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DIDEL 9 novembre 1900 microgears

Micro gears

Gears at module 0.3 are available from DIDEL; they are well suited for motors 3 to 10 mm in diameter. Four gear sizes are available, and for the two large sizes, slotted gears allows to add photodiodes and get precise angle and speed information.

Module and teeth number

The module is the quotient of the nominal diameter of a gear by the number of teeth. For instance, a module 0.3 gear of 60 teeth has a nominal diameter of 0.3 x 60 = 18 mm. Add two teeth for the external diameter, which will be measured as 18.6 mm. The distance between the axis of two gears is simply the module multiplied by the total number of teeth, divided by 2. Add 0.05 to 0.1 mm to be sure the movement will be free. Distance has to be precise for long lasting gears and for reaching the efficiency of 90% one can expect for every stage.

Plastic gears of module 0.3

Gears have a center hole of 0.76 to 0.79 mm. They press-fit on a 0.8mm axis (ream out at 0.78mm) and are loose on a 0.75mm axis. In this case, it is recommended to ream out the hole with a 0.82 reamer and use a 0.8 mm steel axis.

id# number	Teeth number	Weight g	Dia nom	Dia ext	Dia hole	Stock #	Price $	(1 piece) CHF
#1	12	0.04	3.6	4.2	0.78	500		
#2	36/12	0.13	10.8	11.4	0.78	300		
#3	36/12 side	0.17	10.8	11.4	0.78	100		
	48/12 light		14.4	15.0	0.78	not available		
#5	48/12 36 slots	0.19	14.4	15.0	0.78	200		
#4b	60/12 light	0.18	18.0	18.6	0.78	250		
#4	60/12 60 Slots	0.25	18.0	18.6	0.78	200		
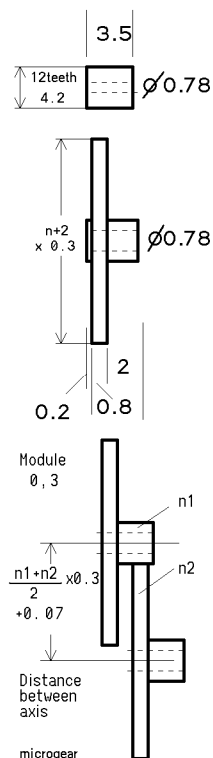
Distance between axis

12 to 36	7.2 mm plus 0.07 mm play
12 to 48	9.0 mm plus 0.07 mm play
12 to 60	10.8 mm plus 0.07 mm play

Pager motors (preliminary offer)

#id	Make	Weight g	Coil Ohm	V/mA	Dia mot	Length mot	Dia axis	Total length	Price $	(1 piece) CHF
	XT-5966	0.56		1.3/90	4.05	10	0.8	15		
	XR5165PE	1.04		1.3/90	6.05	10	0.8	15		
	SM5360F	1.73		1.3/	6.05 8	15	0.8	20		
		2		1.3/90	10	13	0.8	15		
	switec	7.6		5/10	30	10	0.8	20		

Mouse encoder for ⁻*DIDEL⁻ microgears

⁻*DIDEL⁻ encoder uses the H7101 proprietary circuit and provides two signals in quadrature, in response to a light pattern formed of alternating 0.31mm dark and lighted stripes. There are indeed four diodes and two differential amplifiers inside. The histeresis provided by these amplifiers allows not to respect this precise pattern. A large dark or bright slot shoud not trigger any change in the output. With a standard IR LED, a strong lighting is required for full speed, but the LED can be pulsed. A 30 μs pulse set the inside triggers according to the light pattern and informations stays on the outputs until next light pulse. Sampling frequency depends on the rotation speed.
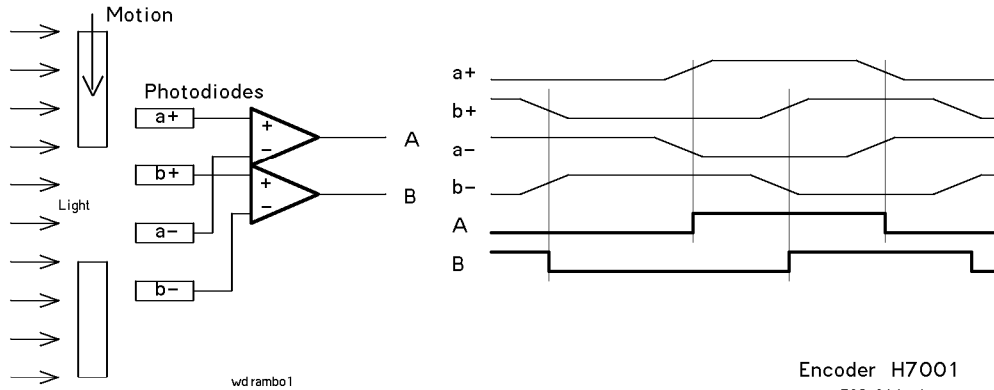
Fig 1. Principle of the photodiodes

The circuit is packaged in a 4-pin black transistor-like case (fig 2). The circuit is bonded on the flat area side. The infrared LED available in the same package are bonded on the side of the lens.

Interfacing the circuit does not need any additional component. Power supply is +5V, 0.1mA, and the output are CMOS compatible, and can dirrectly be fed to a microcontroller input port.

Encoder and microgears

The ⁻*DIDEL⁻ 48 and 60 teeth gears include respectively 36 and 60 slots compatible with the H7101 encoder. Relative dimensions are documented below (fig3).

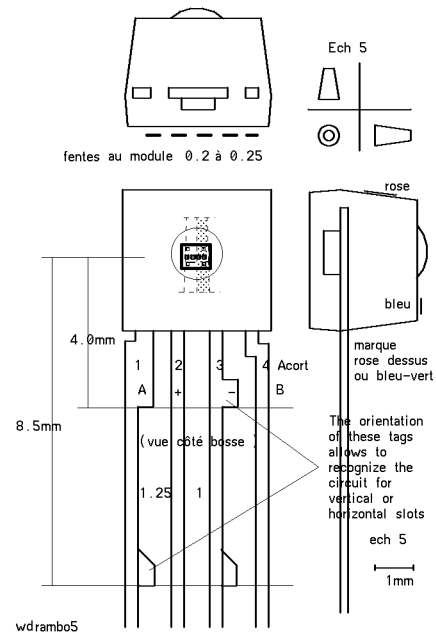Encoder H7001
puce 762x914 microns
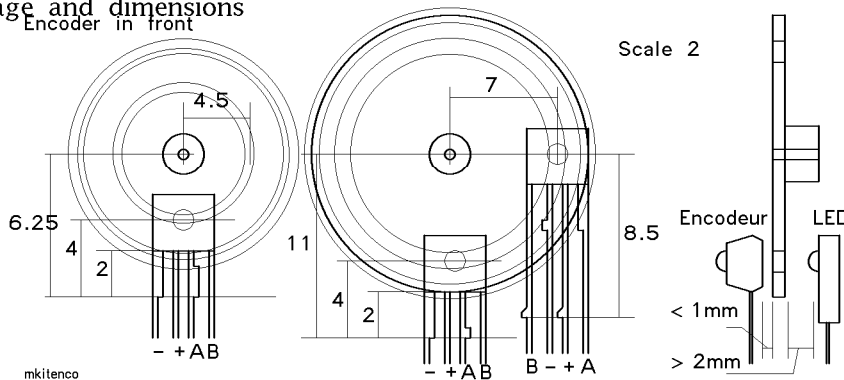
fentes au module 0.2 à 0.25

Fig 2. Package and dimensions

Fig 3. Encoder position relative to microgears
November, 9th 1900 ⁻*DIDEL⁻