New Low Cost Media for DeviceNet

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Abstract: To accentuate the growth of DeviceNet in the market place, a new media option has been released for DeviceNet. This low cost media provides a whole new approach to installing DeviceNet networks saving both time and money through Insulation Displacement Contact (IDC) technology. This paper will describe the technical merits of the media including topologies and connectorization options. In addition this paper will provide time studies on installation time savings over the traditional DeviceNet media options. Being that DeviceNet is based on CAN physical layer, this media can also apply to other powered CAN based networks using 4 or 5 conductors.

Keywords:
IDC, competitive, DeviceNet, CAN, Flat Cable, Micro, Mini, Open Style Thick, Thin

Introduction

DeviceNet has been a successful industrial device level network for over 10 years. In phase one of the release of DeviceNet the media was constructed as a 2 shielded pairs with one overall shield plus 1 drain wire. One of the short falls of a network of this type is the complexity and time associated with the installation of the cabling system. The 2 pair shielded cables were difficult and time consuming to prepare and terminate into connectors. DeviceNet supports three connector families in the original release, 1) Mini, 2) Micro and 3) open style. All of these connectors are 5 circuit type connectors designed to support shielded Thick, Thin and variants of cylindrical cables.

Studies showed that the installation time could be significantly reduced and simplified if the cable preparation phase could be simplified. This was only possible by eliminating the shielding and changing the cable to a common access type cable whereby IDC termination technology can be employed. To be successful the IDC tap assemblies had to be installable anywhere along the trunk line. It was found during this investigation that a specific order of conductors was required to reduce and cancel field currents between the power conductors and the signal conductors. Further it was found that shunt capacitors were needed across the power conductors to quench transient that would otherwise couple into the data pair and disrupt communications (cross talk). This concept was eventually patented. The system was modeled, simulated, built, tested and released. The IDC cabling and connector system met it's goal by reducing the installation time and complexity. The new media is designed to reduce materials and labor. Sealing traditionally adds cost and complexity to the components and is not needed for all applications. By removing these requirements from the design, it is possible to further reduce the component costs and installation labor. The IDC technology provides a cost effective installation solution. A simple hand tool such as pliers, helps to reduce the total cost of ownership through installation time and tool costs.

This white paper documents the methods and results for analyzing the new cable and connectors for use with DeviceNet. The method can be applied to any CAN bus media option. The cable was designed to meet the cabling electrical performance requirements of 120 Ohm Can bus network including DeviceNet.

Method

The parameters that limit CAN based network lengths are signal delay, signal amplitude (attenuation) and of course signal reflections. Therefore the delay,