ID1102G
Dual Channel
Gearwheel Encoder Kit

Product data

Features

- Highly miniaturized gear encoder
- Differential inductive sensing principle
- Insensitive to magnetic interference fields
- Robust against oil, water, dust, particles
- Programmable resolution and maximum speed
- Optional with cable, connector and holder

Applications

- Speed and position control in high-speed spindles
- Industrial / laboratory / office automation
- Milling, grinding and cutting spindles
- Rotating equipment
- High-speed motion control
- Mechatronics applications

Key Specifications

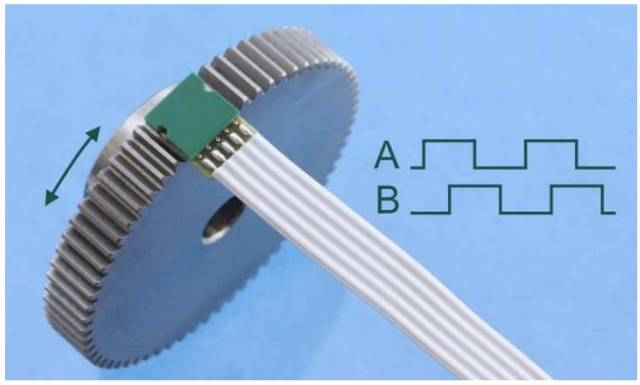
Output format.....A and B in quadrature
Interpolation.....binary from x2 to x16'384 / tooth
Input frequency.....0 – 25 kHz
Output frequency.....0 – 1 MHz
Airgap.....up to 0.6 mm
Supply.....5 V, 10 mA
Temperature.....-20 to 100°C
Gear material.....Ferromagnetic steel

Description

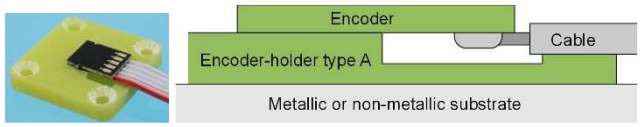
The ID1102G incremental encoder kit consists of an encoder and a gearwheel (Fig. 1). The encoder is an integrated circuit in a PCB housing. It provides incremental A and B output signals in quadrature (Fig. 2). The gearwheel is in ferromagnetic steel and has a module 0.5. The orientation of the encoder is selected in Table 1.

Resolution, maximum speed and airgap
The resolution and the maximum speed of the encoder are user-programmable or can be programmed ex-factory. The resolution depends on a filter setting that limits the maximum speed of the encoder vs. the gearwheel. The resolution also depends on the maximum distance between the encoder and the gear. The resolution and maximum speed for a certain maximum air-gap are selected in Tables 2 and 3.

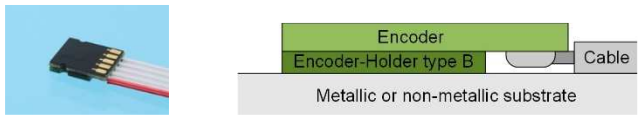
Gearwheels
Gearwheels should be made of ferromagnetic steel and have a module 0.5. Gearwheels with 12 up to 120 teeth are available and can be selected in Table 5.



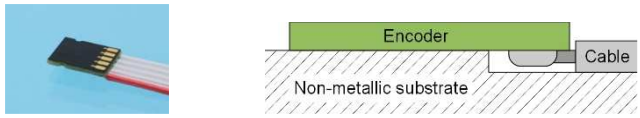
Encoder holders
Different encoder holder options are available and can be selected in Table 6.
The encoder holder **type A** (Fig. 5) may be mounted on any substrate using 4 screw-holes. It has a strain relief for the cable.



The encoder holder **type B** (Fig. 3) may be mounted on any substrate. Use half-holes on encoder PCB housing and alignment pins for accurate positioning.



The encoder without holder may be mounted on non-metallic substrates. Use half-holes on encoder housing and alignment pins for accurate positioning.



Encoder cable and connector
The encoder can be supplied with a flat cable of pitch 1.27 mm and a connector (Fig. 6). The cable length and the connector type are selected in Tables 7 and 8.

Encoder programming
The Evaluation and Programming Tool (EPT) including an interface board and the ASSIST software is available for the linearization and programming of the encoder.

3D models of encoder, holders and scales
STEP models available on www.posic.com.

Specifications

Recommended Operating Conditions

Parameter	Symbol	Remark	Min	Typ	Max	Unit
Supply voltage	VDD		4.5	5.0	5.5	V
Operating Temperature	T_A		-20		100	°C
Airgap	Z			0.2		mm
Lateral tolerance	ΔY	Gear width 4 mm			0.5	mm
Airgap tolerance	ΔZ				0.1	mm

Electrical Characteristics

Electrical characteristics over recommended operating conditions, typical values at VDD = 5.0 V, T_A = 25°C.

Parameter	Symbol	Remark	Min	Typ	Max	Unit
Supply current	IDD	No load	8	10	15	mA
Maximum output frequency	F	A/B output signals	0.8	1	1.2	MHz
High level output voltage*	V_{OH}	I_L = 2 mA	VDD–0.5			V
Low level output voltage*	V_{OL}	I_L = 2 mA			0.5	V
Rise time, fall time	t_r, t_f	C_L = 47 pF			20	ns

If A is pulled up and B pulled down during power-up, the encoder enters into a test mode with a 50 kHz square wave on all outputs.

Encoding Characteristics

Encoding characteristics over recommended operating conditions, typical values at VDD = 5.0 V, T_A = 25°C, airgap = 0.2 mm, speed = max speed/10.

Parameter	Symbol	Remark	Min	Typ	Max	Unit
Pulse width error	ΔP	Nominal value 180°e		10	50	°e
State width error	ΔS	Nominal value 90°e		10	60	°e
Phase shift error	ΔΦ	Nominal value 90°e		10	45	°e

Linearity

For high-resolution high-precision applications, it is possible to linearize the encoder by means of a Look-Up Table (LUT) that is located inside the encoder. The LUT can be programmed in volatile or in non-volatile memory by means of the Evaluation and Programming Tool (EPT) or it can be pre-programmed by ex-factory. The LUT option is selected in Table 4.

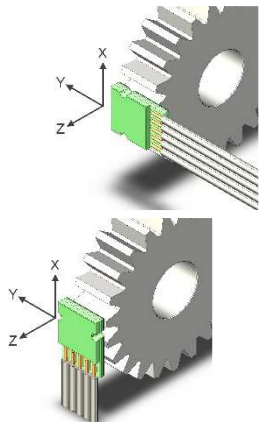


Fig. 1 Coordinate system XYZ.

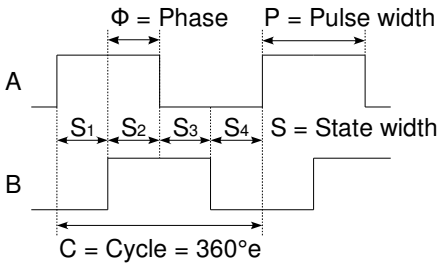


Fig. 2 Encoder output signals A and B in quadrature.

Definitions

Airgap	Distance between encoder and gear in Z-direction. See Fig. 1.
Cycle	One A quad B period, see Fig. 2.
°e	Electrical degree (one Cycle is 360°e)
Phase shift Φ	Number of electrical degrees between the center of the high state of channel A and the center of high state of channel B. Nominal 90°e. Fig. 2.
Pulse width P	Number of electrical degrees that an output is high during one cycle. Nominal 180°e. Fig. 2.
State width S	Number of electrical degrees between two neighboring A and B transitions. Nominal value is 90°e. See Fig 2.

Technical drawings

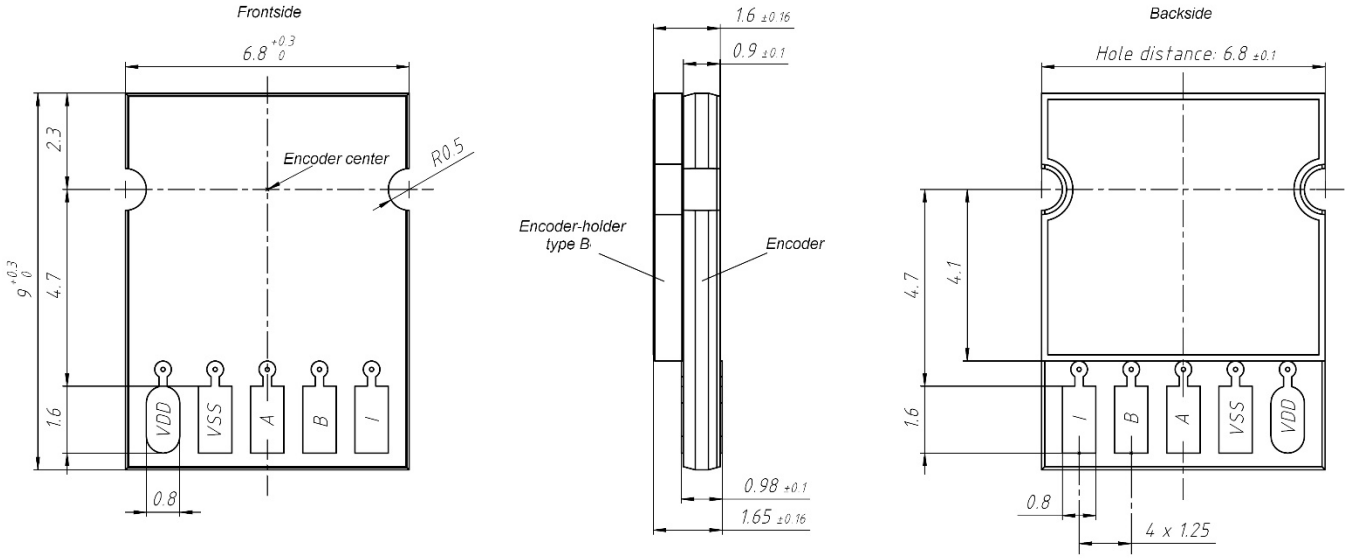


Fig. 3 Dimensions (mm) of ID1102 encoder on encoder-holder type B. The “Encoder center” must be centered with respect to the width of the linear scale (Fig. 4).

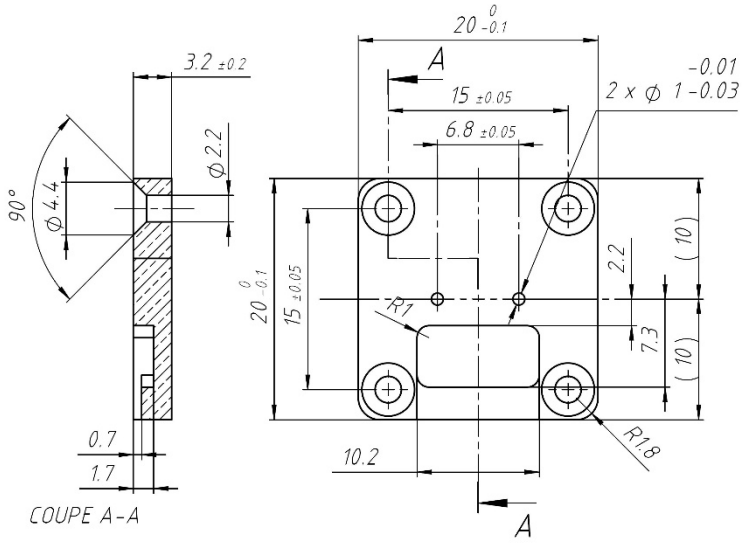
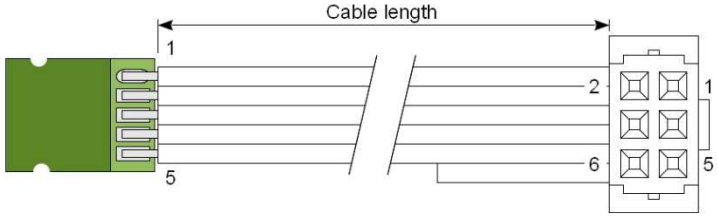


Fig. 5 Dimensions (mm) of encoder-holder type A.



Connector pin	Name	Description
1	VDD	5V Supply
2	VSS	Ground
3	A	A
4	B	B
5	I	Index (multiple)
6	NC	Not connected

Fig. 6 Encoder with flat cable (pitch 1.27 mm) and 6-pin connector DIN41651.

Ordering information

Ordering code: ID1102G-ABBCCD-EEEEE-F-GGG-HH

A	Orientation	Table 1
BB	Maximum speed	Table 2
CC	Resolution	Table 3
D	Look-Up Table	Table 4
EEEEE	Gear	Table 5
F	Encoder holder	Table 6
GGG	Cable	Table 7
HH	Connector	Table 8

Table 1: Orientation. Arrows indicate direction of movement of the scale with rising edge A prior to B.

A	Orientation
0	Not progr.
3	0°
4	90°
5	180°
6	270°

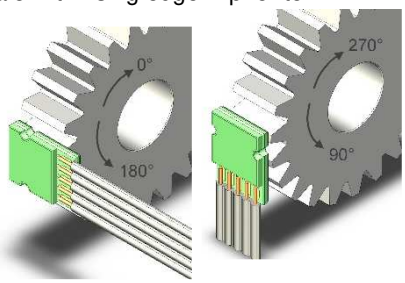


Table 2: Maximum input frequency

BB	Max input freq. (Hz)	Max value CC
00	Not programmed	
01	12	16
02	24	16
03	48	16
04	97	15
05	195	14
06	390	13
07	781	12
08	1'562	11
09	3'125	10
21	6'250	09
22	12'500	08
23	25'000	07

Lower Max input freq. leads to lower jitter of A/B outputs.

Table 3: Interpolation factor per tooth

CC	Interpolation		Max value BB	Maximum Airgap* (mm)
	Bits	Factor		
00	Not programmed			
03	3	x2	23	0.6
04	4	x4	23	0.5
05	5	x8	23	0.5
06	6	x16	23	0.4
07	7	x32	23	0.4
08	8	x64	22	0.3
09	9	x128	21	0.3
10	10	x256	09	0.2
11	11	x512	08	0.2
12	12	x1'024	07	0.2
13	13	x2'048	06	0.2
14	14	x4'096	05	0.2
15	15	x8'192	04	0.2
16	16	x16'384	03	0.2

* Recommended airgap = 0.2 mm. Sequence of A and B transitions is correct up to Maximum Airgap, but encoding specifications may be out of range.

Table 4: Look-Up Table (LUT)

D	Look-Up Table programmed in OTP
0	Not programmed
1	LUT according to gear, to be specified
8	Custom LUT, to be specified
9	Default LUT, no gear specified

Table 5: Gear

EEEEE	Description
00000	No Gear
05xxx	Steel gear, module 0.5, thickness 4 mm xxx = number of teeth, allowed values: 12 – 50, 52, 54, 55, 56, 60, 64, 65, 70, 72, 75, 80, 85, 90, 96, 100, 120

Table 6: Encoder holder

F	Encoder holder
0	No holder
A	Holder type A (Fig. 5)
B	Holder type B (Fig. 3)

Table 7: Cable

GGG	Cable
000	No cable
0xx	Flat ribbon cable, length xx cm

Table 8: Connector

HH	Connector
00	No connector
02	6-pin connector DIN 41651 (Fig. 6)
04	8-pin connector DIN 41651