HEIDENHAIN

Product Information

Gateway

For Connecting EnDat
Encoders to PROFINET IO

PROFINET gateway
For connecting EnDat encoders

Encoders with EnDat interface for connection via gateway

Absolute encoders from HEIDENHAIN with **EnDat interface** are suitable for PROFINET IO. The encoders are electrically connected through a **gateway**. The complete interface electronics are integrated in the gateway, as well as a voltage converter for supplying EnDat encoders with DC 5 V ±5 %. This offers a number of benefits:
- Simple connection of the field bus cables.
- Encoder dimensions remain small.
- No temperature restrictions for the encoder. All temperature-sensitive components are in the gateway.
- No bus interruption when an encoder is exchanged.

Besides the EnDat encoder connector, the gateway provides connections for PROFINET and the power supply. Since the gateway is a bus member, the connection cable to the encoder is not considered to be a stub line, although it can be up to 40 meters long.

PROFINET IO

PROFINET IO is the open Industrial Ethernet standard for industrial communication. It builds on the field-proven functional model of PROFIBUS DP but employs fast Ethernet technology as its physical transmission medium, thereby tailoring it to the fast transmission of I/O data. It offers the possibility of transmitting the required data, parameters, and IT functions at the same time.

Physical characteristics

HEIDENHAIN encoders and the gateway are connected to PROFINET in accordance with 100BASE-TX (IEEE802.3 Clause 25) via one shielded twisted pair of wires per direction. The data transfer rate is 100 Mbit/s (Fast Ethernet).

PROFINET profile

HEIDENHAIN encoders and gateways fulfill the definitions as per profile 3.162, version 4.2. The device profile describes the encoder functions. Rotary encoders support the functions of class 4 (full range of scaling and preset functions). The functions supported by the gateway vary depending on the connected encoder. More information about PROFINET can be obtained from the PROFIBUS user organization (PNO).

Commissioning

In order for an encoder with PROFINET interface to be put into operation, a general station description (GSDML) must be downloaded and imported to the configuration software. The GSDML file contains the execution parameters required for a PROFINET IO device.

Encoders or gateway with PROFINET

Encoders with integrated PROFINET interface or the gateway are directly integrated in the network. Addresses are assigned automatically via a protocol integrated into the PROFINET network. Within a network, a PROFINET IO field device is addressed via its physical device MAC address. The encoders feature two double-color LEDs for diagnostics of the bus and the device.
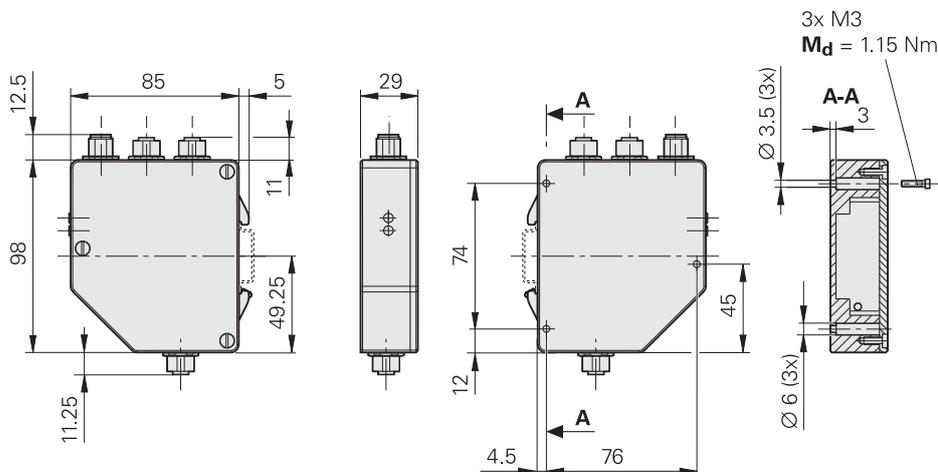
mm

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

Specifications	Gateway PROFINET IO
Input	For absolute linear, angle, and rotary encoders with ordering designation EnDat22 except LC xx3 (multiturn rotary encoders with battery buffer are not supported)
Connection	8-pin M12 flange socket (female)
Cable length	≤ 40 m (with HEIDENHAIN cable), greater lengths upon request
Power supply of encoder	DC 5 V ±5 % (max. 400 mA)
Output	PROFINET IO Functions as per profile 3.162, version 4.2 (see separate table)
Operating status displays	Integrated LED displays: • "Module" ≙ Status of gateway • "Bus" ≙ PROFINET status
Bus connection (PORT 1, PORT 2, U_P)	3 x 4-pin M12 connecting element
Voltage supply	DC 9 V … 36 V
Power consumption	Maximum: *9 V:* ≤ 5.3 W; *36 V:* ≤ 5.3 W (residual ripple included) Typical: 2.4 W + $P_{encoder}$ x 1.33
Operating temperature	–40 °C to +80 °C
Vibration 50 Hz to 2000 Hz **Shock** 11 ms	≤ 100 m/s^2 (EN 60068-2-6) ≤ 300 m/s^2 (EN 60068-2-27)
Protection class EN 60529	IP65
Mass	≈ 400 g
Dimensions	Approx. 150 mm x 90 mm x 30 mm
Fastening	Top-hat rail mounting

Supported functions

Supported functions	Class	Rotary encoders Singleturn	Multiturn	Linear encoders
Position value	3,4	✓	✓	✓
Isochronous mode	4	✓	✓	✓
Functions of class 4	4	✓	✓	✓
Scaling function	4	✓	✓	–
Measuring units per revolution	4	✓	✓	–
Total measuring range	4	✓	✓	–
Cyclic operation (binary scaling)	4	✓	✓	–
Acyclic operation	4	✓	✓	–
Preset	4	✓	✓	✓
Code sequence	4	✓	✓	✓
Preset control G1_XIST1	4	✓	✓	✓
Compatibility mode (encoder profile V.3.1)	3,4	✓	✓	✓
Operating time	3,4	✓	✓	✓
Speed	3,4	✓	✓	✓
Profile version	3,4	✓	✓	✓
Continuous storage of the offset value	4	✓	✓	✓
Identification & maintenance (I & M)		✓	✓	✓
External firmware upgrade		✓	✓	✓

Electrical connection
PROFINET

Connection

PROFINET and the power supply are connected via M12 connecting elements. The necessary mating connectors are:

PORT 1 and PORT 2
4-pin D-coded M12 coupling (male)

Voltage supply
4-pin A-coded M12 connector (female)

PORT 2   PORT 1   U$_P$

Pin layout

PORT 1 and PORT 2 4-pin M12 connector (female) D-coded				
	Position values			
	1	**2**	**3**	**4**	**Housing**
PORT 1/2	**Tx+**	**Rx+**	**Tx–**	**Rx–**	**Shield**
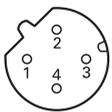
Power supply 4-pin M12 coupling (male) A-coded			
1	**3**	**2**	**4**
U$_P$	**0 V**	**Secondary U$_P$**	**0 V**
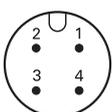
Power should be supplied via the U$_P$ pin. The secondary U$_P$ pin can be used for a secondary power supply (normally not to be assigned, not suitable for looping through of U$_P$).

📖 **Further information:**

Comprehensive descriptions of all available interfaces as well as general electrical information are included in the *Interfaces of HEIDENHAIN Encoders* brochure ID 1078628-xx.

Encoders with EnDat interface

Mating connector: **8-pin M12 coupling (male)**								
	Power supply				**Serial data transfer**			
	8	**2**	**5**	**1**	**3**	**4**	**7**	**6**
	U$_P$	**Sensor U$_P$**	**0 V**	**Sensor 0 V**	**DATA**	$\overline{\text{DATA}}$	**CLOCK**	$\overline{\text{CLOCK}}$
	Brown/Green	Blue	White/Green	White	Gray	Pink	Violet	Yellow

Cable shield connected to housing; **U$_P$** = Power supply voltage
Sensor: The sense line is connected in the encoder with the corresponding power line
Vacant pins or wires must not be used!

Related documents: Adhere to the information in the following documents to ensure the correct and intended operation of the encoder:

- Brochure: *Rotary Encoders* — 349529-xx
- Brochure: *Encoders for Servo Drives* — 208922-xx
- Brochure: *Angle Encoders with Integral Bearing* — 951109-xx
- Brochure: *Linear Encoders for Numerically Controlled Machine Tools* — 571470-xx
- Brochure: *Cables and Connectors* — 1206103-xx