max number of members	N/A	BYTE
7	Data with Ack Path List	Get_Attribute_Single	List of connection instance/consuming application object pairs. This attribute is used to forward data received with acknowledgement.	N/A	BYTE Array of UINT USINT Array of USINT

3.7 INPUT PARAMETER OBJECT

Input Parameter Class (176), Instance (0) Attributes

ATTRIBUTE NUMBER	ATTRIBUTE NAME	SERVICES	DESCRIPTION	DEFAULT, MINIMUM, MAXIMUM	DATA TYPE
1	Revision	Get	Revision of this object	1, 1, 1	UINT

Input Parameter Class (176), Instance (1) Attributes

All attributes in this instance are read-only and support the Get_Attribute_Single service using Explicit Messaging.

ATTRIBUTE NUMBER	ATTRIBUTE NAME	SERVICES	DESCRIPTION	DEFAULT, MINIMUM, MAXIMUM	DATA TYPE	EDS PARAM
1	Revision	Get	SE-330/SE-330AU/SE-330HV Revision	0, 0, 255	USINT	6
2	Trip Status	Get	Bits defines trips	0, 0, 255	USINT	7
3	Pending Trips	Get	Bits define pending trips	0, 0, 3	USINT	8
4	EF/GF Time	Get	Selector position	0, 0, 10	USINT	9
5	EF/GF Level	Get	Selector position	0, 0, 10	USINT	10
6	Pulse Time [1]	Get	Selector position	0, 0, 10	USINT	11
7	NER/NGR Current	Get	Percent of CT rating	0, 0, 255	USINT	12
8	NER/NGR Voltage	Get	Percent of V_N setting	0, 0, 255	USINT	13
9	NER/NGR Change	Get	Deviation from calibrated value	0, -32k, +32k	INT	14
10	Relay Status	Get	Bits indicate output relay state	0, 0, 15	BYTE	15
11	Switches	Get	Front panel switch state	0, 0, 255	BYTE	16
12	Record Head	Get	0 to 9 or 255	0, 0, 255	USINT	17
13	Pre-Trip Status	Get	Trip status for last record	0, 0, 255	BYTE	18
14	Pre-Trip Current	Get	Percent of CT rating	0, 0, 255	USINT	19
15	Pre-Trip Voltage	Get	Percent of V_N setting	0, 0, 255	USINT	20
16	Pre-Trip Change	Get	Deviation from calibrated value	0, -32k, +32k	INT	21

[1] Not Applicable to SE-330HV or SE-330AU.

3.8 PARAMETER OUTPUT OBJECT

This object allows commands to be written to the SE-330/SE-330AU/SE-330HV using Explicit Messaging.

Class (177), Instance (0) Attributes

ATTRIBUTE NUMBER	ATTRIBUTE NAME	SERVICES	DESCRIPTION	DEFAULT, MINIMUM, MAXIMUM	DATA TYPE
1	Revision	Get_Attribute_All	Revision of this object	1, 1, 1	USINT

Class (177), Instance (1) Attributes

ATTRIBUTE NUMBER	ATTRIBUTE NAME	SERVICES	DESCRIPTION	DEFAULT, MINIMUM, MAXIMUM	DATA TYPE	EDS PARAM
1	Command	Get/Set	Sends reset or remote trip command. 0 = No action (IDLE) 1 = Transition from 0 to 1 causes a trip reset. 2 = Transition from 0 to 2 causes a remote trip. 4 = Transition from 0 to 4 causes a clear event records.	0, 0, 2	USINT	22