

## DeviceNet Protocol

DeviceNet is a low cost open communications link designed to connect industrial devices (motors, sensors, etc.) to a network.

The DeviceNet communication link is based on a broadcast oriented communication protocol, the Controller Area Network (CAN). The CAN protocol was originally developed by BOSCH for the European automotive market. The DeviceNet network is capable of supporting up to 64 devices and can accommodate lengths of up to 500 meters.

The DeviceNet specification is divided into two volumes, defined as follows:

### Volume 1

- DeviceNet communication protocol and application
- CAN and its use in DeviceNet
- DeviceNet physical layer and media

### Volume 2

- Device profiles to obtain interoperability and interchangeability among similar products

**Object Model** A DeviceNet node is modeled as a collection of objects. An object provides an abstract representation of a particular component within a product. The realization of this abstract object model with a product is implementation dependent. An object instance and an object class have attributes (data), provide services (methods or procedures) and implement behaviors. Attributes (1-255), Instances (0-65535), Class (1-65535), and Device Address (0-63) are all addressed by number.

Typical object classes found in a DeviceNet product are as follows:

**Identity** A DeviceNet product will typically have a single instance of the Identity Object. This instance will have as attributes a vendor ID, a device type, a product code, a revision, a status, a serial number, a product name, and a state.

**Message Router** A DeviceNet product will typically have a single instance of the message router object. The message router object is the component of a product that passes explicit messages to the other objects.

**DeviceNet** A DeviceNet product will typically have a single instance of the DeviceNet object. This instance would have as attributes: node address, baud rate, bus-off action, bus-off counter and the allocation choice.



**Assembly** A DeviceNet product will typically have one or more optional assembly objects. The primary purpose of these objects is to group different attributes (data) from different application objects into a single attribute which can be moved with a single message.

**Connection** A DeviceNet product will typically have at least two connection objects. Each connection object represents one end point of a virtual connection between two nodes on a DeviceNet network. These two types of connections are called Explicit Messages and I/O Messaging. Explicit messages contain attribute addressing, attribute values, and a service code describing the desired action.

**Parameter** The optional parameter object would be used in devices with configurable parameters. One instance would be present for each configurable parameter. The parameter object provides a standard way for a configuration tool to access all parameters. Configuration options which are attributes of the parameter object could include values, ranges, text strings and limits.

**Application** Usually at least one application object besides those from the assembly or parameter class will be present in a device.

### Physical Layer

DeviceNet devices can be powered directly from the bus and communicate with each other using the same cable. Devices can be removed or inserted from the network without powering down the network.

