

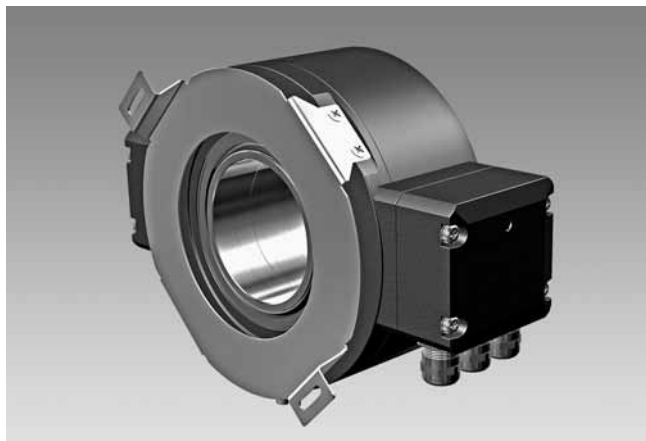
Absolute encoders - bus interfaces

Encoder with through hollow shaft max. $\varnothing 70$ mm

Single and multiturn 13 bit ST / 12 or 16 bit MT

SSI / Profibus / CANopen® / DeviceNet

HMG 161



HMG 161

Technical data - electrical ratings

| | |
|---------------------------|---|
| Voltage supply | 9...30 VDC |
| Consumption w/o load | ≤100 mA (per interface SSI) ≤250 mA (per interface bus) |
| Initializing time | ≤200 ms after power on |
| Interfaces | SSI, Profibus-DPV0, CANopen®, DeviceNet |
| Function | Multiturn |
| Transmission rate | 9.6...12000 kBaud (Profibus) 10...1000 kBaud (CANopen®) 125...500 kBaud (DeviceNet) |
| Profile conformity | Profibus-DPV0 CANopen® CiA DSP 406 V 3.0 Device Profile Encoder V 1.0 |
| Device address | Rotary switch in bus cover |
| Steps per turn | 8192 / 13 bit |
| Number of turns | ≤65536 / 16 bit |
| Additional output signals | Square-wave TTL (RS422) Square-wave HTL |
| Incremental output | 2048 pulses per revolution |
| Sensing method | Optical |
| Code | Gray (version SSI) |
| Code sequence | CW default |
| Inputs | SSI clock (version SSI) |
| Interference immunity | EN 61000-6-2 |
| Emitted interference | EN 61000-6-3 |
| Programmable parameters | Depending on the selected absolute interface |
| Diagnostic function | Position or parameter error |
| Status indicator | DUO-LED integrated in bus cover |
| Approvals | CE, RoHS, UL approval / E256710 |

Features

- Multiturn / SSI / Profibus / CANopen® / DeviceNet
- Optical sensing
- Singleturn 13 bit, multiturn 12 bit / 16 bit
- Through hollow shaft $\varnothing 38...70$ mm
- Multiturn sensing with microGen technologie, without gear or battery
- Special protection against corrosion

Optional

- Additional incremental output (TTL / HTL)
- Insulated bearing

Technical data - mechanical design

| | |
|-------------------------|--|
| Size (flange) | $\varnothing 160$ mm |
| Shaft type | $\varnothing 38...70$ mm (through hollow shaft) |
| Protection DIN EN 60529 | IP 56 |
| Operating speed | ≤3500 rpm (mechanical) |
| Operating torque typ. | 15 Ncm |
| Rotor moment of inertia | 28.5 kgcm ² ($\varnothing 50$) |
| Shaft loading | ≤350 N axial ≤500 N radial |
| Materials | Housing: aluminium Shaft: stainless steel |
| Operating temperature | -20...+85 °C |
| Resistance | IEC 60068-2-6 Vibration 10 g, 10-2000 Hz IEC 60068-2-27 Shock 200 g, 6 ms |
| Explosion protection | II 3 G Ex nA IIC T4 Gc (gas) II 3 D Ex tc IIIB T135°C Dc (dust) |
| Weight approx. | 3 kg (depending on version) |
| Connection | Bus cover Connecting terminal (SSI/ incremental) |

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Part number

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| | | | |
|---|-------|-----------------------------|--|
| | | | <u>Additional incremental signals</u> |
| | Z0 | | Without |
| | T2048 | | TTL level, 2048 pulses |
| | H2048 | | HTL level, 2048 pulses |
| | | <u>Absolute share</u> | |
| | 13 | | 13 bit singleturn |
| | 25 | | 13 bit singleturn + 12 bit multiturn (only S version) |
| | 29 | | 13 bit singleturn + 16 bit multiturn |
| | | <u>Interface/interfaces</u> | |
| S | | | SSI |
| P | | | Profibus |
| C | | | CANopen® |
| D | | | DeviceNet |

Accessories

Connectors and cables

HEK 8 Sensor cable for encoders

Diagnostic accessories

HENQ 1100 Analyzer for encoders

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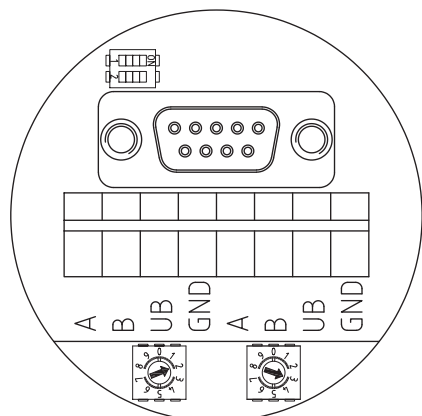
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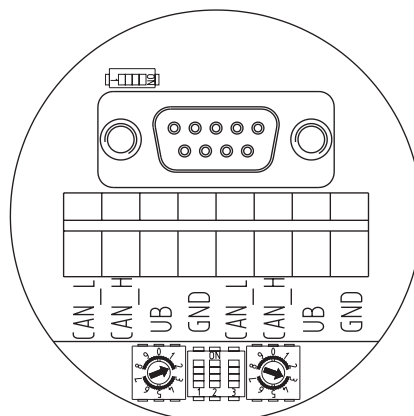
Terminal assignment - Profibus

View A - Connecting terminal in cover



Terminal assignment - CANopen®

View A - Connecting terminal in cover



Terminal significance - Profibus

| | |
|-----|--|
| A | Negative serial data transmission, pair 1 and pair 2 |
| B | Positive serial data transmission, pair 1 and pair 2 |
| UB | Voltage supply 9...30 VDC |
| GND | Ground connection for UB |

Terminals with the same label are internally connected.

Terminal significance - CANopen®

| | |
|-------|--------------------------------|
| CAN_L | CAN Bus signal (dominant low) |
| CAN_H | CAN Bus signal (dominant high) |
| UB | Voltage supply 9...30 VDC |
| GND | Ground connection for UB |

Terminals with the same label are internally connected.

Features - Profibus

| | |
|----------------------|---|
| Protocol | Profibus DP V0 |
| Profibus features | Device Class 1 and 2 |
| Data Exch. functions | Input: Position value Output: Preset value |
| Preset value | The „Preset“ parameter can be used to set the encoder to a predefined value that corresponds to a specific axis position of the system. |
| Parameter functions | Rotating direction: The relationship between the rotating direction and rising or falling output code values can be set in the operating parameter. Scaling: The parameter values set the number of steps per turn and the overall resolution. |
| Diagnostic | The encoder supports the following error messages: - Position error |
| Default settings | User address 00 |

Features - CANopen®

| | |
|-------------------|--|
| Protocol | CANopen® |
| CANopen® features | Device class 2 CAN 2.0B |
| Device profile | CANopen® CiA DSP 406, V 3.0 |
| Operation modes | Polling mode (asynch, via SDO) Cyclic mode (asynch-cyclic) Synch mode (synch-cyclic) Acyclic mode (synch-acyclic) |
| Diagnostic | The encoder supports the following error messages: - Position error |
| Default settings | User address 00 |

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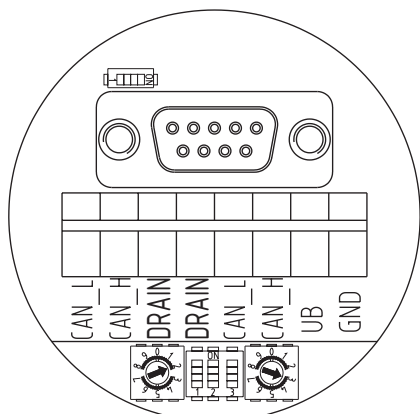
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Terminal assignment - DeviceNet

View A - Connecting terminal in cover



Terminal significance - DeviceNet

CAN_L CAN bus Signal (dominant Low)

CAN_H CAN bus Signal (dominant High)

DRAIN Shield connection

UB Voltage supply 9...30 VDC

GND Ground connection relating to UB

Terminals of the same significance are internally connected and identical in their functions. Max. load on the internal terminal connections UB-UB and GND-GND is 1 A each.

Features - DeviceNet

Protocol DeviceNet

DeviceNet features Device Profile for Encoders V 1.0

Operating modes I/O-Polling
Cyclic
Change of State

Preset value The „Preset“ parameter can be used to set the encoder to a predefined value that corresponds to a specific axis position of the system. The offset of encoder zero point and mechanical zero point is stored in the encoder.

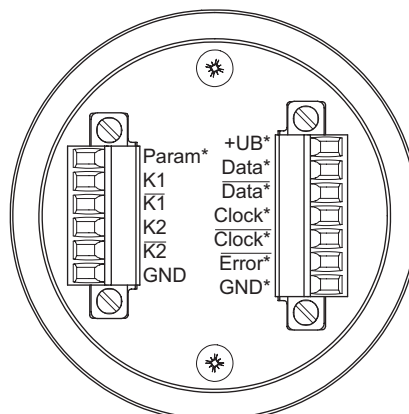
Parameter functions Rotating direction:
The relationship between the rotating direction and rising or falling output code values can be set in the operating parameter.
Scaling:
The parameter values set the number of steps per turn and the overall resolution.

Diagnostic The encoder supports the following error warnings:
- Position and parameter error

Default settings User address 00

Terminal assignment - Incremental and/or SSI

View B - Connecting terminal



* only for SSI

View C - Option

Flange connector M23, 12-pin, male contacts, counter-clockwise

Male Assignment

Pin 1 $\overline{K2}$

Pin 2 Clock *

Pin 3 Data *

Pin 4 \overline{Data} *

Pin 5 K1

Pin 6 $\overline{K1}$

Pin 7 Param *

Pin 8 K2

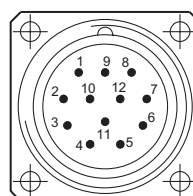
Pin 9 \overline{Error} *

Pin 10 GND

Pin 11 \overline{Clock} *

Pin 12 +UB *

* only for SSI



Absolute encoders - bus interfaces

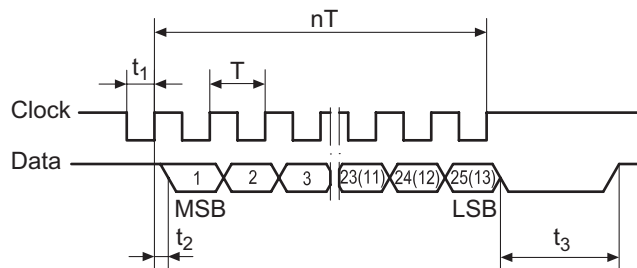
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Data transfer



$$T = 1.25 \dots 10 \mu\text{s}$$

$$t_1 = 0.63 \dots 5 \mu\text{s}$$

$$t_2 \leq 0.4 \mu\text{s}$$

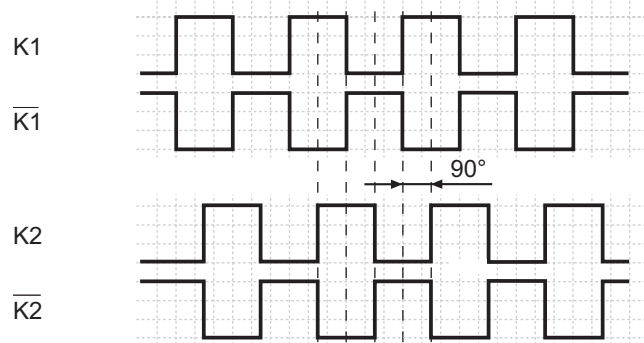
$$t_3 = 12 \dots 30 \mu\text{s}$$

$$n = \text{Number of bits}$$

$$\text{Clock frequency} = 100 \dots 800 \text{ kHz}$$

Output signals

Additional incremental signals
at positive rotating direction



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Dimensions

