Absolute encoders - bus interfaces

Through hollow shaft
CANopen® / 13 bit ST / 16 bit MT / Speed switch
Number of pulses and switching speed freely programmable

HMG10P-T - CANopen®

HMG10P-T - picture similar

Features

- **Interface CANopen®**
- **Magnetic sensing method**
- **Resolution: singleturn 13 bit, multiturn 16 bit**
- **Function display via LEDs**
- **Multiturn sensing with Energy Harvesting technology, without gear or battery**
- **Two-sided bearing system with hybrid bearings**
- **Special protection against corrosion C5-M**

Optional

- **Integrated speed switch programmable**
- **Additional output incremental programmable**

Technical data - electrical ratings

Voltage supply	10...30 VDC
Short-circuit proof	Yes
Consumption w/o load	≤200 mA
Initializing time	≤500 ms after power on
Interface	CANopen®
Function	Multiturn
Transmission rate	10...1000 kBaud
Device adress	Rotary switches in bus connecting box
Steps per revolution	8192 / 13 bit
Number of revolutions	65536 / 16 bit
Additional outputs	Square-wave TTL/HTL,TTL/RS422
Sensing method	Magnetic
Interference immunity	EN 61000-6-2
Emitted interference	EN 61000-6-3
Programming interface	RS485 (≤600 m)
Programmable parameters	Bus system: see bus features Additional output (number of pulses), switch-off and switch-on speeds
Diagnostic function	Position or parameter error
Status indicator	DUO-LED (bus connecting box) 4 LEDs in device back side
Approvals	CE, UL approval / E256710

Technical data - electrical ratings (speed switches)

Switching accuracy	±2 % (or 1 Digit)
Switching outputs	1 output (Open collector, solid state relay on request)
Output switching capacity	30 VDC; ≤100 mA
Switching delay time	≤20 ms

Technical data - mechanical design

Size (flange)	ø105 mm
Shaft type	ø16...20 mm (through hollow shaft)
Flange	Support plate, 360° freely positionable
Protection DIN EN 60529	IP 66/IP 67
Operating speed	≤6000 rpm
Range of switching speed	ns (off) = ±2...6000 rpm, factory setting 6000 rpm
Operating torque typ.	10 Ncm
Rotor moment of inertia	950 gcm²
Admitted shaft load	≤450 N axial ≤650 N radial
Materials	Housing: aluminium alloy Shaft: stainless steel
Corrosion protection	IEC 60068-2-52 Salt mist for ambient conditions C5-M (CX) according to ISO 12944-2
Operating temperature	-40...+85 °C
Relative humidity	95 % non-condensing
Resistance	IEC 60068-2-6 Vibration 30 g, 10-2000 Hz IEC 60068-2-27 Shock 400 g, 1 ms
Weight approx.	2.2 kg (depending on version)
Connection	Bus connecting box Terminal box incremental

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Part number

HMG10P	-T	H		.		C6	.3	00		.A

Additional output
- 0 Without
- 5 1024 ppr* TTL/HTL (Vin=Vout), 6 channels, electrically isolated
- 6 1024 ppr* TTL/RS422, 6 channels

Resolution multiturn
- 0 Without
- 6 16 bit

Voltage supply / interface
- C6 10…30 VDC, CANopen® (DS 406)

Connection
- F 1x bus connecting box with 3 cable glands M16, radial + 1x terminal box with 1 cable gland M20, radial
- Z 1x bus connecting box with 2 connectors M12, radial + 1x terminal box with 1 cable gland M20, radial

Shaft diameter
- C ø16 mm, clamping ring on drive side
- F ø20 mm, clamping ring on drive side
- P ø16 mm, clamping ring on drive side with keyway

Protection
- D IP 66 and IP 67, optimized for dusty environments
- L IP 66 and IP 67, optimized for oily and wet environments

Flange
- H Support for torque arm, shaft insulation hybrid bearing

Speed switch
- Without
- D With speed switch / switching speed 6000 rpm* (Standard: Open collector, solid state relay on request)

* Factory setting, programmable

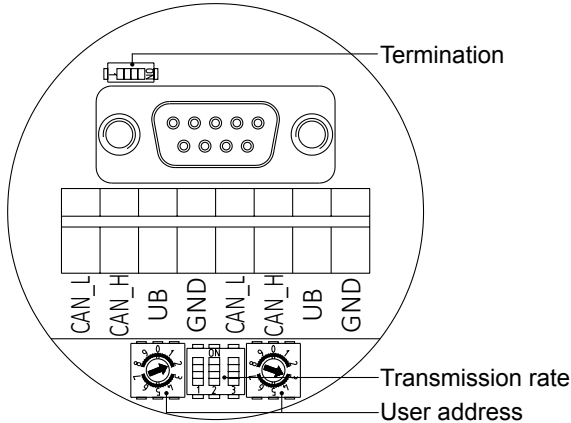# Absolute encoders - bus interfaces

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## Number of pulses and switching speed freely programmable

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CANopen® - Terminal assignment
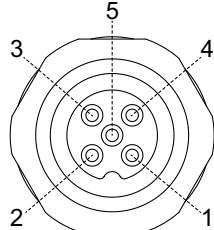
View A [1] - View inside bus connecting box

Termination

Transmission rate

User address

View A¹ [1] **and A²** [1] - View into connector

male / female	Connection	Description
1	GND	Ground for UB
2	UB	Voltage supply 10...30 VDC
3	GND	Ground for UB
4	CAN_H	CAN Bus signal (dominant HIGH)
5	CAN_L	CAN Bus signal (dominant LOW)
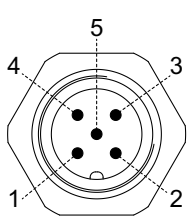
Connector M12
(male, **A¹** [1])
5-pin, A-coded

Connector M12
(female, **A²** [1])
5-pin, A-coded

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.

CANopen® - Features

Bus protocol	CANopen®
CANopen®-Features	Device Class 2 CAN 2.0B
Device profile	CANopen® CiA DSP 406, V 3.0
Operating mode	Polling mode (asynch, via SDO) Cyclic mode (asynch-cyclic) Synch mode (synch-cyclic) Acyclic mode (synch-acyclic)
Diagnosis	The encoder supports the following error warnings: - Position error
Factory setting	User address 00

CANopen® - Termination
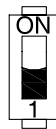
ON = final user
OFF = user x

CANopen® - User address
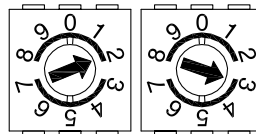
Defined by rotary switch.
Example: User address 23

CANopen® - Transmission rate

Transmission rate	Dip switch position		
	1	2	3
10 kBaud	OFF	OFF	OFF
20 kBaud	OFF	OFF	ON
50 kBaud*	OFF	ON	OFF
125 kBaud	OFF	ON	ON
250 kBaud	ON	OFF	OFF
500 kBaud	ON	OFF	ON
800 kBaud	ON	ON	OFF
1000 kBaud	ON	ON	ON

* Factory setting

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[1] See dimensions

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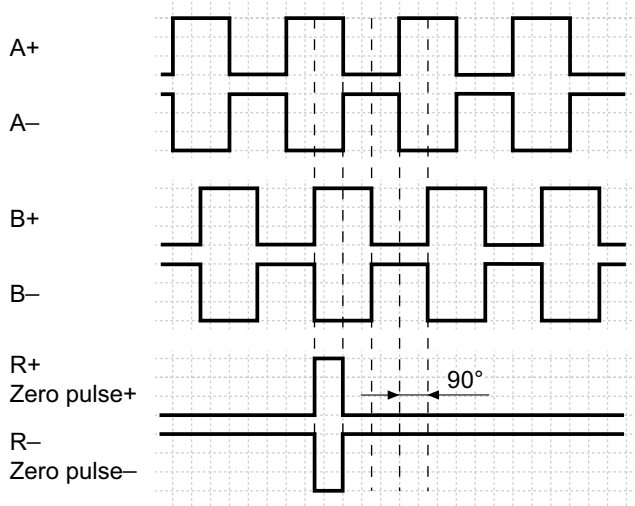### Number of pulses and switching speed freely programmable

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Speed switch / additional output incremental - Terminal significance

Ub [2]	Voltage supply
0V [2]	Ground
A+ [2]	Output signal channel 1
A− [2]	Output signal channel 1 inverted
B+ [2]	Output signal channel 2 (offset by 90° to channel 1)
B− [2]	Output signal channel 2 inverted
R+ [2]	Zero pulse (reference signal)
R− [2]	Zero pulse inverted
nE+	System OK+ / error output
nE−	System OK− / error output inverted
SP+ [3]	DSL_OUT1 / speed switch (Open collector, solid state relay on request)
SP− [3]	DSL_OUT2 / speed switch (0V, solid state relay on request)
SA	RS485+ / programming interface
SB	RS485− / programming interface
dnu	Do not use

Speed switch / additional output incremental - Terminal assignment terminal box

View B [1]

dnu / SP+ [3]
dnu / A+ [2]
dnu / A− [2]
dnu / B+ [2]
dnu / B− [2]
Ub [2]
0V [2]

dnu / SP− [3]
nE+
nE−
dnu / R+ [2]
dnu / R− [2]
SA
SB

Additional output incremental - Trigger level

Trigger level	TTL/RS422
High / Low	≥2.5 V / ≤0.5 V
Transmission length	≤550 m @ 100 kHz
Output frequency	≤600 kHz
Trigger level	**TTL/HTL (Vin = Vout)**
High / Low	≥2.5 V / ≤0.5 V (TTL)
	≥Ub -3 V / ≤1.5 V (HTL)
Transmission length	≤550 m @ 100 kHz (TTL)
	≤350 m @ 100 kHz (HTL)
Output frequency	≤600 kHz (TTL); ≤350 kHz (HTL)

Electrically isolated:
The output TTL/HTL (Vin = Vout) at the additional output incremental is electrically isolated and requires a separate power supply.

[1] See dimensions
[2] Additional output incremental (option)
[3] Speed switch (option)
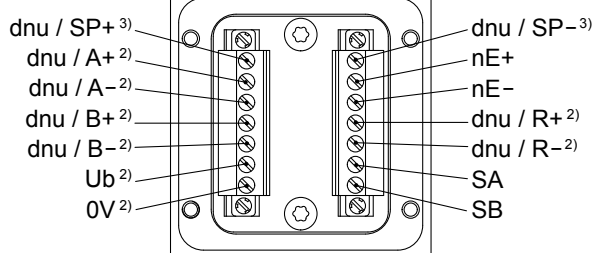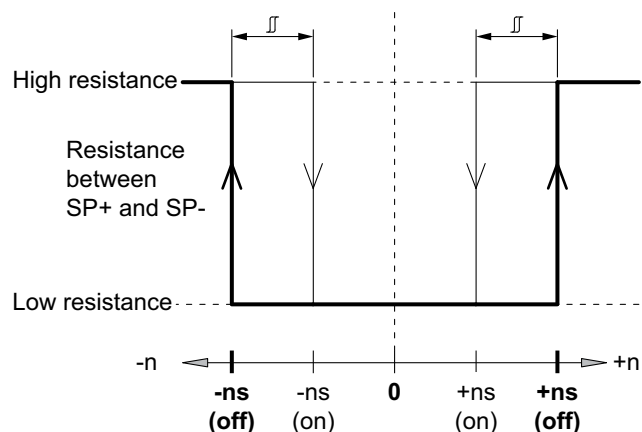
Additional output incremental - Output signals

Version with additional output incremental at positive rotating direction [1]

A+
A−
B+
B−
R+ Zero pulse+
R− Zero pulse−

90°

Speed switch - Switching characteristics

High resistance

Resistance between SP+ and SP-

Low resistance

-n   +n

-ns (off)   -ns (on)   0   +ns (on)   +ns (off)

n = Speed

+ns (off) = Switch-off speed at shaft rotation in positive rotating direction [1].

-ns (off) = Switch-off speed at shaft rotation in negative rotating direction [1].

Switching hysteresis ⨿:
5...100 % (factory setting = 10 % min. 1 Digit)

+ns (on) = Switch-on speed at shaft rotation in positive rotating direction [1].

-ns (on) = Switch-on speed at shaft rotation in negative rotating direction [1].

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Accessories	
Connectors and cables	
11191145	Adapter cable for programming the HMG10P/ PMG10P bus interfaces series D-SUB connector (male) 15-pin with connecting cable, D-SUB connector (male) 9-pin and 7-pin connecting terminal
Mounting accessories	
11043628	Torque arm M6, length 67-70 mm
11004078	Torque arm M6, length 120-130 mm (shortenable ≥71 mm)
11002915	Torque arm M6, length 425-460 mm (shortenable ≥131 mm)
11054917	Torque arm M6 insulated, length 67-70 mm
11072795	Torque arm M6 insulated, length 120-130 mm (shortenable ≥71 mm)
11082677	Torque arm M6 insulated, length 425-460 mm (shortenable ≥131 mm)
11077197	Mounting kit for torque arm size M6 and earthing strap
11077087	Mounting and dismounting set
Programming accessories	
11190106	Z-PA.SDL.1 - *WLAN-Adapter* Programming unit for xMG10P series

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Dimensions

Programming interface
Additional output incremental (option)
Speed switch (option)

Positive rotating direction

Drawing 90° rotated

±9°

~14

14.6

ø69.5
ø50
ød H7

ø105

ød = 16, 20

3x M16x1.5
(Cable ø5-9)

112.5

B

R10

A

CANopen®

Accessory

±15°

86.5
79.5
69.5
86.5

ø6.5

A¹ A²