SERIAL INTERFACES

EnDat 2.2

The EnDat interface is a digital, **bidirectional** interface for encoders. It is capable both of transmitting **position values** as well as transmitting or updating information stored in the encoder, or of saving new information. Thanks to the **serial transmission method**, only **four signal lines** are required. The data is transmitted in **synchronism** with the clock signal from the subsequent electronics. The type of transmission (position values, parameters, diagnostics, etc.) is selected through mode commands that the subsequent electronics send to the encoder.

Interface	EnDat 2.2 serial bidirectional
Data transfer	Position values, parameters and additional data
Data input	Differential line receiver according to EIA standard RS 485 for the signals CLOCK, $\overline{CLOCK}$, DATA and $\overline{DATA}$
Data output	Differential line driver according to EIA standard RS 485 for DATA and $\overline{DATA}$ signals
Position values	Ascending during traverse in direction of cable outlet
Power supply	3.6 V to 14 V

CLOCK FREQUENCY

The clock frequency is variable—depending on the cable length (max. 150 m)—between 100 kHz and 2 MHz. With propagation-delay compensation in the subsequent electronics, either clock frequencies up to 16 MHz are possible or cable lengths up to 100 m. The maximum clock frequency is stored in the encoder memory.

EnDat 2.2	≤ 8 MHz or 16 MHz

Transmission frequencies up to 16 MHz in combination with large cable lengths place high technological demands on the cable. Due to the data transfer technology, the cable connected directly to the encoder must not be longer than 20 m. Greater cable lengths can be realized with a cable no longer than 6 m and an extension cable. As a rule, the entire transmission path must be designed for the respective clock frequency.

EnDat 2.2 without propagation-delay compensation
EnDat 2.2 with propagation-delay compensation

POSITION VALUES

The position value can be transmitted with or without additional data. It is not transmitted to the subsequent electronics until after the calculation time tcal has passed. The calculation time is ascertained at the highest clock frequency permissible for the encoder, but limited at 8 MHz.

Only the required number of bits is transferred for the position value. The bit number can be read out from the encoder for automatic parameterization.

MEMORY AREAS

The encoder provides several memory areas for parameters. These can be read from by the subsequent electronics, and some can be written to by the encoder manufacturer, the OEM, or even the end user. The parameter data are stored in a permanent memory. This memory permits only a limited number of write access events and is not designed for cyclic data storage. Certain memory areas can be write-protected (this can only be reset by the encoder manufacturer).
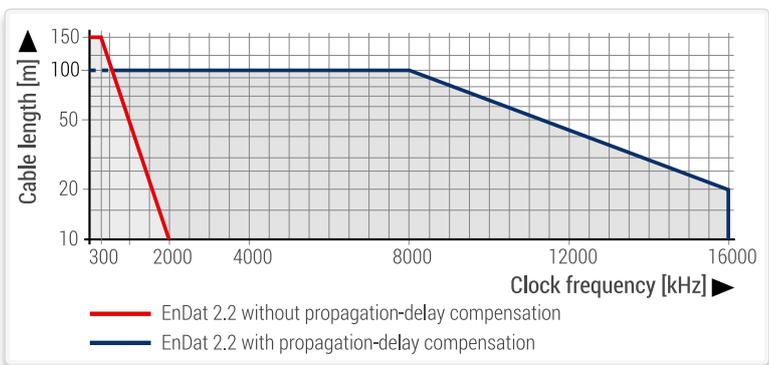
Parameters are saved in various memory areas, e.g.:

- Encoder-specific informationen
- Informationen of the OEM (e. g. „electronic ID-label" of the motor)
- Operating parameters (datum shift, instruction, etc.)
- Operating status (alarm or warning messages)

Monitoring and diagnostic functions of the EnDat interface make a detailed inspection of the encoder possible.
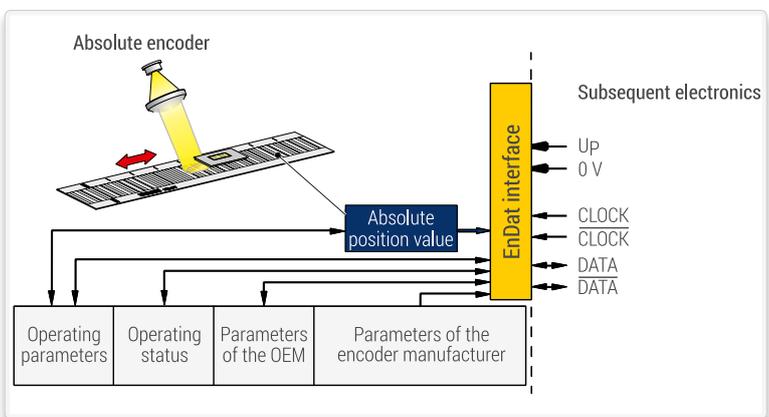
- Error messages
- Warnings
- Online diagnostics based on valuation numbers (EnDat 2.2)

ADDITIONAL DATA

One or two items of additional data can be appended to the position value, depending on the type of transmission (selection via MRS code). The additional data supported by the respective encoder is saved in the encoder parameters.

INPUT CIRCUITRY OF SUBSEQUENT ELECTRONICS

Dimensioning

IC1 = RS 485 differential line receiver

Z0 = 120 Ω

EnDat2.2 is a bidirectional interface of HEIDENHAIN.
Detailed information you will find on: www.endat.de

CUSTOMER-SPECIFIC SERIAL INTERFACES

BiSS C

RSF Elektronik encoders with the **Code B** after the model designation are suited for connection to Biss C controls with **BiSS C unidirectional interface**

- Ordering designation: BiSS/Cu

Fanuc

RSF Elektronik encoders with the **Code F** after the model designation are suited for connection to Fanuc controls with **Fanuc Serial Interface**

- Ordering designation: Fanuc05 αi Interface

Mitsubishi

RSF Elektronik encoders with the **Code M** after the model designation are suited for connection to Mitsubishi controls with **Mitsubishi high speed interface**

- Ordering designation: Mit03-2
  One-pair transmission
- Ordering designation: Mit03-4
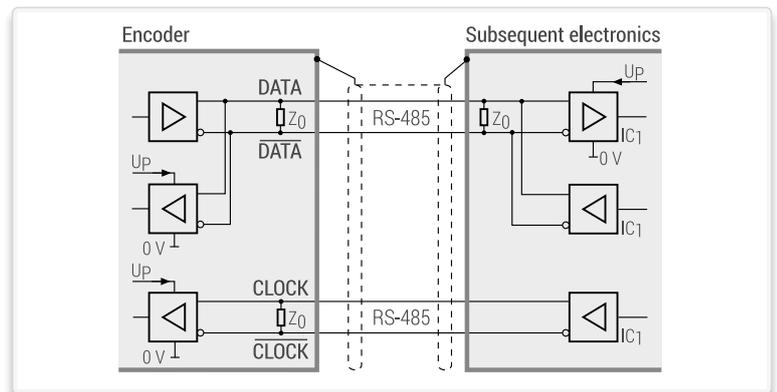 Two-pair transmission

Panasonic

RSF Elektronik encoders with the **Code P** after the model designation are suited for connection to Panasonic controls with **Panasonic Serial Interface**
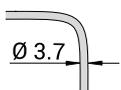
- Ordering designation: Pana02

Yaskawa

RSF Elektronik encoders with the **Code Y** after the model designation are suited for connection to Yaskawa controls with **Yaskawa Serial Interface**
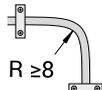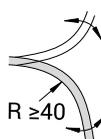
- Ordering designation: YEC07

SHIELDING

Ø 3.7

Shielded PUR-cable,
Drag chain qualified.

R ≥8

Bending radius
fixed mounting

R ≥40

Bending radius
continuous flexing

Shield on housing of the scanning head

Shield on chassis

Scanning head

Cable length

Connector