Position ControllersWith CANopen interface

New approach to automation is compact and easy to use

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CANopen communications protocol is appropriate for applications as diverse as food processing and plastics molding. It offers an already established method of control whether it is used with a series of programmable logic controllers, soft PLCs or standalone controlling devices.
Because of CANopen’s versatility in the industrial market, position controllers are being offered with a universal CANopen interface. Some can be used with incremental encoders in a modular package. The performance capability of these compact positioning controllers ranges from a few watts to more than 700 watts. These controllers have a variety of operating modes, which means all kinds of drive and automation systems can be flexibly assembled using positioning, speed and current regulation via the controller’s on-board circuitry. The built-in CANopen interface allows networking to multiple axes and online commanding by CANopen master units. The CANopen bus system is easy to use and enables a wide variety of controls and devices to work together via an open architecture structure, which can be opened using free software and firmware. This means manufacturers can have their own in-place control system, whether proprietary or not, and still talk with any CANopen-ready device without having to write one line of code. Some position controllers with a universal CANopen interface have a built-in Gateway feature that allows communication with any system controller, computer or PLC via RS232. They offer an alternative to using only CANopen throughout a system. The transferred control functions are translated by the controller and delivered to other controls and devices on the system through CANopen. In this way, CANopen remains transparent to the user, yet provides fully functional operations. The way this works is the control system communicates with the first controller through its RS232 port. If the transmitted command is meant for the first controller, then the command is executed. If the command is meant for another component on the bus, the information is passed directly through CANopen to the appropriate device and then the command is executed.

Application Examples

Applications that can benefit from the use of controllers with CANopen communications interface capability include any automation system in any industrial operation that needs multiple local controls. An example is an automated welding machine that needs to have a central control system, which integrates with other parts of the manufacturing process, as well as a remote system that can control specific operations. Welding machine control often is the domain of PLCs. When adjusting and manipulating data necessary to control feed rates, as well as control the I/O of the system, a PLC easily integrates, through the use of CANopen, with the controller's digital positioning system. Multiple axes of control are instantly attainable.
Another example of how the controller can be incorporated into a CANopen communications system is when a packaging device requires a precise ratio between two axes. The PLC can maintain overall system operation without affecting the axes directly. A controller with CANopen communications interface capability is ideal for such an operation. CANopen can easily be engaged to communicate directly with the controller. This allows the controller to handle the precise ratio requirements of the system, while the PLC maintains communications contact with the other devices in the system.

Structure and Protocol

Transferring data is done using a system that reads and writes to the controller's object dictionary. Service Data Object (SDO) transport protocol is the entry used to transmit these objects, regardless of size. The SDO communication is used to configure the object of the controller. Although larger entries are split into segments, segmenting isn't necessary for objects of four bytes or fewer; as a result, transfer can be expedited. Nearly all objects in the controller's object dictionary are designed to be non-segmented transfers to ensure speed.
Higher priority transfers are also possible when dealing with the need for real-time data. This is done using Process Data Objects (PDOs), which are unconfirmed services containing no protocol overhead. Consequently, they represent an extremely fast and flexible method of transmitting data from one node to any number of other nodes. PDOs can be specifically compiled and confirmed by the user to suit specific requirements. Each PDO has a unique identifier and is transmitted by only one node. But it can be received by more than one producer/consumer communication. PDO transmissions may be driven by remote requests and by sync messages received. A remotely requested trigger is when another device initiates the transmission of an asynchronous PDO by sending a transmission request. For synchronous transmission triggering, in order to initiate simultaneous sampling of input values of all nodes, a periodically transmitted sync message is used. Synchronous transmission of PDOs can take place in cyclic and acyclic transmission modes. Multiple digital positioning controllers can be used to alleviate specific and/or critical operations from the central PLC control, desktop computer system or proprietary controller.