FORTEST

O27 - EtherCAT

Communication interface for automated systems in the automotive sector

Description

Ethernet for Control Automation Technology is the new interface available on the ForTest T-Series testing tools with ultra-high latency performance Ethernet protocol and connectable stations.

EtherCAT is an open and highly flexible protocol based on a real-time Ethernet variant that enables data communication in automation systems. It was developed by ETG (EtherCAT Technology Group) with a significant contribution from the company Beckhoff.

ForTest's new EtherCAT interface enables test controllers to be interrogated as EtherCAT slave devices, and finds space in intelligent slave and I/O solutions.

The EtherCAT communication protocol combines a number of features such as interference immunity and high bandwidth to act as a real-time communication protocol for the industrial world. The flexibility of the development makes it compatible with other previous versions.

A unique principle called "on-the-fly processing" gives EtherCAT a number of unique advantages. Because messages are sent before they are processed at each node, EtherCAT operates at high speed and efficiency.

The process also creates flexibility in topology and synchronization. Outside of the benefits of "on-the-fly" machining, EtherCAT includes a safety protocol and multiple peripheral profiles.

The Ethernet application levels used in industrial automation systems are typically low payload and half-duplex. For example, an Ethernet message for an application layer such as Modbus TCP can only contain a single register for a server device with little data such as a valve controller.

In small payload devices like these they lose huge bandwidth ranges because not only are small packets of data moved but these messages are only issued when the client or master requires such data.

In EtherCAT applications, the machine structure determines the network topology and not the other way around. In traditional Industrial Ethernet systems, there are limitations on how many switches and hubs can be cascaded, thus limiting the overall network topology. Since EtherCAT does not require hubs or switches, there are no such limitations.

Lines, trees, star topologies and all their combinations are possible with an almost unlimited number of knots.

Automatic link detection allows network nodes and segments to be disconnected during operation and then reconnected.

The line topology is extended to a ring type for cable redundancy.

For synchronization, a distributed clock mechanism is applied that brings the jitter to very low values, significantly less than 1 µs. This optimises the time and cost of system integration with the PLCs and controllers most used in the industrial automation sector.

EtherCAT requires no special hardware in the master device and can be implemented in software on any standard Ethernet MAC, even without a dedicated communication coprocessor. The typical process of establishing a distributed clock is initiated by the master by sending a transmission to all slaves at a given address.

GSDML configuration files and protocol document as well as some implementation examples are provided with the device. The material is available at the following link:

http://downloads.fortest-leak-testing.it

Technical code

The field defining the EtherCAT option is located in position 27 of the technical code.

T8990-065000-5300000100000010000000100000000010010000000

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