

# 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**

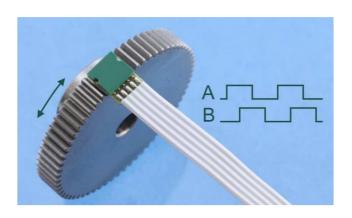
The ID1102G incremental encoder kit consists of an encoder and a gearwheel (Fig. 1). The encoder is an integrated circuit in a PCB housing. It provides incremental A and B output signals in quadrature (Fig. 2). The gearwheel is in ferromagnetic steel and has a module 0.5. The orientation of the encoder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



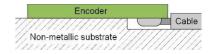
The encoder holder **type B** (Fig. 3) may be mounted on any substrate. Use half-holes on encoder PCB housing and alignment pins for accurate positioning.





The encoder without holder may be mounted on nonmetallic 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	Тур	Max	Unit
Supply voltage	VDD		4.5	5.0	5.5	V
Operating Temperature	TA		-20		100	°C
Airgap	Z			0.2		mm
Lateral tolerance	ΔΥ	Gear width 4 mm			0.5	mm
Airgap tolerance	ΔΖ				0.1	mm

#### **Electrical Characteristics**

Electrical characteristics over recommended operating conditions, typical values at VDD = 5.0 V, T<sub>A</sub> = 25°C.

Parameter	Symbol	Remark	Min	Тур	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*	Voh	I <sub>L</sub> = 2 mA	VDD-0.5			V
Low level output voltage*	Vol	I <sub>L</sub> = 2 mA			0.5	V
Rise time, fall time	tr, tf	C <sub>L</sub> = 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<sub>A</sub> = 25°C, airgap = 0.2 mm, speed = max speed/10.

Parameter	Symbol	Remark	Min	Тур	Max	Unit
Pulse width error	ΔΡ	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.

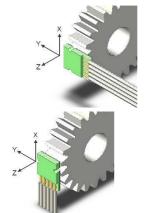


Fig. 1 Coordinate system XYZ.

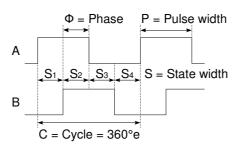


Fig. 2 Encoder output signals A and B in quadrature.

# **Definitions**

Distance between encoder and gear in Z-Airgap

direction. See Fig. 1.

Cycle One A quad B period, see Fig. 2. Electrical degree (one Cycle is 360°e) °е

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**

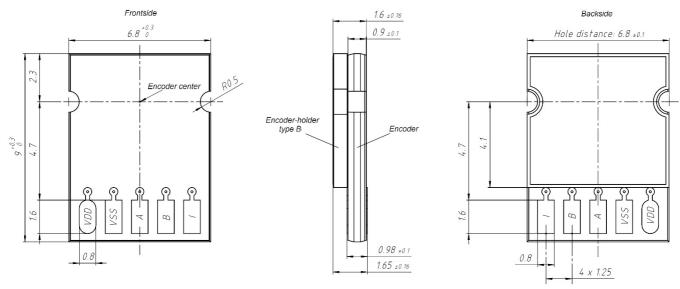


Fig. 3 Dimensions (mm) of ID1102 encoder on encoder-holder type B. The "Encoder center" must be centered with respect to the width of the linear scale (Fig. 4).

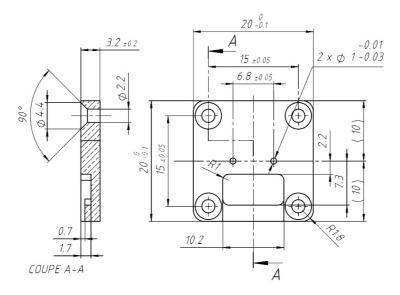
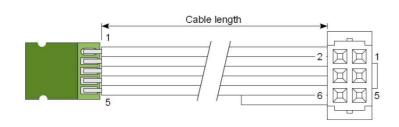


Fig. 5 Dimensions (mm) of encoder-holder type A.



Connector pin	Name	Description
1	VDD	5V Supply
2	VSS	Ground
3	Α	Α
4	В	В
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 Orientation BB Maximum speed Table 2 CC Table 3 Resolution D Look-Up Table Table 4 **EEEEE** Gear Table 5 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.

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

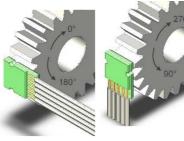


Table 2: Maximum input frequency

able 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	
80	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

СС	Inter	polation	Max value	Maximum	
	Bits	Factor	BB	Airgap* (mm)	
00	Not	t programm	ned		
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

<sup>\*</sup> 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

ſ	EEEEE	Description
ı	LLLLL	Description
	00000	No Gear
Ī		Steel gear, module 0.5, thickness 4 mm
	05xxx	xxx = number of teeth, allowed values:
	USXXX	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
Α	Holder type A (Fig. 5)
В	Holder type B (Fig. 3)

Table 7: Cable

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

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