Absolute Magnetics

AM INTEGRATE 37q – A0

Magnetic Encoder

- ✓ **Absolute position encoder**
- ✓ **No calibration needed**
- ✓ **Robust against external stray fields**
- ✓ **Wide mounting tolerances**
- ✓ **Air gap variation possible**
- ✓ **15’000 rpm**
- ✓ **Typical accuracy ±0.3°**

Robust, accurate and stray field immune - innovation for magnetic encoders

Overview

Symbol	Parameter	min.	typ.	max.	Unit
Vcc	Supply voltage	4.5	5	5.5	V
Icc	Current consumption	-	60	-	mA
Res_ST$_{ABI}$	Resolution single turn ABI interface*	-	14	-	bit
Acc @1000rpm	Accuracy @ 1’000 rpm	-	± 0.3	-	degree
Acc @7000rpm	Accuracy @ 7’000 rpm	-	± 0.3	-	degree
Acc @15000rpm	Accuracy @ 15’000 rpm	-	± 0.35	-	degree
Rep	Repeatability	-	0.15	-	degree
Speed	Maximum speed	-	-	15’000	rpm
AG	Air gap	0.2	0.7	2.0	mm
Ecc	Eccentricity	-	-	0.5	mm
SF	Stray-field immunity	10	-	-	mT
T$_{amb}$	Operating temperature	-40	-	+125	°C

*configurable resolution, 8 to 14 bit

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1. Accuracy Measurements

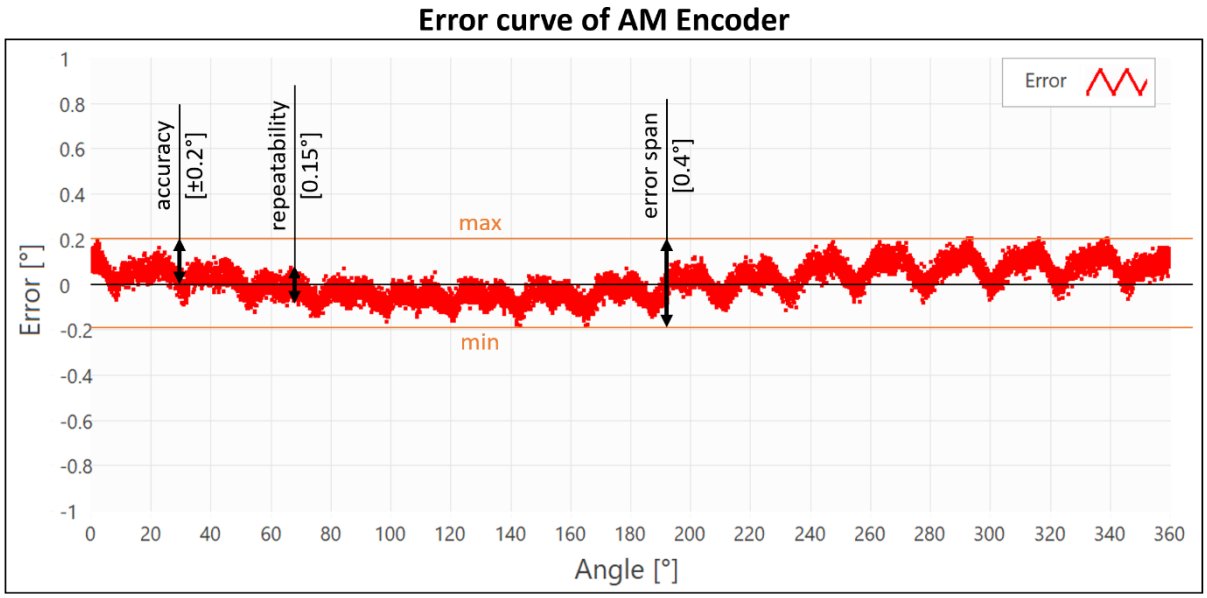

Figure 1:Typical error curve with descriptions, measured at 7'000 rpm at nominal air gap

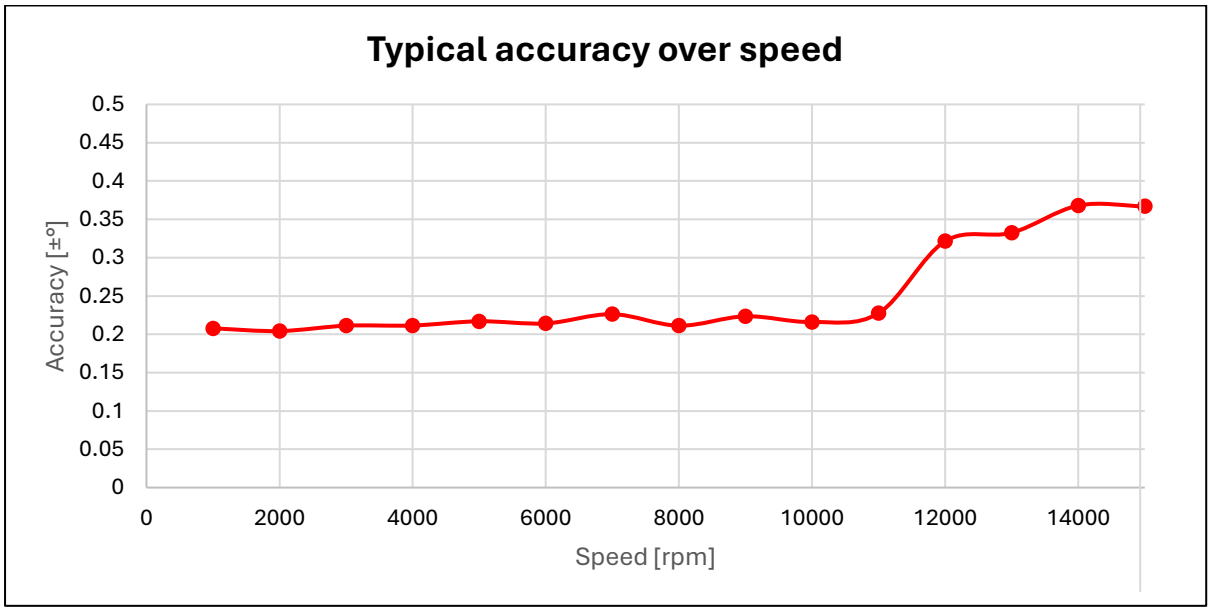

Figure 2: Measurement of typical accuracy at speeds up to 15'000 rpm, at nominal air gap

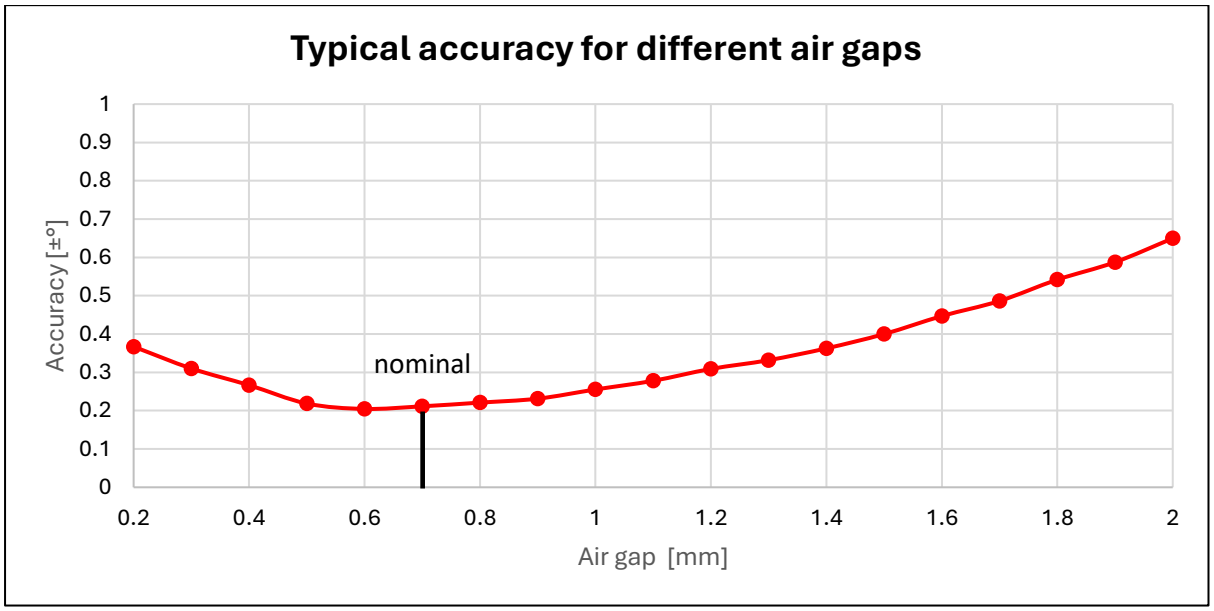

Figure 3: Typical accuracy for different air gaps

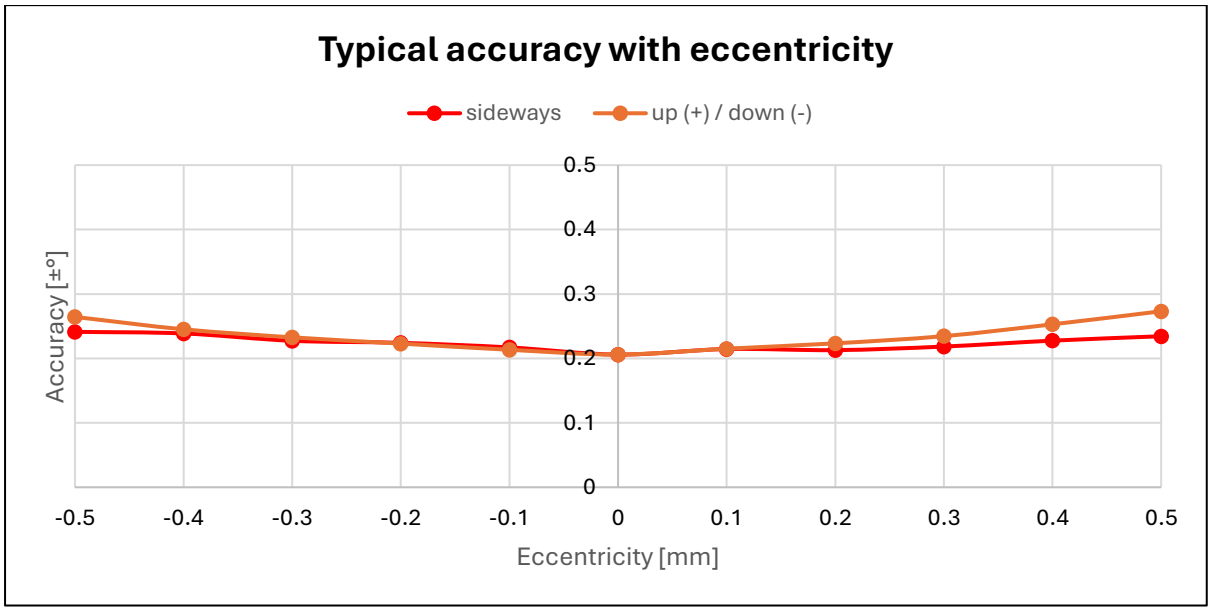

Figure 4: Typical accuracy with eccentric alignment

2. Absolute Maximum Ratings

Symbol	Parameter	min.	max.	Unit
Vcc	Supply voltage	-0.3	6.0	V
$ESD_{Contact}$	ESD performance Contact Discharge according IEC 61000-4-2	-	9	kV
ESD_{Air}	ESD performance Air Discharge according IEC 61000-4-2	-	16.5	kV
T_{store}	Storage temperature	-55	+125	°C

3. Electrical Data

Symbol	Parameter	min.	typ.	max.	Unit	Remark
t_{rr}	Position refresh rate	-	10	-	µs	
τ_{ABI}	Latency ABI interface	-	< 1	-	µs	Internal latency compensation of (3* t_{rr})
t_{start}	Startup time	-	-	16	ms	

4. ABI Interface

Symbol	Parameter	Test Condition	min.	typ.	max.	Unit
t_r$_{ABI}$	Rise time ABI pulse	R_{Diff} = 100 Ω C_{Diff} = 50 pF	7	11	20	ns
t_f$_{ABI}$	Fall time ABI pulse		7	11	20	ns
V_DO$_{ABI}$	Differential ABI output voltage	R_L = 100Ω	3	4	-	V
V_SHO$_{ABI}$	Single high ABI output voltage		2.4	2.7	-	V
V_SLO$_{ABI}$	Single low ABI output voltage		-	0.2	0.4	V
I_SC$_{ABI}$	ABI Short-Circuit output current	One output = 0V One output = Vcc	-	-	±150 ±200	mA

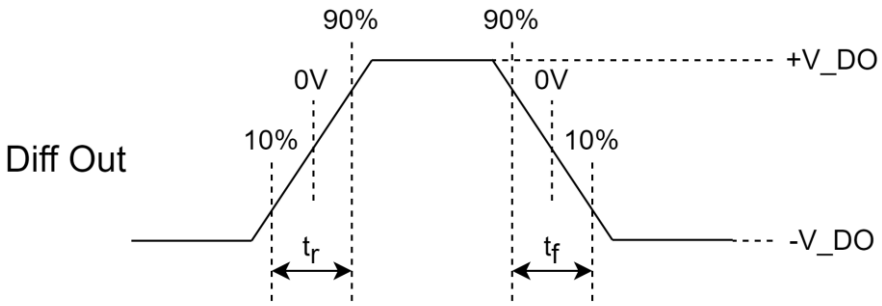

Figure 5: ABI timing diagram

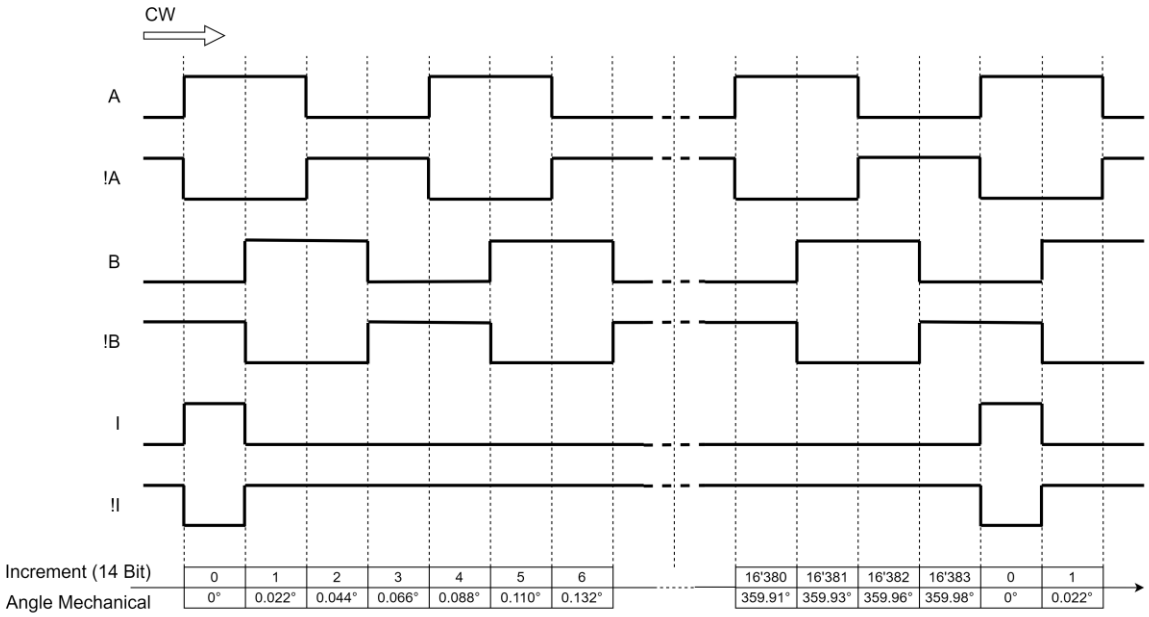

Figure 6: ABI output signal

4.1. ABI Startup sequence

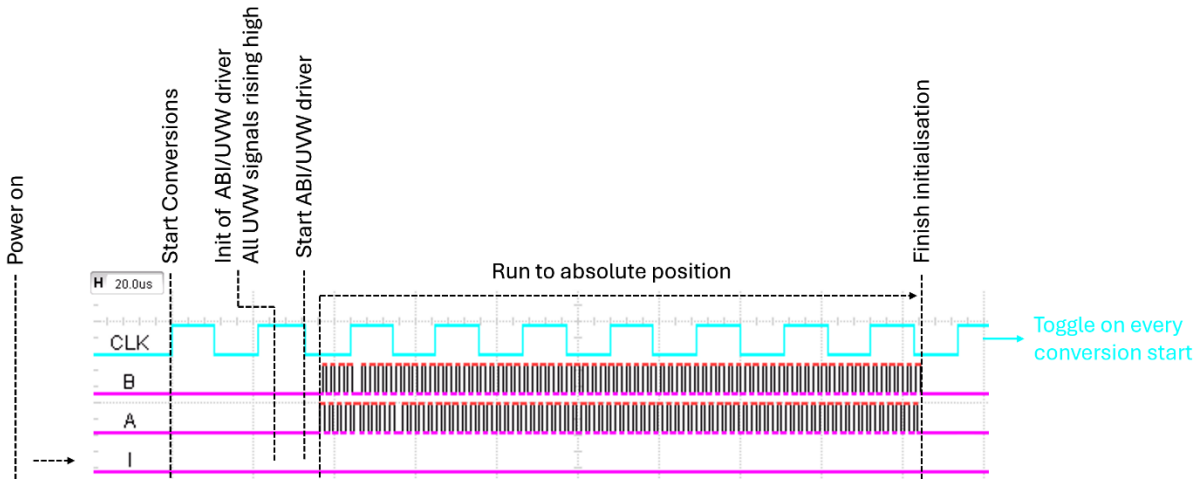

Figure 7: ABI startup behavior

The ABI interface has a true power-on absolute position feature. After power-on or reset, the encoder initializes itself. The ABI interface starts at position 0 and runs then to the absolute position.

5. Mechanical Data

Symbol	Parameter	min.	typ.	max.	Unit
ID Magnet	Inner diameter magnet	14.983	-	14.994	mm
OD Magnet	Outer diameter magnet	-	37	-	mm
OD PCB	Outer diameter PCB	-	40	-	mm
ID PCB	Inner diameter PCB	-	18.5	-	mm
H	Height of system	-	10	-	mm
AG	Air gap*	0.2	0.7	2.0	mm
Ecc	Eccentricity	-	-	0.5	mm
Mass	Mass magnet assembly	-	16.7	-	g
Shaft	Recommended shaft diameter	15.001	-	15.009	mm

*Highest element PCB to magnet surface

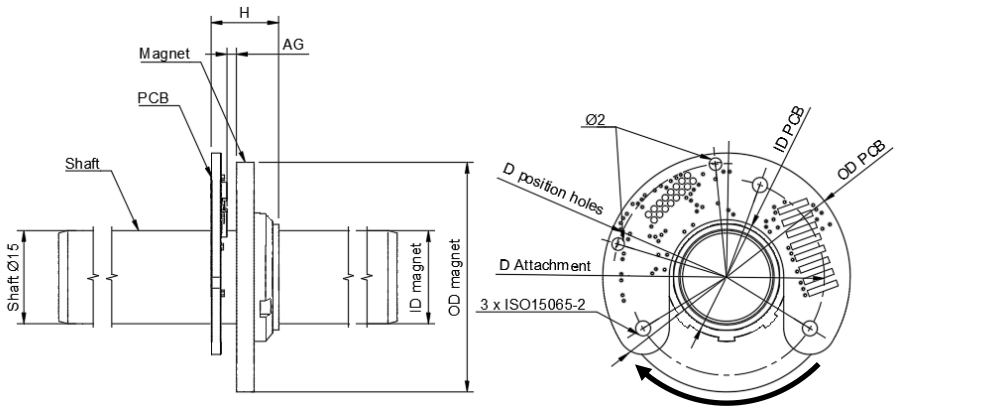

Figure 8: Mechanical dimensions schematic

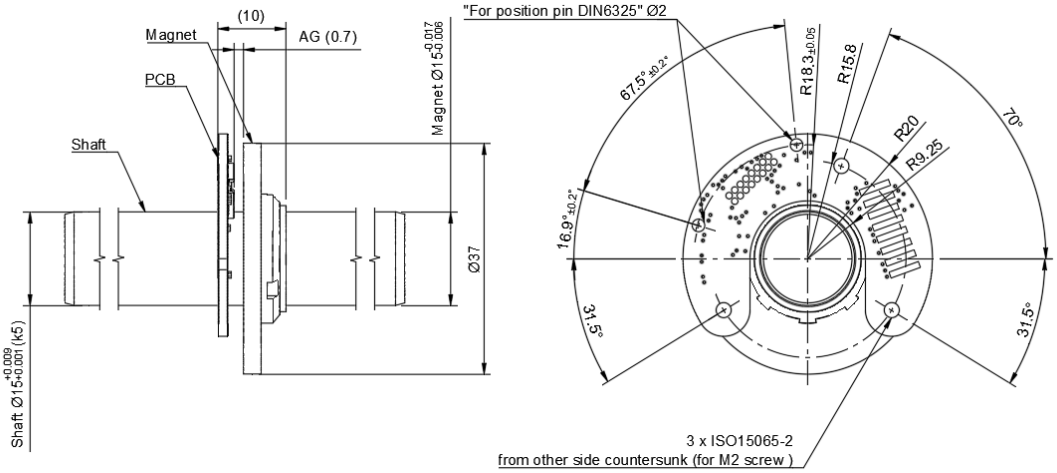

Figure 9: Mechanical dimensions

6. Pinout

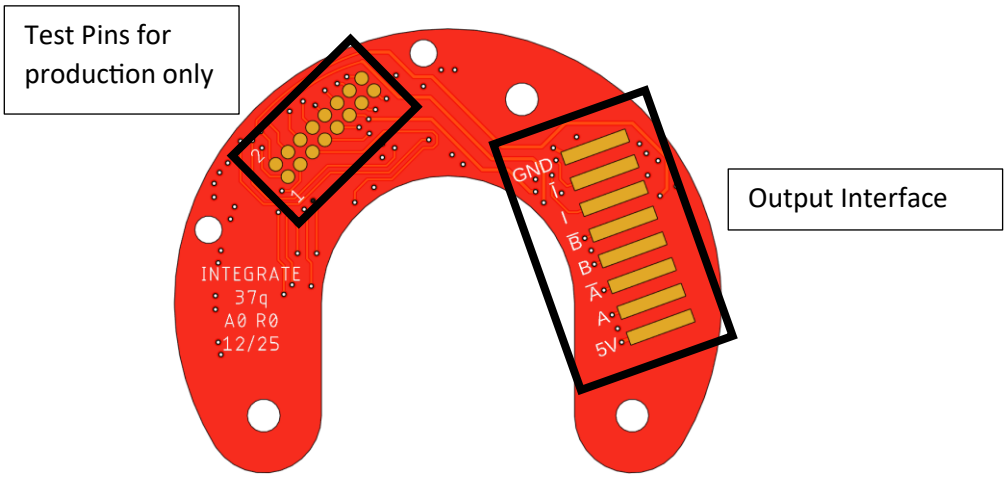

Figure 10: PCB Pinout

Signal	Description
GND	Ground
$\overline{\mathbf{I}}$	ABI, I inverted signal
I	ABI, I signal
$\overline{\mathbf{B}}$	ABI, B inverted signal
B	ABI, B signal
$\overline{\mathbf{A}}$	ABI, A inverted signal
A	ABI, A signal
5V	Power supply 5V

7. Contact

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All performance data provided are based on laboratory measurements at 20°C temperature and are for reference only. Actual performance may vary depending on application and conditions.

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