Basics of Absolute Encoders ACURO

Open Digital Sensor Interface (BiSS)

GENERAL INFORMATION

The bidirectional digital sensor interface BiSS safeguards communication between position encoders or measuring devices and industrial controls, such as a drive control, for example, and if necessary can transmit measurement values from up to 8 sensors simultaneously.

For 1 to 8 subscribers the interface master provides a clock signal for the simultaneous capture of all position data and for the synchronous-serial data transmission which follows on from this. Just four unidirectional RS422 data lines are required; the slave electronics, kept to an absolute minimum, are incorporated on the sensor ICs.

When the master sends a clock pulse on line MA, the slave answers directly on return line SL with the recorded position data. Commands and parameters can be swapped on a PWM pulse form; this is, however, not necessary to start the BiSS protocol.
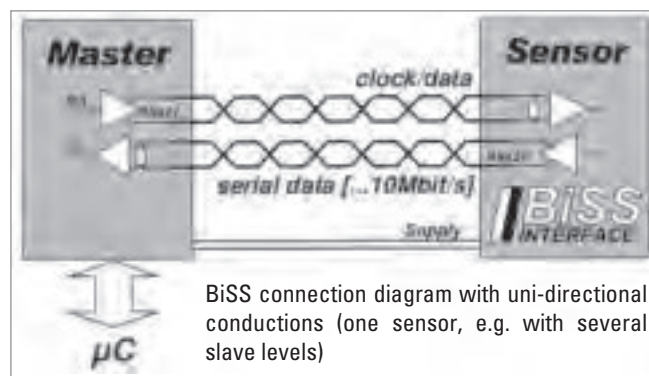
TRANSFER SEQUENCE

With each data cycle the master learns and compensates for line delays, thus permitting clock rates of up to 10 Mbit/s even for cable lengths of up to 100 m. Changes in line conditions which occur during cable drag, for example, are corrected. The precision of synchronization among several position encoders along various axes is less than 1 microsecond; the master also makes the signal delay it has recorded accessible to the control unit, allowing further optimization.

The BiSS protocol classifies each subscriber in the following data sections: sensor data, register data. These data sections have various setups with regard to access and transmission performance so that a number of different sensor applications are catered for. Bidirectional parameter communication for device configuration - also applicable to what are known as OEM parameters - is usually consigned to the register data section, with rapidly changing angle data being assigned to the sensor data section.

Control cycle times of less than 100 μs are thus not a problem, even for data words of up to 64 bits in length. There is enough room in the protocol for redundancy; this space is normally used to implement a CRC (cyclic redundancy check). Framed by just one start and one stop bit, the sensor data is transmitted at the best-possible core data rate. Permanent monitoring of the position and operation of the encoder is possible without interfering with the control cycle.

**Block diagram of a
BiSS Master-Slave configuration**

BiSS connection diagram with uni-directional conductions (one sensor, e.g. with several slave levels)

Configuration

Specific product developments of individual users are not restricted or made unnecessarily expensive by a compulsory compatibility.

A BiSS subscriber is described with just a few parameters and the XML-descriptive file included with the delivery simplifies start up of the control system.

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