HEIDENHAIN

Functional Safety

Product Information

EIB 2391S

External Interface Box

December 2012

EIB 2391S

External Interface Box

- **Input: HEIDENHAIN encoders with EnDat22 interface**
- **Output: DRIVE-CLiQ interface**

Requirements on encoders with EnDat22 interface at the input

The EIB supports connection of the following encoders (with or without functional safety) to the DRIVE-CLiQ interface:

- Absolute linear encoders (e.g. LC 183, LC 483, LC 115, LC 415, LC 2xx, LIC 4000)
- Absolute singleturn rotary encoders and angle encoders (e.g. RCN 2xxx, RCN 5xxx, RCN 8xxx, ECN 1325, ROC 425, ROC 1023, ECN 125)
- Absolute multiturn rotary encoders (e.g. EQN 1337, EQN 437, ROQ 437, ROQ 1035, but no battery-buffered encoders)

In principle, it is possible to connect further encoders featuring the EnDat22 interface depending, however, on the firmware level of the EIB and the subsequent electronics. Please contact HEIDENHAIN or the manufacturer of the subsequent electronics for further information.

After switch-on, the EIB tests various characteristics of the connected EnDat encoder and automatically adapts to the encoder. If the encoder does not fulfill the specific requirements, a corresponding error message is transmitted through the DRIVE-CLiQ interface.

The encoder must meet the following requirements:

- EnDat 2.2 mode commands must be supported
- EnDat clock frequency ≥ of 8 MHz
- Must be adjustable to a shortened recovery time of 1.25 to 3.75 µs
- Increasing position values in positive measuring direction (see mating dimensions of the encoder)
- Multiturn rotary encoders with binary line count, but no battery-buffered encoders
- Linear encoders with measuring steps in nanometers (nm)

Functional safety

The EIB can be used in safety-related applications only if the connected encoder supports functional safety.
The characteristics regarding functional safety are substantially determined by the connected encoder and the subsequent electronics (if necessary, contact the manufacturer; the EIB essentially passes on the characteristics of the encoder).

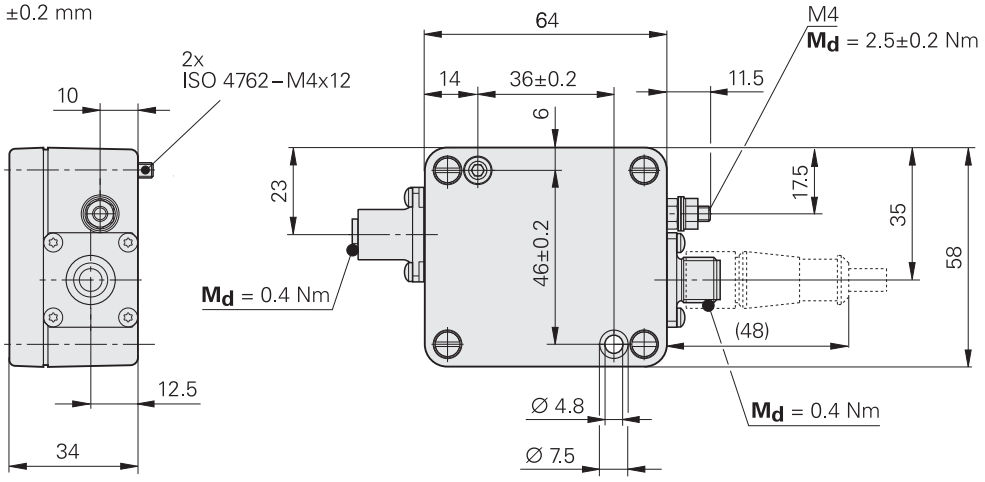
The **safe position** is substantially determined by the connected encoder and the subsequent electronics. The EIB itself does not influence the safe position. The data “safe position” and “safety-related measuring step (SM)” of the connected EnDat encoder are required for calculating the safe position. Please contact the manufacturer of the subsequent electronics for further information.

The **PFH value** of the total system (EIB 2391S + encoder) is the sum of the PFH values of the EIB 2391S and the connected encoder.

For information on the encoder, please refer to its documentation (Product Information, Catalog, and Mounting Instructions). Please contact the manufacturer of the subsequent electronics for more information on the application of the EIB and encoder in safety-related applications.

Caution:
The software of the DRIVE-CLiQ subsequent electronics must be designed for operation of the EIB 2391S in safety-related applications (planned availability as of approx. mid-2013). For more information on availability, please refer to the manufacturer.

mm
Tolerancing ISO 8015
ISO 2768 - m H
< 6 mm: ±0.2 mm



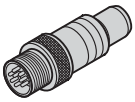
Specifications	EIB 2391S
Functional safety	Depending on the connected encoder and subsequent electronics, suited for applications up to • SIL 2 according to EN 61508:2011 (further basis for testing: EN 61800-5-2) • Category 3 PL d according to EN ISO 13849-1:2008
PFH	26 x 10^{-9} (with respect to an application height of ≤ 1000 m above sea level)
Safe position	Determined by the connected encoder and the subsequent electronics (for example by the configuration); the EIB has no influence on the safe position
Input	
Interface	EnDat 2.2
Ordering designation	EnDat22
Electrical connection	M12 connector (female), 8-pin
Power supply of encoder (U_{P2})	5.1 V DC ± 0.15 V, max. 2500 mW
Cable length	≤ 100 m[1)]
Output	
Interface	DRIVE-CLiQ
Ordering designation	DQ01
Electrical connection	M12 connector (male), 8-pin
Cable length	≤ 95 m[2)]
Power supply (U_{P1})	24 V DC (16.0 V to 28.8 V) (up to 36.0 V DC is possible without detriment to functional safety)
Power consumption	*Maximum* *With 16.0 V:* ≤ 4.1 W *With 28.8 V:* ≤ 4.35 W *Typical* *With 24 V:* 1.1 W + 1.15 x P_{Mtyp} (where P_{Mtyp} = typical power consumption of encoder)
Operating temperature	0 °C to 60 °C
Storage temperature	–30 °C to 70 °C
Vibration 55 to 2000 Hz **Shock** 11 ms	100 m/s² (IEC 60068-2-6) 200 m/s² (IEC 60068-2-27)
Protection	IP 65
Weight	Approx. 180 g

1) With HEIDENHAIN cable; note the power supply at the encoder.
2) Depending on the output cable; the plug connection to the EIB is to be considered a DRIVE-CLiQ coupling.

Interfaces

Pin layout of the EIB input

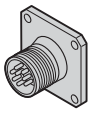
Mating connector
8-pin coupling, M12



	Power supply				Absolute position values			
	8	**2**	**5**	**1**	**3**	**4**	**7**	**6**
EnDat	**U_{P2}**	**Sensor** U_{P2}	**0 V**	**Sensor** 0 V	**DATA**	**$\overline{\text{DATA}}$**	**CLOCK**	**$\overline{\text{CLOCK}}$**
	Brown/Green	Blue	White/Green	White	Gray	Pink	Violet	Yellow

Pin layout of the EIB output

On the EIB 2391 S
8-pin flange socket, M12



	Power supply		Absolute position values				Other	
	1	**5**	**3**	**4**	**7**	**6**	**2**	**8**
DRIVE-CLiQ	**U_{P1}**	**0 V**	**RXP**	**RXN**	**TXP**	**TXN**	/	/

Cable shield connected to housing; **U_P** = Power supply voltage
Sensor: The sensor line is connected in the EIB with the corresponding power line.
Vacant pins or wires must not be used!

Cables
For cables to connect encoders, see the Catalog or Product Information of the encoder.
Cables from the respective manufacturer, complete with connectors, are required for use in safety-related applications:
- Cable for encoder connection: from HEIDENHAIN
- Cable for connecting the EIB to the subsequent electronics: from the manufacturer of the subsequent electronics

HEIDENHAIN

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Related documents
The instructions in the following documents ensure the correct and intended operation of the EIB:
- Catalog, Product Information and Mounting Instructions of the connected encoder
- Technical Information: *Safety-Related Position Measuring Systems* 596632
- Mounting Instructions: *EIB 2391 S* 895532

Applicable for implementation in a control or inverter:
- Application conditions for safe control with HEIDENHAIN DRIVE-CLiQ encoders 579641
- Data of the subsequent electronics manufacturer for use of the EIB 2391 S in safety-related applications