(PROPOSAL)

Device Profile

for

Encoders

DSE 354-01

DeviceNet™

Version 2.0 **Revision 0**

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1. Introduction

Device: Encoder
Device Type: 08 hex

Encoders are used to detect positions of any kind of machines. These devices could be used for following applications: Sensing of angles, distances, tracks, velocity and motion control. This profile covers the measuring principle of absolute and incremental systems as well as the mechanical specification of rotary and linear devices. The detected physical position could be calculated by the device and functionalities like cams, work area switches offers an intelligent position detection.

2. Object Model

The Object Model in Figure 1 represents an encoder. The table below indicates:

- the object classes
- whether or not the class is required
- the number of instances present in each class

Object Class	Implementation	Number of Instances
Identity	Required	1
Message Router	Required	1
DeviceNet	Required	1
Connection	Required	at least 1 - Explicit, 1 I/O
Assembly	Required	at least 1
Parameter	Optional	1
Position Sensor	Required	1

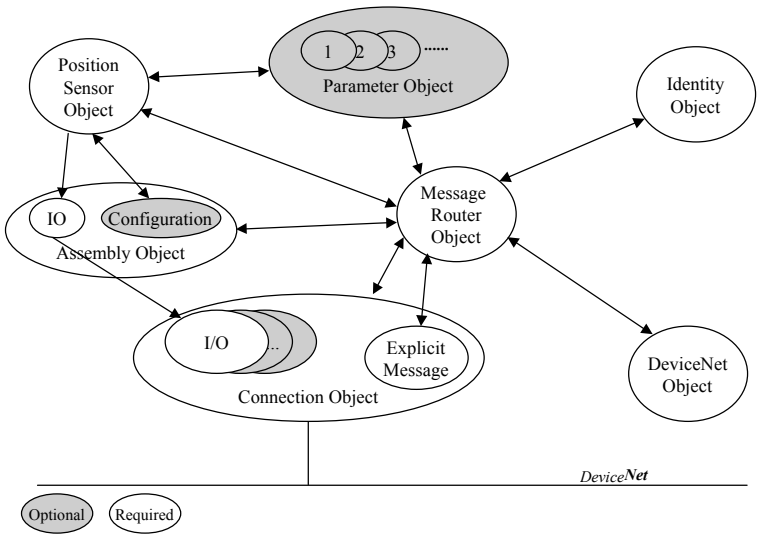

Figure 1

3. How Objects Affect Behaviour

The objects supported for the encoder affect the device's behavior as shown in the table below.

Object	Effect on Behavior
Identity	Supports the reset service
Message Router	No effect
DeviceNet	Configures port attributes
Connection	Contains the number of logical ports into the device
Assembly	Defines I/O data format and configuration data format
Parameter	Provides a public interface to the encoder configuration data
Position Sensor	Affects Position Value (attribute)

4. Defining Object Interfaces

The objects supported for the encoder have the interfaces listed in the table below.

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

5. I/O Assembly Instances

The following table identifies the I/O Assembly instances which should be supported by the encoder device.

Number	Required / Optional	Type	Name
1	Required	Input	Position Value
2	Optional	Input	Position Value & Warning Flag & Alarm Flag
3	Optional	Input	Position Value & Velocity

6. I/O Assembly Data Attribute Format

The I/O assembly data Attributes have the format shown below.

Instance	Byte	Bit7	Bit6	Bit5	Bit4	Bit3	Bit2	Bit1	Bit0
1	0	Position Value							
	1								
	2								
	3								
2	0	Position Value							
	1								
	2								
	3								
	4	Vendor specific			Reserved by DeviceNet			Warning Flag	Alarm Flag
3	0	Position Value							
	1								
	2								
	3								
	4	Velocity							
	5								
	6								
	7								

7. Mapping I/O Assembly Data Attribute Components

The following table indicates the I/O Assembly Data Attribute mapping for the Encoder Profile.

Data Component Name	Class		Instance	Attribute	
	Name	Number	Number	Name	Number
Position Value	Position Sensor	0x23	1	Position Value	3
Velocity	Position Sensor	0x23	1	Velocity	23
Warning Flag	Position Sensor	0x23	1	Warning Flag	69
Alarm Flag	Position Sensor	0x23	1	Alarm Flag	66

8. Defining Device Configuration

Public access to the Position Sensor Object by the Message Router must be supported for configuration of the encoder. If supported, the optional Parameter Object may be used to access the encoder's configuration parameters. Each instance of the Parameter Object is linked to a specific configurable attribute or attributes within the Position Sensor Object.

If the Parameter Object is supported a minimum of the Parameter Stub attributes are required with the support for Full Parameter Attributes being optional.

8.1 Parameter Object Instances

The following table indicates the Parameter Object Instances supported by encoder devices.

Instance	Name
1	Code Sequence
2	Commissioning Diagnostic Control
3	Scaling Function Control
4	Position Format
5	Measuring units per Revolution
6	Total Measuring Range
7	Position Measuring Steps
8	Preset Value
9	Position Value
10	Operating Status
11	Single Turn Resolution
12	Number of distinguishable revolutions
13	Alarm Flag
14	Alarms
15	Supported Alarms
16	Warning Flag
17	Warnings
18	Supported Warnings

8.2 Mapping Parameter Object Data

The following table indicates the Parameter Object data mapping for encoder devices.

Configuration	Class		Instance	Attribute	
Parameter Name	Name	Number	Number	Name	Number
Code Sequence	Position Sensor	23 hex	1	Code Sequence	11
Commissioning Diagnostic Control	Position Sensor	23 hex	1	Commissioning Diagnostic Control	12
Scaling Function Control	Position Sensor	23 hex	1	Scaling Function Control	13
Position Format	Position Sensor	23 hex	1	Position Format	14
Measuring units per Revolution	Position Sensor	23 hex	1	Measuring units per Revolution	15
Total Measuring Range	Position Sensor	23 hex	1	Total Measuring Range	16
Position Measuring Steps	Position Sensor	23 hex	1	Position Measuring Steps	17
Preset Value	Position Sensor	23 hex	1	Preset Value	18
Position Value	Position Sensor	23 hex	1	Position Value	3
Operating Status	Position Sensor	23 hex	1	Operating Status	61
Single Turn Resolution	Position Sensor	23 hex	1	Single Turn Resolution	62
Number of distinguishable revolutions	Position Sensor	23 hex	1	Number of distinguishable revolutions	63
Alarm Flag	Position Sensor	23 hex	1	Alarm Flag	66
Alarms	Position Sensor	23 hex	1	Alarms	64
Supported Alarms	Position Sensor	23 hex	1	Supported Alarms	65
Warning Flag	Position Sensor	23 hex	1	Warning Flag	69
Warnings	Position Sensor	23 hex	1	Warnings	67
Supported Warnings	Position Sensor	23 hex	1	Supported Warnings	68

8.3 Configuration Parameter Definitions

The configuration parameters for an encoder device are listed in Section Position Sensor Object. These parameters will need to be part of an EDS file in order to configure an encoder via an external tool. Refer to DeviceNet Volume II Chapter 4 for the definition, format and example of an EDS file.

8.4 Effect of Configuration Parameters on Behavior

See Encoder Position Object for the configuration parameters affect on the device's behavior