

Absolute encoders - bus interfaces

Hollow shaft, end shaft or cone shaft max. $\varnothing 20$ mm

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

CANopen / SSI / Profibus / DeviceNet

HMG 11, HMG 11 + FSL



HMG 11

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	10...1000 kBaud (CANopen) 9.6...12000 kBaud (Profibus) 125...500 kBaud (DeviceNet)
Profile conformity	Profibus-DPV0 CANopen CiA DSP 406 V 3.0 Device Profile Encoder V 1.0
User 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
Sensing method	Optical
Code	Gray or binary (version SSI)
Code sequence	CW default, programmable
Inputs	SSI clock (version SSI)
Interference immunity	DIN EN 61000-6-2
Emitted interference	DIN EN 61000-6-4
Programmable parameters	Depending on the selected absolute interface
Diagnostic function	Position or parameter error
Status indicator	DUO-LED integrated in bus cover
HMG 11	
Approval	UL approval / E256710
HMG 11 + FSL	
Switching rotation speed	850...2800 rpm

Features

- Encoder multiturn / SSI / Profibus / CANopen
- Optical sensing
- Resolution: singleturn 13 bit, multiturn 12 bit / 16 bit
- Hollow shaft, end shaft or cone shaft $\varnothing 16-20$ mm
- Multiturn sensing with microGen technologie, without gear or battery
- Available with redundant absolute signals
- Special protection against corrosion
- Also in combination with centrifugal switch FSL

Optional

- With additional incremental signals (TTL / HTL)

Technical data - mechanical design

Dimensions (flange)	$\varnothing 122$ mm
Protection DIN EN 60529	IP 67
Shaft loading	≤250 N axial, ≤400 N radial
Materials	Housing: aluminium alloy Shaft: stainless steel
Operating temperature	-20...+85 °C
Weight approx.	3.5 kg (depending on model)
Connection	Bus cover Terminal box (SSI/incremental)
HMG 11	
Shaft	$\varnothing 16$ mm end shaft $\varnothing 20$ mm hollow shaft $\varnothing 17$ mm cone shaft 1:10
Operating speed	≤3500 rpm (mechanical)
Operating torque typ.	12 Ncm
Rotor moment of inertia	760 gcm ²
Resistance	IEC 60068-2-6 Vibration 10 g, 10-2000 Hz IEC 60068-2-27 Shock 100 g, 6 ms
Explosion protection	II3G Ex nA IIC T4 Gc (gas) II3D Ex tc IIIC T135°C Dc (dust)
HMG 11 + FSL	
Shaft	$\varnothing 16$ mm end shaft $\varnothing 17$ mm cone shaft 1:10
Operating speed	≤1.25 x switching speed
Operating torque typ.	15 Ncm
Rotor moment of inertia	790 gcm ²
Resistance	IEC 60068-2-6 Vibration 5 g, 10-2000 Hz IEC 60068-2-27 Shock 50 g, 11 ms

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Part number

Absolute encoder

HMG 11

			<u>Additional incremental signals</u>		
		Z0	Without		
		T1024	TTL level, 1024 pulses*		
		T2048	TTL level, 2048 pulses*		
		H1024	HTL level, 1024 pulses*		
		H2048	HTL level, 2048 pulses*		
			<u>Absolute share</u>		
	13	13 bit singleturn			
	25	13 bit singleturn + 12 bit multiturn (only S and SS version)			
	29	13 bit singleturn + 16 bit multiturn			
			<u>Interface/interfaces</u>		
S	SSI				
P	Profibus				
C	CANopen				
D	DeviceNet				
SS	2 x SSI				
PS	Profibus and SSI				
CS	CANopen and SSI				
DS	DeviceNet and SSI				
PP	2 x Profibus				
CP	CANopen and Profibus				
DP	DeviceNet and Profibus				
CC	2 x CANopen				
DC	DeviceNet and CANopen				
DD	2 x DeviceNet				

Absolute encoder with centrifugal force switch FSL

HMG 11 + FSL

			<u>Additional incremental signals</u>		
		Z0	Without		
		T1024	TTL level, 1024 pulses*		
		T2048	TTL level, 2048 pulses*		
		H1024	HTL level, 1024 pulses*		
		H2048	HTL level, 2048 pulses*		
			<u>Absolute share</u>		
	13	13 bit singleturn			
	25	13 bit singleturn + 12 bit multiturn (only S and SS version)			
	29	13 bit singleturn + 16 bit multiturn			
			<u>Interface/interfaces</u>		
S	SSI				
P	Profibus				
C	CANopen				
D	DeviceNet				
SS	2 x SSI				
PS	Profibus and SSI				
CS	CANopen and SSI				
DS	DeviceNet and SSI				
PP	2 x Profibus				
CP	CANopen and Profibus				
DP	DeviceNet and Profibus				
CC	2 x CANopen				
DC	DeviceNet and CANopen				
DD	2 x DeviceNet				

* The incremental signals are duplicated with configuration SS
Please note: additional incremental output signals are not feasible with PP, CP, DP, CC, DC and DD interface.
Please indicate the required switching rotation speed when ordering with centrifugal force switch (permanent parameter defined at works).

Accessories

Connectors and cables

HEK 8 Sensor cable for encoders

Mounting accessories

DMS 6 Torque arm size M6

Diagnostic accessories

HENQ 1100 Analyzer for encoders

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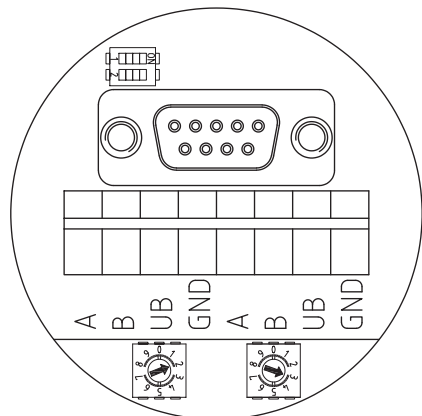
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Terminal assignment - Profibus

View A - Connecting terminal in cover



Terminal 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

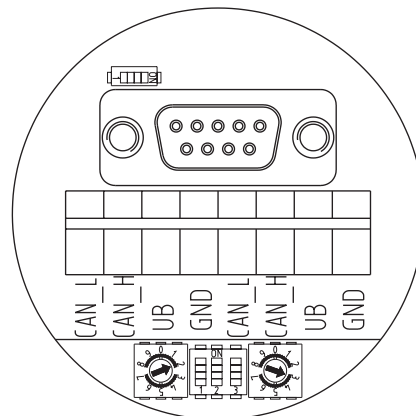
Terminals with the same label are internally connected.

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

Terminal assignment - CANopen

View A - Connecting terminal in cover



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 - 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

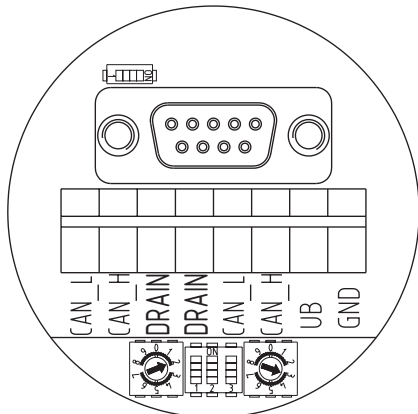
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Terminal assignment - DeviceNet

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

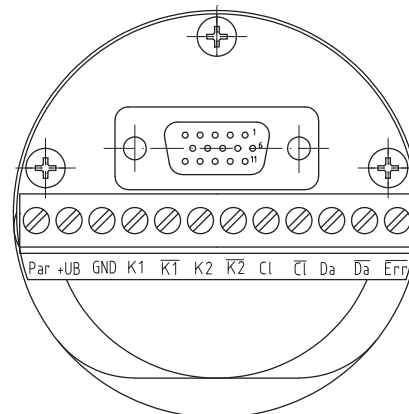
Terminals of the same significance are internally connected and identical in their functions. Max. load on the internal terminal connections UB-UB and GND-GND is 1 A each.

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 in cover

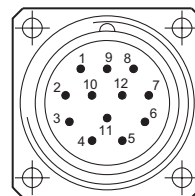


View C - Option

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

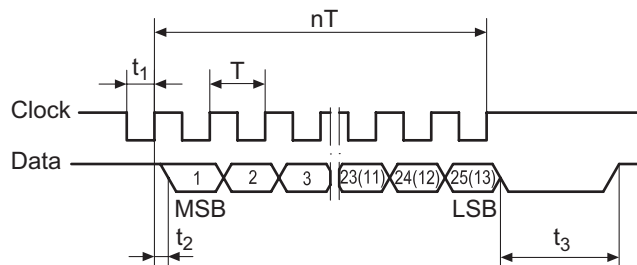
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Data transfer



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

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

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

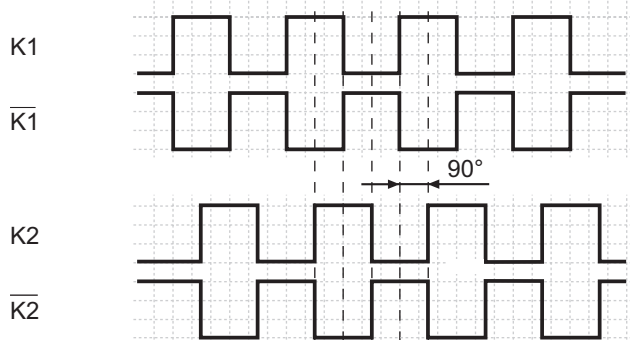
$$t_3 = 12 \dots 30 \mu\text{s}$$

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

Clock frequency 100...800 kHz

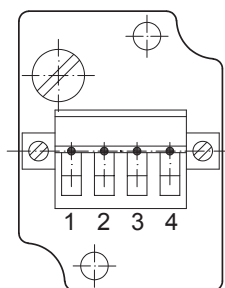
Output signals

Additional incremental signals
at positive rotating direction



Terminal assignment

Connecting terminal centrifugal switch FSL
View D



Make contact



Break contact

