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.Supported encoder types

Position encoders with the following manufacturer-side **order code** are supported as digital position encoders:

- **EnDat22** (digital EnDat2.2 interface only, clock frequency <8MHz, no analog 1Vpp signals)

If position encoders with the order code EnDat02 have been designed with an interface clock frequency <2MHz and additionally have 1Vpp sine signals, they can be evaluated as combined encoders with AXS-V-0310 and above (see "Encoders with EnDat2.x interface and 1Vpp signals").

.Encoder connection

Due to the high data transmission frequency of 8 MHz that is sensitive to interference, it is recommended to use die electrical connections of the manufacturer's company and to observe the corresponding recommendations for mounting.

."EC" option required!

Position encoders with EnDat2.2 interface can be connected via the multi-encoder input of the ctrlX DRIVE controllers (EC interface option).

.Absolute evaluation

Encoders with EnDat2.2 interface can be evaluated in absolute form if the travel range of an axis is within the actual position range that can be displayed in absolute form, i.e. the absolute encoder range. The absolute encoder range (S-0-0601.x.23) describes one encoder revolution for single-turn encoders, and for multi-turn encoders in most cases 4096 encoder revolutions. For linear encoders, it is encoder type-specific.

.Battery-buffered multi-turn encoders

WARNING!

. Actual position value offset in case of battery failure of battery-buffered EnDat2.2!

EnDat2.2 encoders with battery-buffered multi-turn memory function are only supported at a later point in time! However, a battery-buffered EnDat2.2 may be connected at ctrlX DRIVE, but:

- The battery status is not checked.
- Battery wear or supply voltage interruption can cause loss of position data reference which may result in actual position value offset.
- In the case of actual position value offset, any previously established position data reference is lost without the position status becoming invalid.

If a battery-buffered EnDat2.2 is used nevertheless, it is mandatory to ensure the following aspects on the user side:

- Separation of battery and position encoder must not be possible with drive switched off
- Only replace the battery with the encoder connected and the controller supplied with control voltage (DC24V)
- Battery replacement at an early stage or permanent external monitoring of the correct battery status required

A data memory range for user data is available on the encoder side.

.Commissioning

Encoders with an EnDat2.2 interface have to be connected at the optional slot XG21 (EC). They are automatically detected when the drive controller is switched on. When switching from CM to PM, the data of the motor and of the encoder are automatically loaded from the encoder memory to the controller.

This is a "Plug & Play" encoder type which is configured automatically via the "encoder scan" function!

If it is required to reduce the initialization period, deactivate the "encoder scan" function in "S-0-0602.x.1, Phys. encoder type". See also .

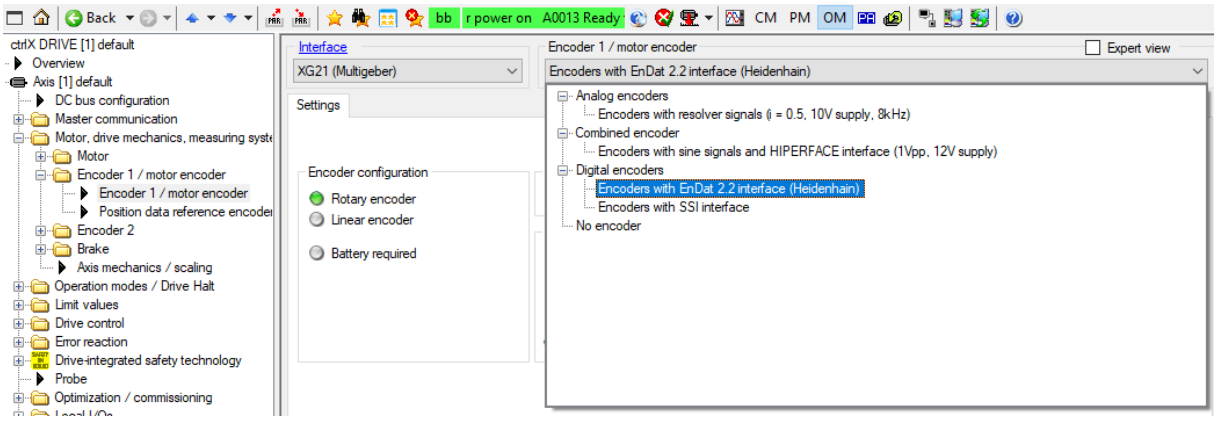

Fig. 190: Selecting the encoder interface and the digital encoder in the ctrlX DRIVE Engineering dialog, "EnDat2.2 encoder" example

In the encoder basic dialog, the properties of the EnDat2.2 encoder are displayed.

Depending on the maximum travel range of the axis and the absolute encoder range, the option of evaluation as absolute encoder is displayed.

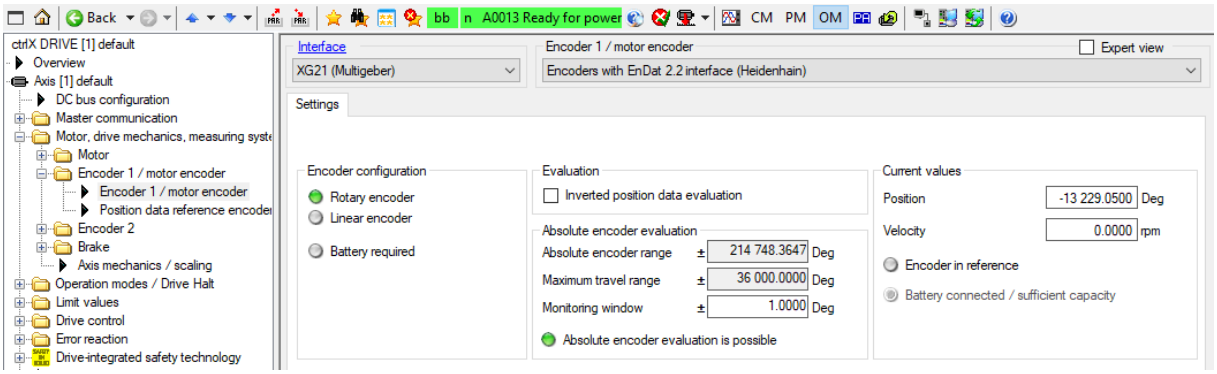

Fig. 191: ctrlX DRIVE Engineering dialog for encoder configuration of an EnDat2.2 encoder

In the "Expert view" of the encoder dialog, diagnostics and details on Basic and Extended encoder evaluation are displayed and further configuration options are provided:

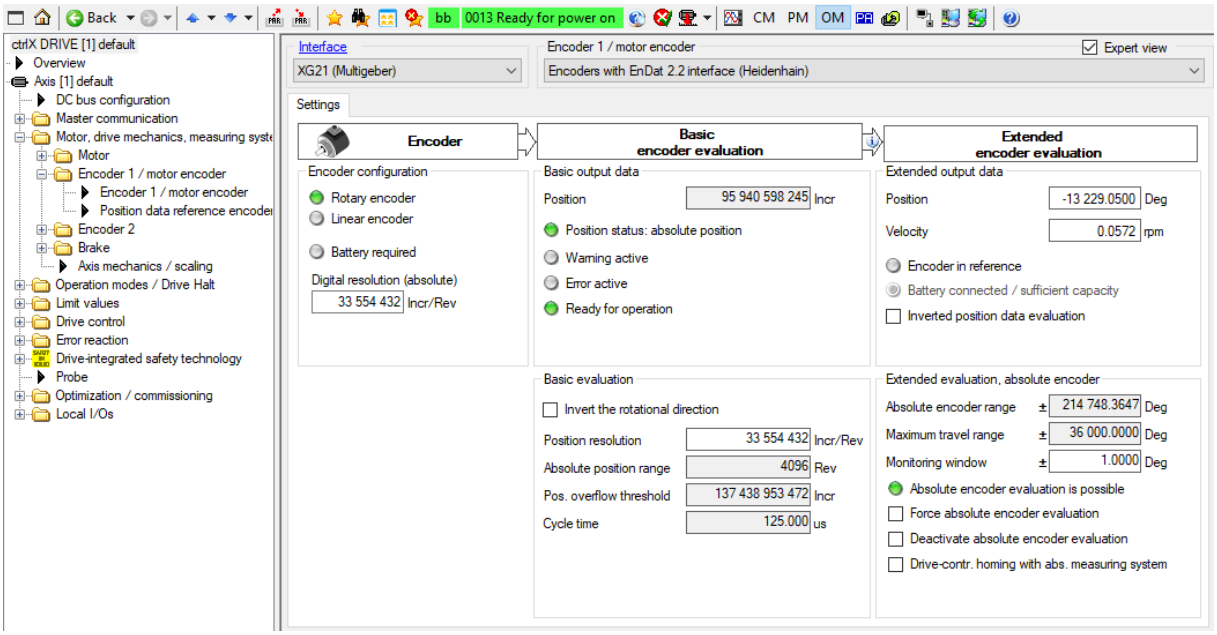

Fig. 192: Expert view of the settings dialog of ctrlX DRIVE Engineering for diagnostic purposes and for further configurations

.Additional information and details

The actual position values cyclically and serially transmitted in so-called "telegrams" have an EnDat2.2-specific transmission protocol:

.Protocol specification EnDat2.2 interface:

- Length of the transmission protocol: variable depending on the selected EnDat2.2 type.
- Coding of position information: Binary code
- Error bits: 2
- Check bits for position: 5
- Check bits for "Additional info 1": 5
- Check bits for "Additional info 2": 5
- Data transmission frequency (baud rate): 160 kHz at initialization, 8 MHz at cyclic data transmission

.Features of EnDat2.2 encoders

EnDat2.2 encoders are equipped with a data memory containing all manufacturer-side type-specific data ("electronic type plate") including:

- Absolute encoder resolution (digital) S-0-0602.x.22: encoder type-specific
- Absolute encoder range S-0-0601.x.23: encoder type-specific
- Serial number of the encoder (S-0-0601.x.136)
- Type designation of the EnDat2.2 encoder (S-0-0602.x.139)

Other features:

- Virtual reference marks at every single-turn overflow
- Memory range for user data (OEM range) with encoder type-specific data volume
- Transmission of additional information (e.g. motor temperature), depending on the encoder type

.Firmware-side actual position value generation

Position display of Basic encoder evaluation of EnDat2.2 encoders:

- Position display with rotary encoders: In total, 48 position bits (single- and multi-turn bits) can be evaluated.
- Position display with linear encoders: The resolution in nm/increment is encoder type-specific. The possible measuring length is limited by the number of position bits (max. 48!) for position display.

.Monitoring and diagnostics

Errors of the correct function of the encoder are displayed via the "Error" bit in "S-0-0600.x.1, Encoder status":

- Error states occurring in the encoder
- Double data telegram failure of the encoder, this causes the cyclic encoder evaluation to be interrupted.

In addition, the detailed diagnostics of the ctrlX DRIVE Engineering configuration tool show more detailed error causes:

- Error bit 1 or error bit 2 of the encoder or both have signaled an error
- The CRC check of the position data and/or of the additional data has signaled a transmission error
- Failed data telegrams

The encoder error bits (1 and 2) signal disturbances of sampling lighting, track signal amplitude, position generation, power supply and current consumption.

- The drive recognizes replacement of the connected encoder type by checking the serial number after activation. If the serial number has changed, position data reference is deleted and the axis is no longer homed.

.Application as motor encoder

There is a time offset between the recording of actual position values and their availability for drive control due to the serial transmission of the position data. The time offset between the recording of actual position values and their availability for motor control due to the serial transmission of data via the EnDat2.2 format at a transmission rate of 8 MHz for cyclic position and status data is sufficiently small.

.Transmission of motor temperature

The EnDat2.2 protocol can also transmit additional information (motor temperature) besides the position data. For this purpose, the following requirements must have been complied with:

- The EnDat2.2 encoder has to support temperature transmission.
- A PT1000 or a KTY84-130 temperature sensor can be connected to the dedicated connection points of the encoder.
- The transmission of the motor temperature must be activated in "P-0-0512, Temperature sensor"

.Data memory range for user data

EnDat2.2 encoders are equipped with encoder data memory and also provide a data memory range for user data (OEM

memory range) besides provision of their own encoder-specific data. The data are stored in non-volatile form. That is to say, the stored data are maintained in case of a power failure. Write protection for the user data memory range is not available.

.Parameterization

EnDat2.2 encoders are equipped with an encoder data memory that tracks the encoder-specific data. They are automatically loaded to the respective parameters of the drive if, in "S-0-0602.x.1, Phys. encoder type", the characteristic number for the encoder was entered or the EnDat2.2 encoder was recognized by automatic scanning of the connected encoders. The remaining parameterization is supported by dialogs in ctrlX DRIVE Engineering, see also ↘ “Commissioning ”