# HEIDENHAIN

Product Information
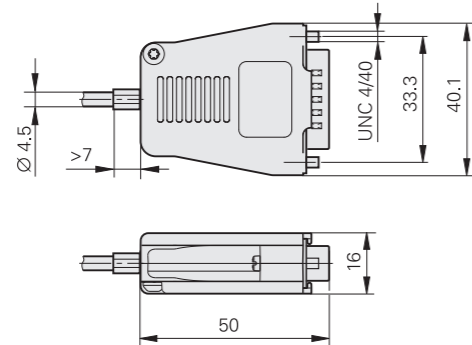
# EIB 3011
# EIB 3091 F
# EIB 3091 M

Signal Converters in
Cable Design

# EIB 3001

- **Signal converters in a D-sub connector housing**
- **Integrated 16 384-fold subdivision**
- **Input: Incremental encoders from HEIDENHAIN**
- **Output: EnDat 2.2, Fanuc Serial Interface or Mitsubishi high speed interface**

mm
Tolerancing ISO 8015
ISO 2768:1989 - mH
≤ 6 mm: ±0.2 mm

Ø 4.5  >7  UNC 4/40  33.3  40.1  16  50

| Specifications | EIB 3011 | EIB 3091 F | EIB 3091 M |
|---|---|---|---|
| **Input** | For HEIDENHAIN encoders | | |
| Incremental signals | $\sim$ 1 V$_{PP}$ (input frequency: ≤ 400 kHz) | | |
| Reference mark | One or distance-coded | | |
| Electrical connection* | 15-pin, 2-row D-sub connector (female), with locking nuts<br>12-pin M23 connector (female) | | |
| Supply voltage of encoder | DC 5.2 V ±0.25 V | | |
| Cable length | ≤ 6 m | | |
| **Output** | | | |
| Interface | EnDat 2.2 | Fanuc Serial Interface | Mitsubishi high speed interface |
| Ordering designation | EnDat22 | Fanuc02 | Mit03-4 |
| Calculation time $t_{cal}$<br>Clock frequency | ≤ 5 µs<br>≤ 16 MHz | – | – |
| Electrical connection | 15-pin, 2-row D-sub connector (male) with locking screws and integrated electronics | | |
| Cable length (with HEIDENHAIN cable)[1] | ≤ 100 m | ≤ 20 m[2] | ≤ 20 m[2] |
| **Subdivision** | ≤ 16384-fold (depending on encoder) | | |
| **Supply voltage** | 3.6 V to 14 V | | |
| Power consumption (maximum) | *3.6 V:* 1700 mW (including I$_{Mmax}$ = 150 mA)<br>*14 V:* 1700 mW (including I$_{Mmax}$ = 150 mA) | | |
| Current consumption (typical, without load) | *At 5 V:* 75 mA + 1.3 · I$_{Mtyp}$ | | |
| **Operating temperature**<br>**Storage temperature** | 0 °C to +70 °C<br>–30 °C to +70 °C | | |
| **Vibration** 55 Hz to 2000 Hz<br>**Shock** 11 ms | 100 m/s$^2$ (EN 60068-2-6)<br>200 m/s$^2$ (EN 60068-2-27) | | |
| **Protection** EN 60529 | IP40 | | |
| **Mass** | ≈ 0.075 kg (without cable, with electronics) | | |

\* Please indicate when ordering
[1] Comply with the supply voltage at the EIB; I$_{Encoder}$ ≤ 150 mA
[2] Greater cable lengths upon request

# Electrical connection
## Pin layout: EIB

### Input

**15-pin D-sub connector**   |   **12-pin M23 connector**

| | Power supply | | | | Incremental signals | | | | | | Other signals | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| D-sub | 12 | 2 | 10 | 11 | 5 | 6 | 8 | 1 | 3 | 4 | / | 7 | 9 |
| M23 | 4 | 12 | 2 | 10 | 1 | 9 | 3 | 11 | 14 | 7 | 5/13/15 | 8 | 6 |
| | U$_P$ | Sensor U$_P$ | 0 V | Sensor 0 V | A+ | A– | B+ | B– | R+ | R– | Vacant | H/L1 [1] | L/L2 [1] |
| | Brown/Green | Blue | White/Green | White | Brown | Green | Gray | Pink | Red | Black | / | Violet | Yellow |

**Shield** on housing; **U$_P$** = Power supply voltage
**Sensor:** The sense line is connected internally to the respective power line.
[1] Homing or limit signals (depending on the encoder)

### Output

**15-pin D-sub connector**

| | Power supply | | | | Incremental signals | | | | | | Serial data transfer | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| pin | 4 | 12 | 2 | 10 | 1 | 9 | 3 | 11 | 14 | 7 | 5 | 13 | 8 | 15 |
| EIB 3011 | U$_P$ | Sensor U$_P$ | 0 V | Sensor 0 V | / | / | / | / | / | / | DATA | $\overline{\text{DATA}}$ | CLOCK | $\overline{\text{CLOCK}}$ |
| EIB 3091 F | U$_P$ | Sensor U$_P$ | 0 V | Sensor 0 V | / | / | / | / | / | / | Serial Data | $\overline{\text{Serial Data}}$ | Request | $\overline{\text{Request}}$ |
| EIB 3091 M | U$_P$ | Sensor U$_P$ | 0 V | Sensor 0 V | / | / | / | / | / | / | Serial Data | $\overline{\text{Serial Data}}$ | Request Frame | $\overline{\text{Request Frame}}$ |

**Shield** on housing; **U$_P$** = Power supply voltage
**Sensor:** The sense line is connected internally to the respective the power line.
Vacant pins or wires must not be used!

# Configuration of the EIB 3001

In order for the EIB 3001 to operate correctly with the encoder, certain encoder parameters must be stored in the EIB 3001 (e.g., the number of signal periods, nominal increment of the reference marks, encoder ID). This programming can be done only by HEIDENHAIN. This information is also printed on the ID label and can be read via the EnDat interface.

**Information on the ID label**
The **data interface** designates the type of interface for transmission of the position values at the output of the EIB.

**Line count or signal period**
For rotary encoders, the signal period is expressed in the number of signal periods per revolution. For linear encoders, the signal period is shown in µm.

The **Encoder ID** states the type of connectable encoder. For example, in the case of EnDat:
00  Incremental linear encoder without distance-coded reference marks
10  Incremental linear encoder with distance-coded reference marks
80  Incremental rotary or angle encoder without distance-coded reference marks
90  Incremental rotary or angle encoder with distance-coded reference marks
For the EnDat interface, this value is stored in word 14 of the EnDat 2.1 parameters.

The **nominal increment N of the reference marks** is indicated in signal periods if the connected encoder has distance-coded reference marks (EnDat 2.2 encoder ID = 10 or 90)

**Example:**
Information on the ID label for the connection of an ERM 280 (line count: 1024) to the EnDat 2.2 interface via an EIB 3001:
Data interface: EnDat22
Encoder ID: 80
Line count or signal period: 1024
Nominal increment of the ref. marks: N/A
Subdivision: 16384

Line count or signal period
Data interface

Nominal increment of the reference marks
Subdivision
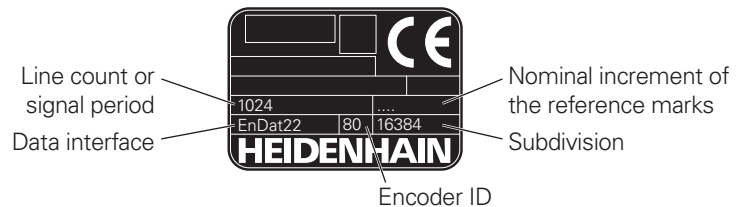
Encoder ID

# Connection information

**Finding the absolute reference**
Because incremental encoders are connected to the EIB 3001, the device provides relative position values immediately upon switch-on, starting with the switch-on position. The absolute reference is not established until the reference marks are traversed.

For encoders with distance-coded reference marks, two successive reference marks must be traversed without a change in direction.

**EIB 3001: requirements for the control**
EnDat 2.2 permanently provides the relative position as Position 1. When the absolute reference is found, the RM bit is set in the EnDat additional data, and the absolute position value is transmitted as Position 2. Before using the EIB 3001, please check whether the subsequent electronics support this EnDat 2.2 device profile for incremental encoders.

**Please note:**
It is not possible to combine the EIB 3011 and interface electronics with the DRIVE-CLiQ interface (e.g., EIB 2391 S or EIB 3392 S), because these interface electronics accept only absolute encoders.

**EIB 3001: encoder mounting and online diagnostics**
The encoder is mounted with the help of the testing and inspection devices from HEIDENHAIN, but not with the EIB 3001. After the encoder has been mounted, it can be connected to the EIB 3001 and the downstream electronics.

For checking encoder functionality, the EIB 3001 supports online diagnostics by outputting valuation numbers for the incremental track and a valuation number for the sum evaluation of the reference pulse. This allows the function reserve of the connected encoder to be evaluated.

# HEIDENHAIN

📖 **Further information:**

Comply with the requirements described in the following documents to ensure correct operation of the encoder:
- Brochure: *Interfaces of HEIDENHAIN Encoders*          1078628-xx
- Brochure: *Cables and Connectors*          1206103-xx
For brochures and Product Information documents, visit *www.heidenhain.com*.