



Parameters of the encoder manufacturer

The meaning of the information contained in the parameters of the encoder manufacturer depends on the encoder.

HEIDENHAIN encoders can be divided into six groups. They are differentiated by the type of encoder (word 14 of the EnDat 2.1 parameters).

Encoder types:

- L** Linear encoders
- W** Angle encoders (rotational)
- D** Rotary encoders (rotational)
- E** EIB external interface box for conversion of 1 V_{PP} to pure serial EnDat 2.2
- iL** Incremental linear encoder with integral conversion of 1 V_{PP} to pure serial EnDat 2.2
- iR** Incremental rotational encoder with integral conversion of 1 V_{PP} to pure serial EnDat 2.2

The meanings of parameters are divided into evaluation categories. On the basis of these categories, the user can make clear decisions on the use of parameters and their integration in the application software.

Evaluation categories:

- **Required:**
It is essential for operation that these parameters be considered.
- **Depends on application:**
Whether these parameters are to be considered depends on the customer's application. If, for example, no OEM range is used, then the parameter regarding memory allocation for parameters of the OEM need not be considered.
- **Informative:**
These parameters are not required for encoder operation, but they give the user additional information such as the model number.
- **Not relevant:**
If no encoder types were assigned to any of the three other evaluation categories, then the parameter is not required for encoder operation and can be ignored.

The additional information for EnDat 2.2 contained in the parameters of the encoder manufacturer depends in part on the respective encoder.

EnDat 2.2 parameters can be read out only with EnDat 2.2 mode commands.

The types of additional information, additional functions, diagnostic values, and specifications that the respective encoder supports are saved in the assigned status words of these memory areas. Before interrogation of the additional information, HEIDENHAIN recommends reading out the supported information and functions (typically for every initialization of encoders). They are also shown in the encoders' specifications.

Parameters of the encoder manufacturer for EnDat 2.1

| Word | Content | Unit for | | Required | Depends on application | Informative | Remark |
|------|---|----------------|----------------------|----------|------------------------|-------------|---|
| | | Linear encoder | Rotary/angle encoder | | | | |
| 4 | Mask 0 | – | – | – | – | – | – |
| 5 | Mask 1 | – | – | – | – | – | – |
| 6 | Mask 2 | – | – | – | – | – | – |
| 7 | Mask 3 | – | – | – | – | – | – |
| 8 | Version of the EnDat Interface | – | – | – | – | All | "2" saved with EnDat 2.1 or 2.2 |
| 9 | Memory allocation for parameters of the OEM | – | – | All | – | – | Depends on encoder; program flexibly. Memory pointer to first free address |
| 10 | | | | | | | |
| 11 | Memory allocation for compensation values | – | – | – | – | – | Reserved for encoder manufacturer |
| 12 | | | | | | | |
| 13 | Number of pulses for transfer of position value (transmission format) | – | – | All | – | – | Setting the correct clock number for position transmission |
| 14 | Encoder type | – | – | All | – | – | Defines the units of the parameters |
| 15 | Signal period or signal periods per revolution for incremental output signals | nm | – | All | – | – | E, iL, iR: for calculating the smallest display step (LSB) or the correct display value for negative traverse direction All: for EnDat-compliant datum shift |
| 16 | | | | | | | |
| 17 | Distinguishable revolutions (only for multiturn encoders) | – | – | W D | – | – | Required for correct calculation of the position. |
| 18 | (Nominal) increment of reference marks | mm | Signal periods | – | – | E iL iR | – |
| 19 | Position of first reference mark | mm | – | – | – | iL | Not supported by EIB . |

Parameters of the encoder manufacturer for EnDat 2.1 (continued)

| Word | Content | Unit for | | Required | Depends on application | Informative | Remark |
|------|--|-------------------|--------------------------------|----------|------------------------|-------------|---|
| | | Linear encoder | Rotary/angle encoder | | | | |
| 20 | Measuring step or steps per revolution with serial data transmission | nm | Measuring steps per revolution | All | – | – | – |
| 21 | | | | | | | |
| 22 | Datum shift of the encoder manufacturer | Signal periods | Signal periods | All | – | – | To be accounted for by the user for datum shift |
| 23 | | | | | | | |
| 24 | ID number | – | – | – | – | All | Safety technology |
| 25 | | | | | | | |
| 26 | | | | | | | |
| 27 | Serial number | – | – | – | All | – | Encoder exchange can be detected (may affect application—safety related) |
| 28 | | | | | | | |
| 29 | | | | | | | |
| 30 | Direction of rotation or traverse | – | – | All | – | – | – |
| 31 | Status of commissioning diagnosis | – | – | – | – | – | No longer supported since 1999 |
| 32 | Maximum mechanically permissible linear velocity or shaft speed | m/min | rpm | – | W L D iL iR | – | Required for cross checking of absolute position ↔ incremental position |
| 33 | Accuracy depending on linear velocity or shaft speed, Area I | LSB ¹⁾ | LSB ¹⁾ | – | W L D | – | Comparison of absolute and incremental position not possible with E iL iR , because these encoders have only incremental information |
| 34 | Accuracy depending on linear velocity or shaft speed, Area II | LSB ¹⁾ | LSB ¹⁾ | – | W L D | – | |
| 35 | Support of error messages 1 | – | – | All | – | – | For definition of an “error mask” (safety related) |
| 36 | Support of warnings | – | – | – | – | All | For preventive maintenance |
| 37 | EnDat command set | – | – | All | – | – | Information whether EnDat 2.2 mode commands are supported |
| 38 | Reserved for measuring length ²⁾ | – | – | – | – | L iL | Not supported by EiB . |
| 39 | Maximum calculating time | – | – | All | – | – | For monitoring (time out) |
| 40 | HEIDENHAIN specifications | – | – | – | – | – | – |
| 41 | | | | | | | |
| 42 | | | | | | | |
| 43 | | | | | | | |
| 44 | | | | | | | |
| 45 | | | | | | | |
| 46 | | | | | | | |
| 47 | CHECKSUM | – | – | – | – | – | – |



¹⁾ The higher-valued byte contains the divisor with respect to the maximum permissible linear velocity or rotational shaft speed up to which this accuracy is valid.

²⁾ Not supported by all linear encoder models; initialized with default value 0.

Parameters of the encoder manufacturer for EnDat 2.2

| Word | Content | Unit for | | Required | Depends on application | Informative | Remark |
|----------|--|-------------------|-----------------------|----------|------------------------|-------------|---|
| | | Linear encoder | Rotary/ angle encoder | | | | |
| 0 | Status of additional information 1 | – | – | – | All | – | Can be safety related. Cross checking of “what is required” and “what does the encoder support” |
| 1 | Status of additional information 2 | – | – | – | All | – | |
| 2 | Status of additional functions | – | – | – | All | – | |
| 3 | Acceleration | m/s ² | 1/s ² | – | All | – | Consider the scaling factor. |
| 4 | Temperature | K | K | – | All | – | Consider the scaling factor. |
| 5 | Diagnostic status | – | – | – | – | All | – |
| 6 | Support of error message 2 | – | – | All | – | – | For definition of an “error mask”: (safety related) |
| 7 | Forced speed-up status | – | – | – | All | – | Safety technology |
| 8 | | | | | | | |
| 9 | Measuring step or measuring steps per revolution for position value 2 | nm | – | – | All | – | Safety technology or EIB, iL, iR |
| 10 | | | | | | | |
| 11 | Accuracy depending on linear velocity or shaft speed of position value 2, Area I | LSB ¹⁾ | LSB ¹⁾ | – | All | – | Safety technology or EIB, iL, iR |
| 12 | | LSB ¹⁾ | LSB ¹⁾ | – | All | – | Safety technology or EIB, iL, iR |
| 13 | Accuracy depending on linear velocity or shaft speed of position value 2, Area II | LSB ¹⁾ | LSB ¹⁾ | – | All | – | Safety technology or EIB, iL, iR |
| 14 | | LSB ¹⁾ | LSB ¹⁾ | – | All | – | Safety technology or EIB, iL, iR |
| 15 | Distinguishable revolutions Position value 2 (only for multiturn encoders) | – | – | W D | – | – | Required for correct calculation of the position |
| 16 | Direction of rotation of position value 2 | – | – | All | – | – | – |
| 17 to 20 | Encoder designation | – | – | – | – | All | – |
| 21 | Support of instructions | – | – | – | – | – | Not yet supported. Not for safety technology |
| 22 | Max. permissible encoder temperature at measuring point | K | K | – | W L D iL iR | – | Not supported by EIB . |
| 23 | Max. permissible acceleration | m/s ² | 1/s ² | – | W L D iL iR | – | Not supported by EIB . |
| 24 | Number of blocks for memory area Section 2 | – | – | All | – | – | Depends on encoder; program flexibly |
| 25 | Maximum clock frequency | kHz | kHz | All | – | – | Depends on connector, cable lengths |
| 26 | Number of bits for position comparison | – | – | – | All | – | Safety technology |
| 27 | Scaling factor for resolution | – | – | All | – | – | For calculation of the smallest display step (LSB). |
| 28 | Measuring step or measuring steps per revolution or subdivision values of a grating period | – | – | All | – | – | |
| 29 | | | | | | | |
| 30 | Max. velocity or shaft speed for continuous code value | m/min | rpm | – | W L D iL iR | – | Specific to application. Applies for encoders that permit higher mechanical than electrical speed. Not supported by the EIB |
| 31 | Offset between position value and position value 2 | – | – | – | All | – | Safety technology |
| 32 | | | | | | | |
| 33 | | | | | | | |
| 34 | “Number of distinguishable revolutions” with scaling factor | – | – | W D | – | – | Required for correct calculation of the position |
| 63 | CHECKSUM | – | – | – | – | – | – |



¹⁾ The higher-valued byte contains the divisor with respect to the maximum permissible linear velocity or rotational shaft speed up to which this accuracy is valid.