



Concept



OVERVIEW

The open source BiSS Interface (bidirectional/serial/synchronous) protocol implements a realtime interface. BiSS enables a digital, serial and secure communication between controller, sensor and actuator. The BiSS protocol is used on the lower sensor/actuator communication level in industrial applications which require transfer rates, safety, flexibility and a minimized implementation effort. In addition to its technical advantages, two conditions have established the current global standard: free BiSS license for applications and the stability and continuity of the protocol since its introduction.

BiSS follows the industrial trend of fully digital communication and increasing functional capabilities. BiSS provides the BiSS protocol-specific features of the BiSS bus structure and the CRC cyclic redundancy check for all transmissions.

BiSS with a point-to-point setup is hardware compatible to the industrial standard SSI (Serial Synchronous Interface). Minimum two unidirectional lines (clock and data) enable:

- Cyclic at high speed (up to 10 MHz with RS422 and 100 MHz with LVDS)
- Line delay compensation for high speed data transfer
- Request processing times for data generation at slaves
- Safety capable: CRC, Errors, Warnings
- Bus capability for multiple slaves and devices in a daisy chain

Actuators operation can be enabled with an additional MO line (master to slave).

System components

The BiSS system can be implemented in different ways:

- on the sensor side there is a sensor word (e.g. a position) generated by one sensor (BiSS slave, encoder).
- the drive (BiSS master) can either be a drive with all needed functionality integrated.

BiSS SYSTEM STRUCTURE

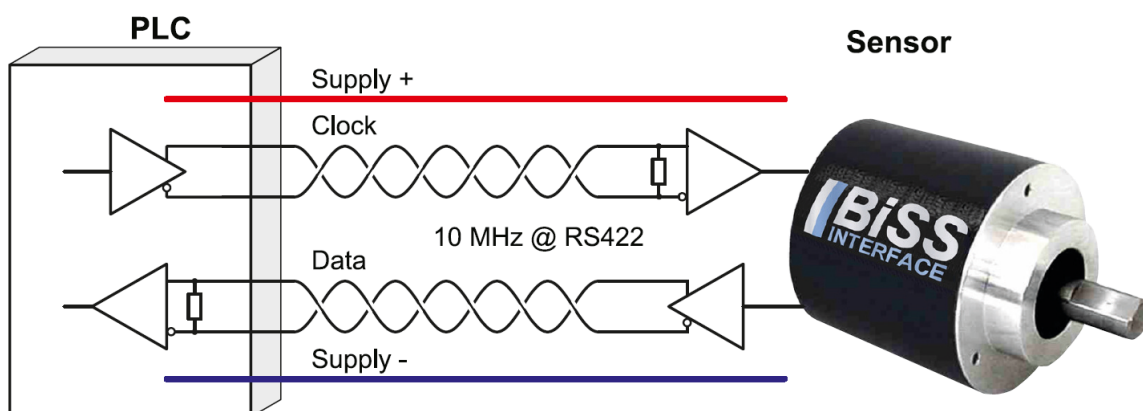


Figure 1: BiSS system structure based on a standard encoder and standard drive

A typical setup of a BiSS system with a drive/PLC (BiSS master) and encoder (BiSS slave) is shown in Figure 1. The position data is sent over a single cable from the BiSS slave on the right to the BiSS master on the left. The standard drive contains the blocks "BiSS Master" and "RS-422 Bus Transceiver" as well as the encoder contains the blocks "BiSS Slave" and "RS-422 Bus Transceiver". The sensor that generates the position word can be a single chip solution or a set of separate encoder-iCs. The position data, the status and CRC values are evaluated in the BiSS master.

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BiSS COMMUNICATION FORMAT

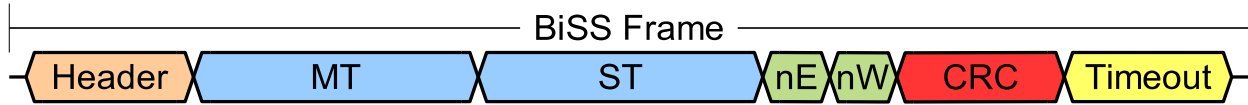


Figure 2: BiSS communication profile

In encoder applications the position value is the sensors data. The position word used for motor control can be of high resolution and is protected against transmission errors with a standard 6-bit CRC (HD = 3). The data length for the position is 1 ... 55 bit.

BiSS IDENTIFICATION AND CONFIGURATION

BiSS supports a device based identification: the BiSS ID. The BiSS ID is based on a 2 byte unique BiSS Device Manufacturer ID and a structured 6 byte BiSS Device Manufacturer defined Device ID. Additionally there is a dedicated 4 byte serial number. The BiSS ID can be used to parse a an external BiSS XML file to determine the device BiSS configuration.

BiSS supports a device based configuration identification: the BiSS Profile ID. The BiSS Profile ID is based on a 2 byte code to identify the BiSS Profile and the profile specific device configuration. The BiSS Profile ID can be used to determine the device BiSS configuration.

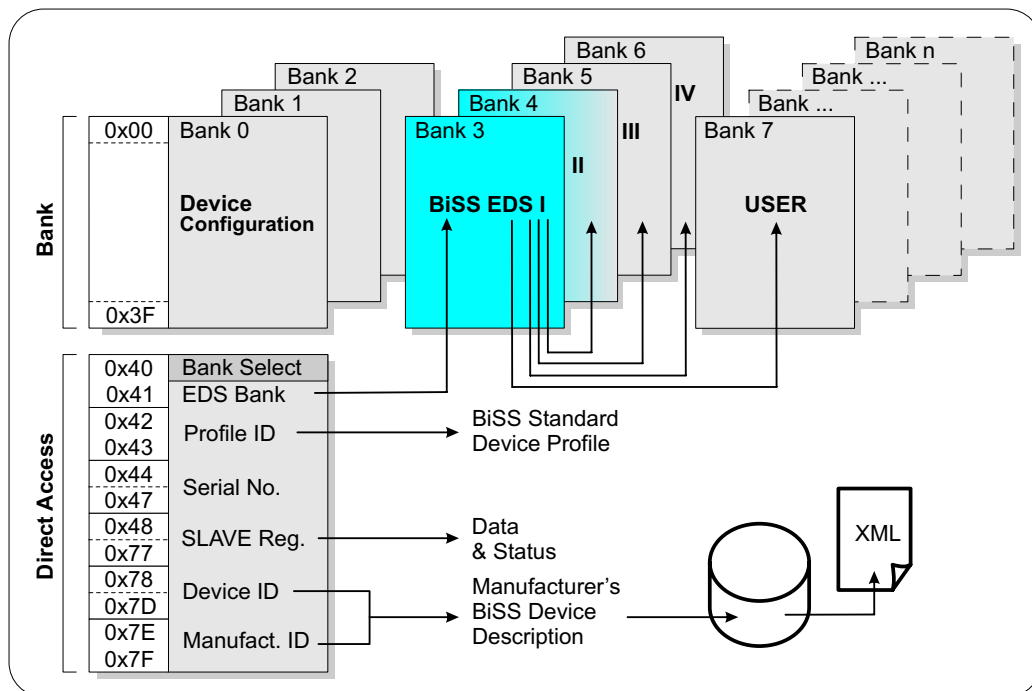


Figure 3: BiSS ID, SN, EDS and USER DATA

BiSS Electronic Data Sheet (EDS) supports a device based configuration identification: the BiSS EDS. The BiSS EDS may be a stand alone EDS or a combined EDS based on a common part and a profile specific part. The BiSS EDS is based on a set of 64 byte banks of data to identify the BiSS device configuration. The BiSS EDS can also be used to address and carry additional BiSS device information like MOTOR INFORMATION SHEET and individually storable and readable USER DATA.

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DEFINITIONS

Abbr.	Description
SCD	Single Cycle Data
MT	Multiturn position
ST	Singleturn position
E	Error status bit, part of status
W	Warning status bit, part of status
CRC	Cyclic redundancy check sum
HD	Hamming distance

Table 1: Explanations

BiSS SAFETY

Safety-critical applications targeting up to SIL3 can now be fully covered by BiSS Safety and the BiSS interface. The safety communication level "BiSS Safety" is certified by TÜV Rheinland and follows in extracts the requirements stated in DIN EN 61784-3:2011 and can be used in safety applications up to SIL3 according IEC61508:2010.



BiSS LINE

One Cable Technology applications can now be fully covered by BiSS Line and the BiSS interface. BiSS Line uses the core BiSS definitions and device content but maps the communication on an RS485 half duplex line. The BiSS Line protocol is usable with a 2-wire or 4-wire setup. The 2-wire setup combines communication and power supply on the a single twisted pair of lines. BiSS Line provides multi device capability and forward error correction (FEC).



BiSS ASSOCIATION e.V.

The BiSS Association e.V. operates as an exchange platform concerning the BiSS Interface and such products and solutions. Members have access to this community and the ability to promote their solutions and to suggest their enquiries concerning the BiSS Interface. On the internet platform www.biss-interface.com, members exchange information on the development of open interfaces and report on their available solutions using the BiSS Interface. These include evaluation boards such as master and slave PHYs, hardware components (iCs, FPGAs, smart sensors), IP, files, licenses

and services, sensor systems and encoders, as well as complete drive solutions. The association welcomes new international members for collaboration and further development in the field of machine communication.

