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### PREAMBLE

For absolute position encoder, the serial BiSS interface is now used standard for fast and secure transmission of absolute measurement data . Thanks to the line delay compensation in the master high clock frequencies are possible , thanks to a CRC protected transmission bit errors are detected. Another advantage is also the permanent register communication possible , which is used for parameterization of the units and later for exchange of diagnostic data during operation.

When using the BiSS for safety application , the system structure for a safe data transfer may vary. BiSS Safety applications may be based on sensors, master and monitoring units. Most applications including the BiSS Safety applications require only a point-to-point connection, so that it is the principle given bus capability of the BiSS interface can be used within a sensor or encoder, evaluate, for example, multiple redundant sensor levels. It would , viewed from the master or monitoring side , appear each redundant sensor level as a separate data source and be evaluated. Therefor the master automatically requests the sensors measurement data and checks cyclically for plausibility under inclusion of redundant existing sensor levels measurement data.

This BiSS Application Note describes various BiSS Safety system structures the function and their possibilities of use.

### BiSS SAFETY SYSTEM STRUCTURE

#### BiSS Safety System Structures

The BiSS Safety System Structure that is based on a standard drive may require the following components:

- BiSS Standard Drive (master)
- BiSS Safety Extension (monitor)
- BiSS Safety Encoder (slave)

The BiSS Safety System Structure that is based on a BiSS safety capable drive may require the following components:

- BiSS Safety Drive (safety master, master, monitor)
- BiSS Safety Encoder (slave)

#### BiSS Safety Encoder Structure

The BiSS Safety Encoder Structure may be based on the following components:

- BiSS Standard Encoder combined with a BiSS Safety Encoder (slave and bus capable safety slave)
- BiSS Safety Encoder (slaves)

#### BiSS Communication Content

The BiSS Safety Communication may be based on the following components:

- BiSS Standard/Control Position Word: CPW
- BiSS Safety Position Word: SPW
- BiSS Diagnosis Content:
  - BiSS Feedback Bits
  - BiSS Sign-Of-Life-Counter
  - BiSS Diagnosis Word
  - BiSS Commutation Bits

#### Physical Layer Flexibility

The physical layer (PHY) for all BiSS communications may vary from the shown PHY RS422. Alternative PHY solutions are

- TTL
- CMOS
- LVDS
- BiSS Line
- 2 wire interconnect
- 4 wire interconnect
- Optical LWL/Fiber Link
- any other physical layer for serial communication

### DETAILS ON BiSS SAFETY ENCODER

#### BiSS Safety Encoder with P2P Interface, dual slave

This *BiSS* Safety Encoder is based on a *BiSS* bus structure with two slaves and a Point-to-Point standard interface PHY. The two slaves provide the SPW and CPW. The position of both slaves is an configuration option.

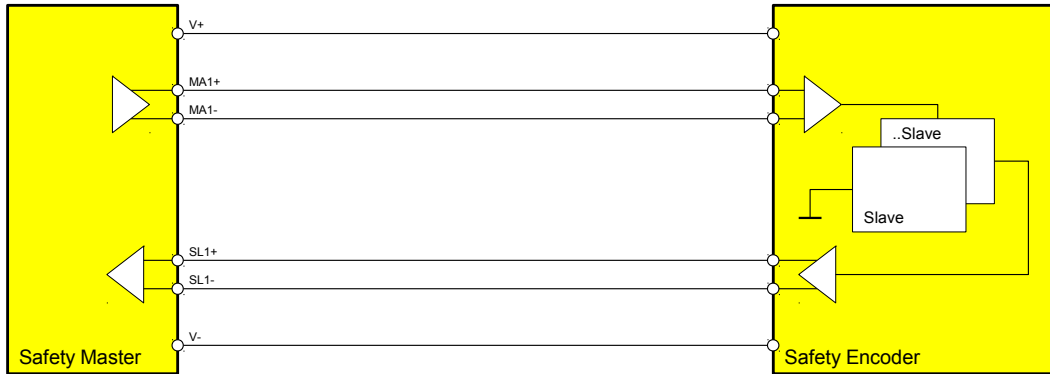


Figure 1: BiSS Safety Encoder with P2P Interface, dual slave

#### BiSS Safety Encoder with P2P Interface, single slave

This *BiSS* Safety Encoder is based on a *BiSS* bus structure with a single slaves and a Point-to-Point standard interface PHY. The slave provide both the SPW and CPW. The position of both positions and diagnosis may be an configuration option.

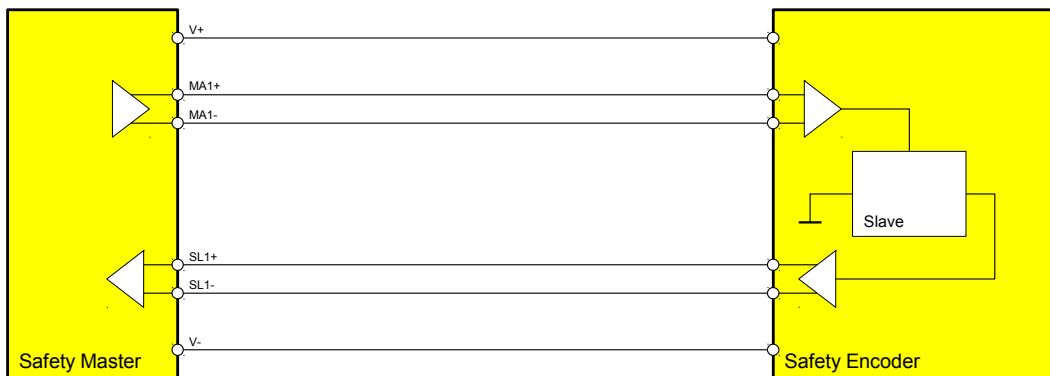


Figure 2: BiSS Safety Encoder with P2P Interface, single slave

### BiSS Safety and Standard Encoder with separated devices, bus and/or P2P Interface, dual slave

This *BiSS* Safety Encoder is based on a *BiSS* bus structure combined with a *BiSS* standard encoder. Each device is equipped with a single slave or multiple slaves. The *BiSS* Standard Encoder may be based on a standard P2P interface or a *BiSS* bus capable interface. The *BiSS* Safety Encoder is based on a *BiSS* bus capable interface. Two slaves in different devices provide the SPW and CPW. The position of both positions and diagnosis may be an configuration option.

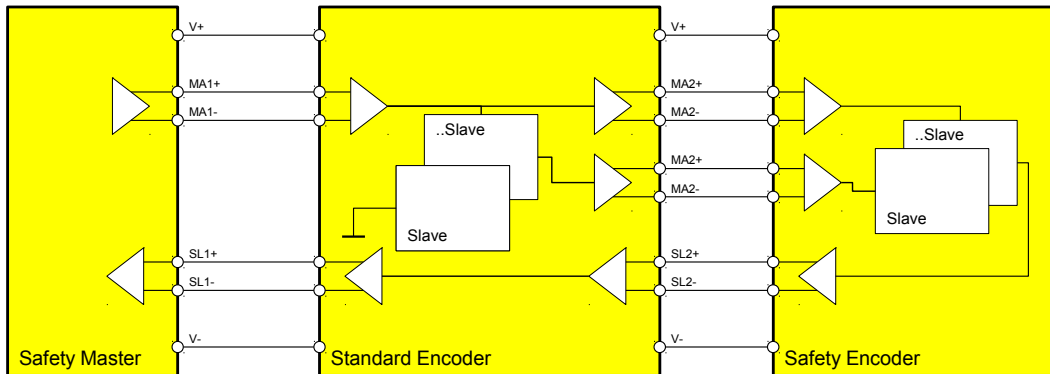


Figure 3: BiSS Standard and Safety Encoder with separated devices

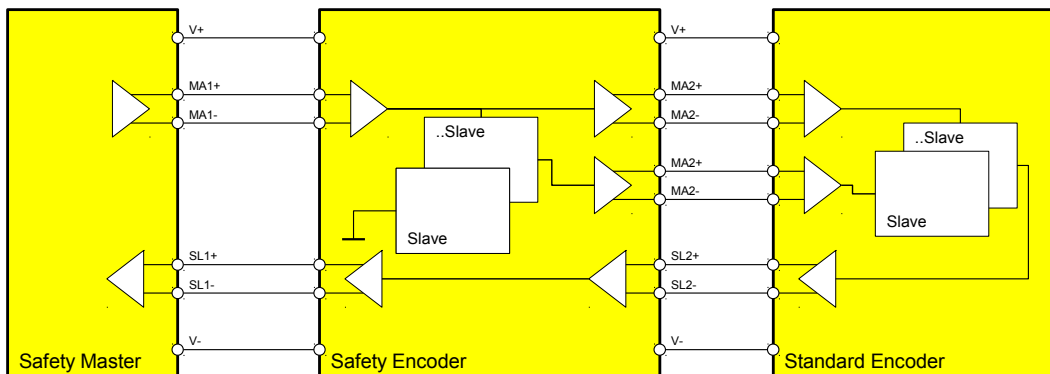


Figure 4: BiSS Safety and Standard Encoder with separated devices

### DETAILS ON BiSS SAFETY MASTER

#### BiSS Safety Master with single functionality

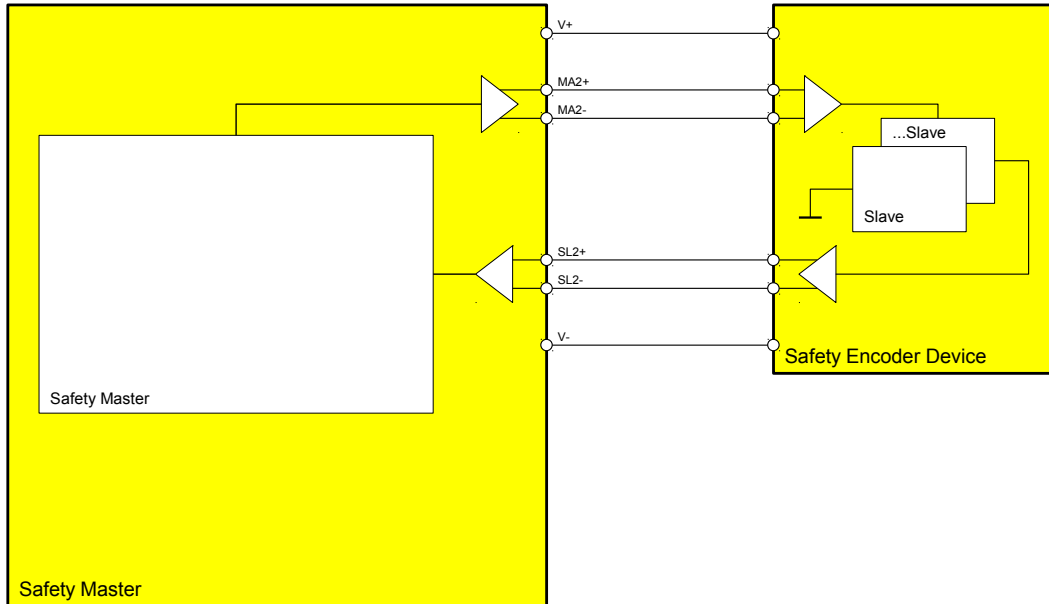


Figure 5: BiSS Safety Master with single functionality

#### BiSS Safety Master with splitted functionality

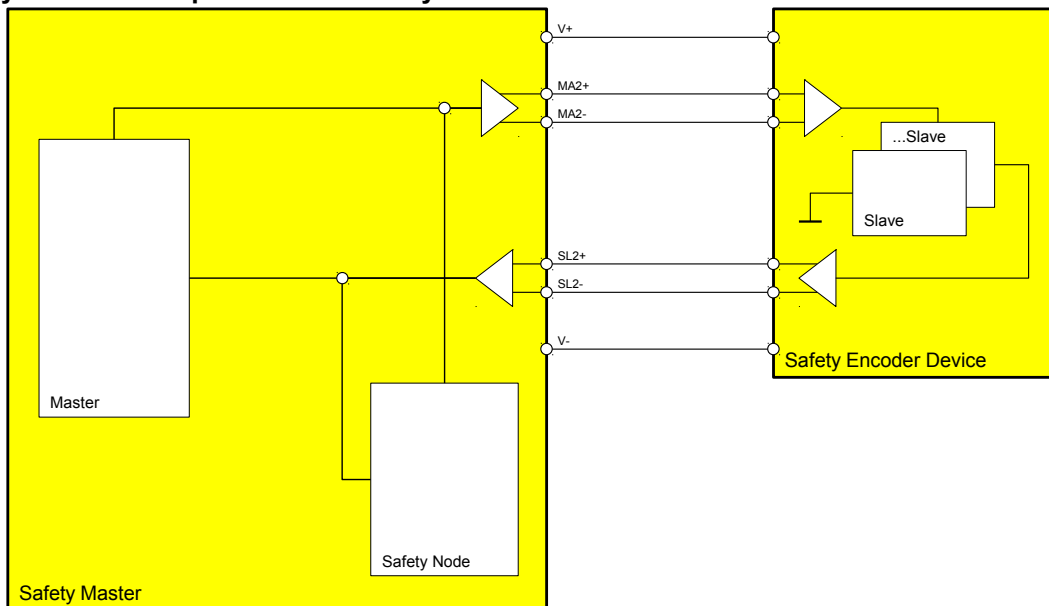


Figure 6: BiSS Safety Master with splitted functionality

### DETAILS ON BiSS MASTER AND BiSS SAFETY EXTENSION

#### BiSS Standard Master with external BiSS Safety Listener

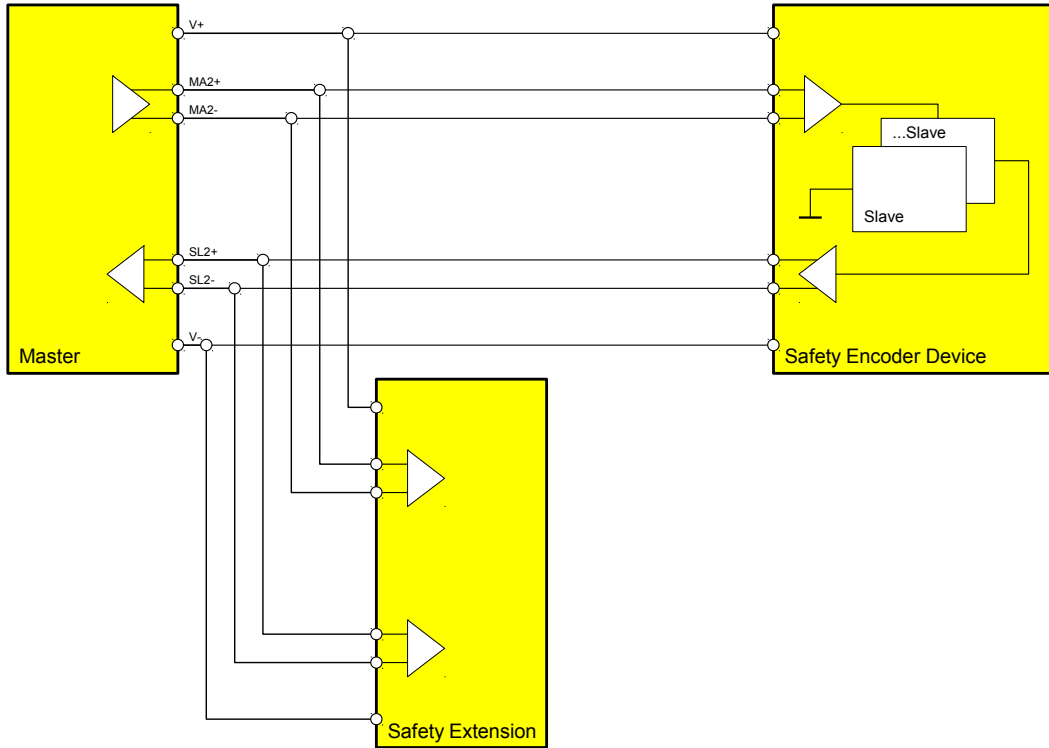


Figure 7: BiSS Standard Master with external BiSS Safety Listener

#### BiSS Standard Master with external BiSS Safety Transfer Processor

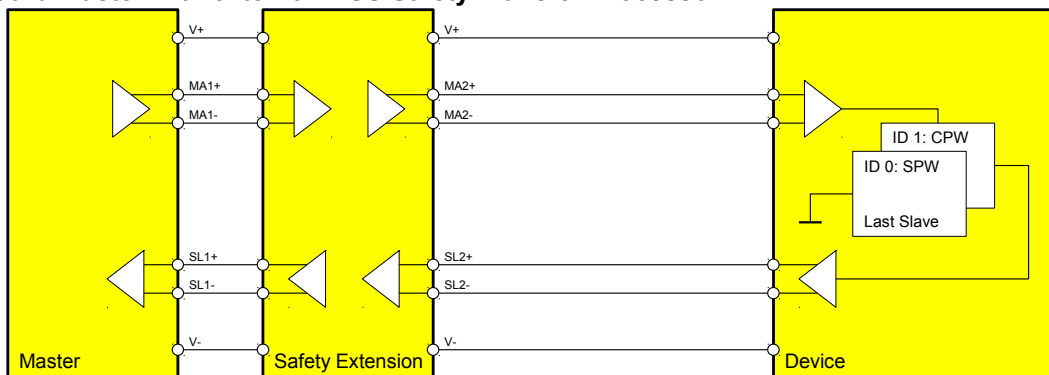


Figure 8: BiSS Standard Master with external BiSS Safety Transfer Processor

### REVISION HISTORY

Rel.	Rel. Date*	Chapter	Modification	Page
A0.1	2015-10-14		Initial release	all

Rel.	Rel. Date*	Chapter	Modification	Page
A1	2015-11-06		Release	all

\* Release Date format: YYYY-MM-DD