maxon motor control		
maxon motor ag Brünigstrasse 220 CH – 6072 Sachseln www.maxonmotor.com	**MAXPOS / BISS-C:** **Compatibility of BISS encoders** **(e.g. Renishaw)**	Version: 2.01 (Eng.) Author : WJ Date : 2018-08-03

Topic:

- What technical details of BISS-C encoders are important in case of a MAXPOS controller?

- Why do some BISS-C encoders (e.g. by Renishaw) not work with the MAXPOS?

Situation:

BISS-C is a globally well established standard which is mainly designed for the information and position data exchange in between encoders and motor controllers. The BISS-C standard is implemented by a lot of different encoder manufacturers. Quite often the BISS-C interface is offered as a possible alternative to SSI. maxon's MAXPOS controllers also offer a BISS-C compliant interface to connect encoders. Anyway there might be sometimes a problem that the BISS data exchange of an encoder and controller seems not to be compatible with each other.

The BISS-C standard specifies different ways of communication for a data exchange and features like a so-called electronic encoder data sheet, which can be accessed by a controller to read out some specific technical data. One limitiation in case of a BISS component selection and usage is that some of the BISS specification marks and features are not mandatory for implementation to comply with the BISS standard. This means that the manufacturers of encoders and controllers are partly free what BISS characteristics are implemented by them or not. There is just a limited number of mandatory items which have to be fulfilled to be BISS-C compliant. Due to this it is possible that the encoder and the interface of the controller complies properly with the BISS-C standard but these components can still not be used in combination.

Technical background:

BISS specifies an uni-directional and a bi-directional data exchange. The uni-directional communication enables just the encoder to send data to the controller. The bi-directional communication enables the controller to poll specific information (e.g. electronic data sheets) of the encoder. Most BISS-C encoders support the bi-directional communication because it is the key that the controller and encoder can exchange data in the most flexible way. The bi-directional communication and the possibility of electronic data sheets are two important advantages of the BISS standard compared to SSI.

The MAXPOS BISS-C interface counts on a bi-directional communication (with CDM and CDS). The bi-directional data exchange is in use by the MAXPOS during initialization phase to poll some base data (-> identification) of the encoder. It is also the base how the MAXPOS checks if there is actually a BISS-C encoder connected and working properly.

The MAXPOS encoder routines processed during start-up check the reaction of a BISS encoder by a request based on a bi-directional data exchange. If a BISS-C encoder does not support bi-directional communication, there is no reaction or return message by the encoder. It is not possible for the MAXPOS to check if there is actually a BISS-C encoder connected or not (due to the missing reaction). The MAXPOS reports an encoder error state and the usage of such a BISS-C encoder with uni-directional communication only is not possible.

Conclusion:

The **MAXPOS counts on a bi-directional data exchange** at least during initialization. If a BISS-C encoder has just implemented the more limited uni-directional communication, there is no data exchange and usage by the MAXPOS possible although the encoder as well as the MAXPOS fully comply with the BISS-C standard.

Example:

BISS-C encoders by **Renishaw just support uni-directional communication** like mentioned in this document: www.renishaw.com/en/biss-protocol-support--39687

We are sorry that **Renishaw's BISS-C encoders cannot be used by the MAXPOS** due to this up to now.

Solution:

We recommend that you check the specification details of a concrete BISS-C encoder in advance before you decide to use a combination of such an encoder or controller.

There have been some concrete BISS-C encoders tested by maxon. These encoders plus the corresponding configuration data is listed up in the chapter "Extended Encoders Configuration / BISS C Absolute Serial Encoder / Configuration Examples" of the "MAXPOS Application Notes Collection".

If you want to use a BISS-C encoder which is not listed by the maxon documentation, this is still very likely to work properly too but please check first of all if bi-directional communication is possible based on the documentation of the encoder's manufacturer. Sometimes this might not be so obvious by a BISS-C encoder data sheet or just mentioned by a separate general information. If you are not sure if bi-directional communication is supported by your preferred encoder type, please let this confirm by your supplier of the encoder. maxon will be also pleased to help you with the investigation about the compatibility of concrete BISS-C encoders and the MAXPOS. Please provide us the manufacturer name and the complete part number of the encoder (or its data sheet) for some initial investigation then.

Most encoder suppliers offer encoders alternatively with a BISS-C or SSI interface. If the BISS-C communication of the encoder is not compatible with the MAXPOS, there might be a chance to use a SSI interface version instead. Even in case of SSI please do not miss to check if the SSI data format fits to the configuration features of the controller, especially if the SSI data stream holds additional bits beside the position data. maxon will also advise you concerning the compatibility of your preferred SSI encoder choice.

If there is some reason (e.g. size or functionality) why a concrete BISS-C encoder (which is not compatible with the MAXPOS) is required by your series application, please contact maxon and let us know more about your application and requirements. We will investigate in the possibility of a customized MAXPOS (or EPOS4) firmware which supports your concrete encoder. This investigation and an offer for a customized firmware adaptation is free of charge.