HEIDENHAIN

Product Information

EIB 8000

External Interface Box

09/2018

EIB 8000

The EIB 8000 series is particularly suitable for applications requiring high precision in evaluation and compensation of the encoder signals and a very fast acquisition and transmission of measured values. During highly accurate angle measurement in a vacuum, e.g. with an RON 905, the EIB 8000 can attain very high accuracy thanks to its adapted signal compensation. The EIB 8000 is also predestined for applications requiring highly accurate information on actual velocity, because the EIB can form highly accurate information on actual traversing speeds by oversampling the encoder signals. The EIB 8000 is therefore specifically suited for applications such as telescopes or highly accurate test stations.

Up to **eight HEIDENHAIN encoders** with sinusoidal incremental signals (1 V_{PP}) can be connected to the EIB 8000 series.

The EIB 8000 series subdivides the periods of the incremental signals up to 65536-fold for **measured-value generation.** Compensation of the incremental signals reduces error within one signal period. The EIB 8000 combines an automatically concurrent adjustment of offset, phase, and amplitude of the incremental signals (online compensation) with point-based, location-dependent compensation of the effect of the signal form error (waveform compensation). The position values, which are formed with a very high sampling rate, are supplied to a position-value filter with adjustable characteristics in regard to bandwidth, etc., and finally output.

The integrated **measured-value memory** enables the EIB 8000 series to save typically 125 000 measured values per axis. Internal or external triggers can be used for axis-specific storage of the measured values.

A position data link (PDL) is available for high-performance **data output**. To use the PDL, the higher-level control must have a corresponding remote station. For more information, please contact HEIDENHAIN. An Ethernet interface (TCP/IP or UDP communication) is available as an alternative. This permits direct connection to a PC, laptop, or industrial PC. Ethernet transmission also permits the use of switches or hubs for connecting more than one EIB. It is also possible to use WLAN transmission, for example.

The method of measured value transmission can be set via the **operating mode**. For more information, see the "Operating modes" section.

Extensive **trigger inputs and outputs** make flexible handling of the EIB 8000 possible. The main application is the determination of the moment at which the position data of each axis is generated or the synchronization of multiple EIB 8000 units. In forming position data, the EIB 8000 can generate them synchronously or asynchronously. During synchronous generation, the position data are triggered in a fixed time interval, where the triggering is formed from an exact synchronization clock (SynClk) and a position trigger marker (PTM).

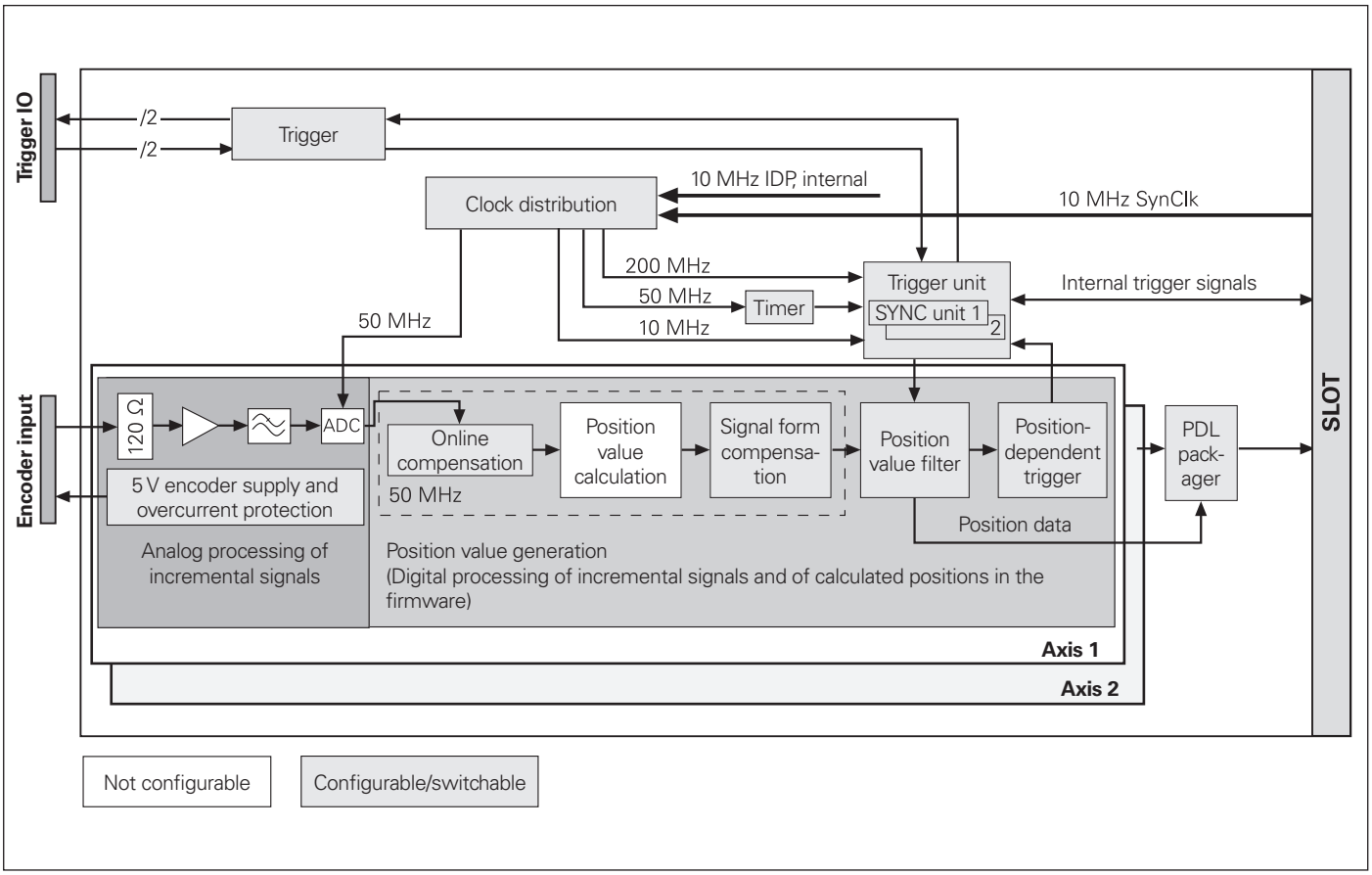
A CLK signal (typically 10 MHz) is marked by a flank defined by a PTM, which then releases the trigger event. The CLK signal (alternatively also designated as SynClk) and the PTM can be connected differentially (LVDS signals) or single-ended (LVTTL signals). The EIB 8000 features appropriate inputs for the signals. The EIB 8000 can also generate signals internally, trigger the position value formation, and provide it for other devices. The respective corresponding connections are also available. As an alternative, the position data can also be generated by triggering on asynchronous events. Trigger inputs and outputs are available on the front and back panels of the EIB 8000 for these applications (differential inputs and outputs as per RS-485).

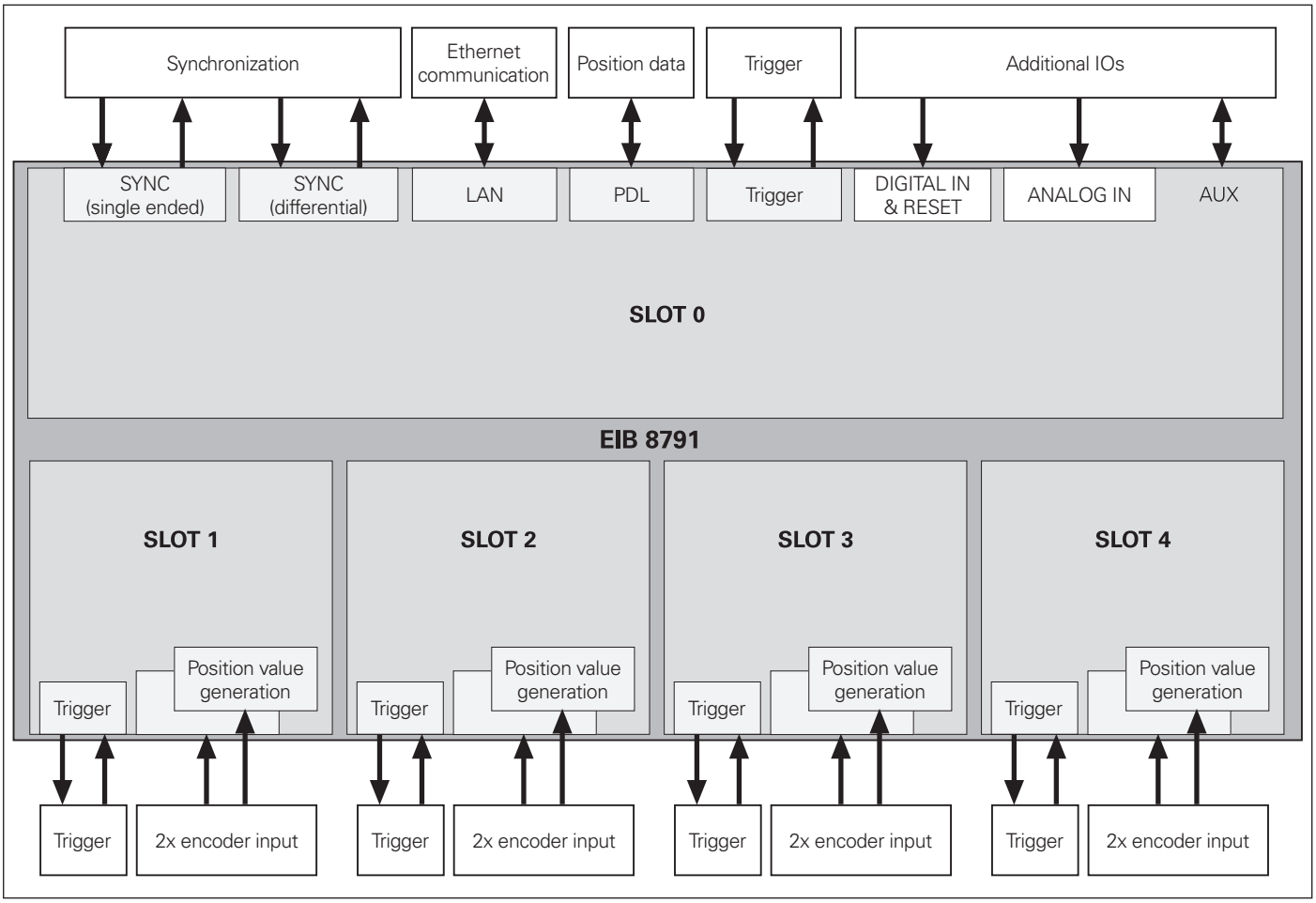
Eight differential digital inputs are provided at the DIGITAL IN connection. In addition, a differential remote reset input is available. The remote reset input is used for remote triggering of the reset function. This functions identically to the reset button on the front of the product.

Driver software for Windows, Linux, and LabVIEW is included in the items supplied, in order to **process the measured values** on a PC, as well as example programs. The driver software enables customers to easily program their own applications. In addition, example programs demonstrate the capabilities of the EIB 8000 series.

The EIB is designed for integration in a 19-inch rack and occupies one rack unit.

Basic circuit diagram





Specifications	EIB 8000
Encoder inputs	26-pin MDR connections (female) for eight encoders
Input signals	~ 1 V_{PP}
Power supply for encoders	5.15 V DC ±0.10 V; max. 450 mA per channel Overcurrent protection (automatic switch-off, resettable) at 550 mA
Input frequency	≤ 20 MHz
Subdivision factor	65536-fold
Signal adjustment	Online compensation, signal form compensation, position value filter
Cable length[1)]	≤ 30 m (with encoder current consumption of ≤ 150 mA)
Data register for measured values	48 bits
Measured-value memory	Typically 125,000 position values per channel with 8 axes
Measured-value trigger[2)]	Storage of the measured values of the eight axes alternatively through external or internal trigger. ***External:*** • Signal via trigger input (front and/or back panel) • Software command (via Ethernet) • Synchronous mode (via SynClk + PTM) ***Internal:*** • Timer • Synchronous mode (SynClk + PTM generated internally)
Trigger input	Differential inputs as per RS-485, (terminating resistors can be activated) *Rear panel:* four inputs, 9-pin D-sub connection (male) *Front panel:* two inputs, 8-pin M9 connection (female)
Trigger output	Differential outputs as per RS-485 *Rear panel:* four outputs, 9-pin D-sub connection (female) *Front panel:* two outputs, 8-pin M9 connection (female)
Synchronization connections	*Differential inputs:* 18-pin female (differential inputs as per LVDS, 100 Ω differential terminating resistors, PCIe connection) *Differential outputs:* 18-pin female (differential outputs as per LVDS, PCIe connection) *Single-ended inputs and outputs:* SMA, RG 2231 U or RG 3161 U cable recommended (single-ended as per LVTTL, 50 Ω terminating resistors)
Digital inputs	Rear panel: 25-pin D-sub (male) 8 differential digital inputs, input voltage range DC –0.5 V to 14 V
Remote reset input	Release of the reset function (identical to reset button on the front panel)
Access to measured values	Depends on the selected operating mode (see separate table)
Software	Example programs; driver software for Windows, Linux and LabVIEW
Data interface[3)]	Ethernet as per IEEE 802.3 (10/100/1000 Mbit/s)
PDL data interface	38-pin female (PCIe connection, corresponding remote station required in the subsequent electronics)
Reset functionality	Release through a button on the device or through a separate input (remote reset)
Dimensions	Approx. 483 x 318 x 44 mm
Operating temperature **Storage temperature** **Altitude**	0 to 45 °C 0 °C to 70 °C ≤ 5000 m above seal level
Power connection	AC 100 V to 240 V (±10 %), 50 Hz to 60 Hz (±3 Hz), power consumption approx. 250 W

[1)] The supply voltage range of the encoder must be maintained; specified cable length applies when HEIDENHAIN cables are used.
[2)] Different trigger sources can be assigned to the individual axes.
[3)] The quality of the data cable between the EIB and PC must be adapted to the transmission rate and cable length.
Note: The features can be extended by updating the firmware.

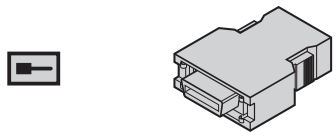
Operating modes

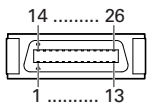
	PDL streaming	Soft Realtime Mode	Recording	Polling
Properties	Acquisition of measured values with high trigger rate and low latency	Immediate transmission of measured values when the trigger event occurs	Storage of measured values in the EIB's internal measured-value memory	Software request from customer application
Selectable trigger sources	All internal and external sources	All internal and external sources		By software command
Trigger rate	≤ 10 MHz	≤ 400 kHz	≤ 10 MHz	Depends on the application
Access time to measured values (latency)	< 10 µs	< 5 µs	–	–
Data interface	PDL	Ethernet	Ethernet	Ethernet

Electrical connection

Pin layout ~ 1 V_{PP}

MDR connector, male





	Voltage supply				Incremental signals						Other signals			
	10	**23**	**9**	**22**	**1**	**14**	**3**	**16**	**7**	**20**	**11**	**12**	**13**	**5/15**
~ **1 V_{PP}**	**U_P**	**Sensor** 5 V	**0 V**	**Sensor** 0 V	**A+**	**A–**	**B+**	**B–**	**R+**	**R–**	**Vacant**	**L1** H[1)]	**L2** L[1)]	**Vacant**

Cable shield connected to housing; **U_P** = Power supply voltage
Sensor: The sense line is connected internally with the corresponding power line.
Vacant pins or wires must not be used.
Pins 2, 4, 6, 8, 15, 17, 19, 21, and 26, which are connected internally with the 0 V connection, can be used for additional shielding of the incremental signals.

[1)] Homing and limit signals depend on the version of the encoder (support depends on the firmware)

PUR adapter cable		
Complete with 15-pin D-sub connector (female) and 26-pin M23 connector (male)		1038743-xx

Software
EIB application software

The EIB application software demonstrates the commissioning of the EIB 8000 and shows its features and functions:

- Configuration of settings required for operation of the EIB 8000 (e.g. input interface, operating mode, and trigger settings)
- Straightforward depiction of transferred data such as positions and status
- Saving settings to manage various application projects

For more information, refer to the User's Manual for Application Development.

The EIB 8000 application software is on the driver CD and can be installed directly if LabVIEW™ (2012 version, service pack 1, 32-bit) is on the computer. If LabVIEW™ is not on the computer, the tool can be installed with a cost-free run-time from LabVIEW™. The tool is also provided on the driver CD as virtual instrument (VI).

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Further information

Product overview *Interface Electronics* 598160-xx

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