

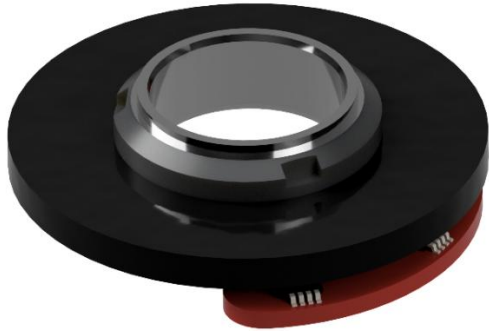


Absolute Magnetics

Smart Sensor Systems

AM INTEGRATE 37s

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 $\pm 0.2^\circ$**

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

Overview

Symbol	Parameter	min.	typ.	max.	Unit
Vcc	Supply voltage	3.1	3.3	3.6	V
Icc	Current consumption	-	52	-	mA
Res_ST _{ABI}	Resolution singleturn ABI interface*	8	12	14	bit
Res_ST _{SPI}	Resolution singleturn SPI interface	-	16	-	bit
Res_MT _{SPI}	Resolution multiturn SPI interface	-	16	32	bit
Acc @1000rpm	Accuracy @ 1'000 rpm	-	± 0.2	-	degree
Acc @7000rpm	Accuracy @ 7'000 rpm	-	± 0.2	-	degree
Acc @15000rpm	Accuracy @ 15'000 rpm	-	± 0.3	-	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

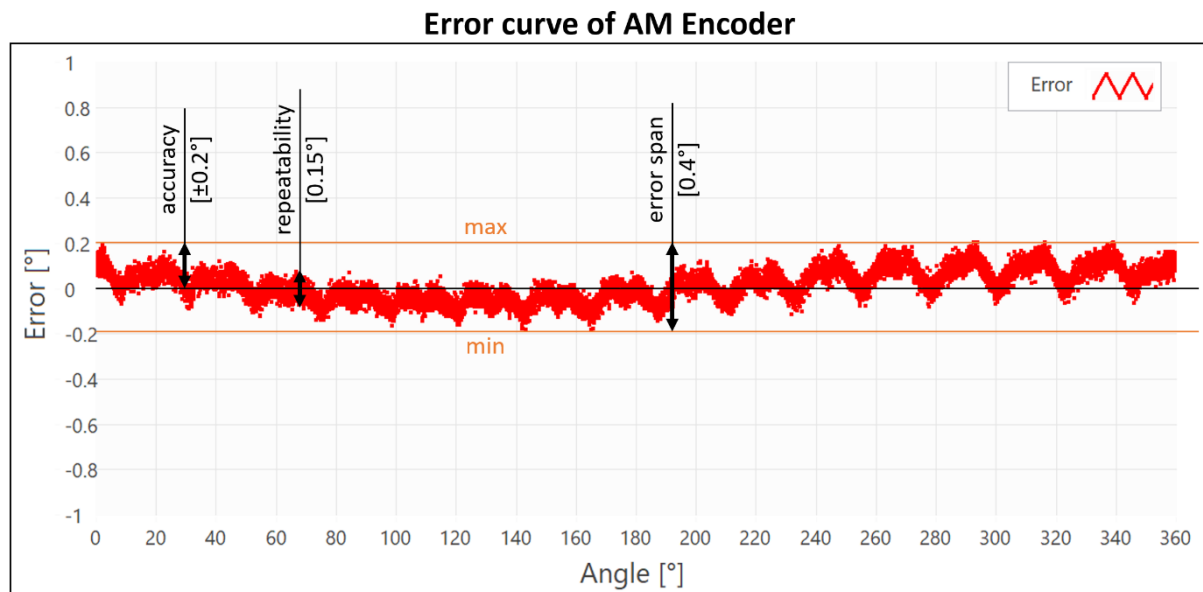


Figure 1: Typical error curve with descriptions, measured at 7'000 rpm at nominal air gap

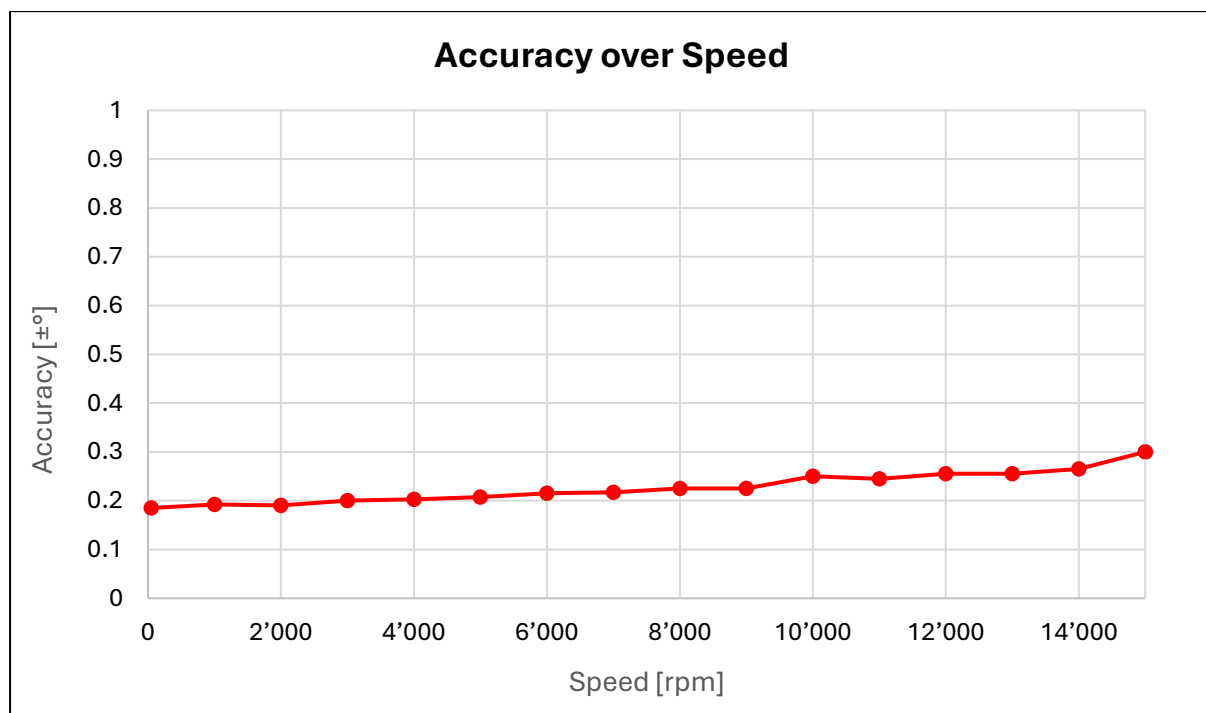


Figure 2: Measurement of accuracy at speeds up to 15'000 rpm, at nominal air gap

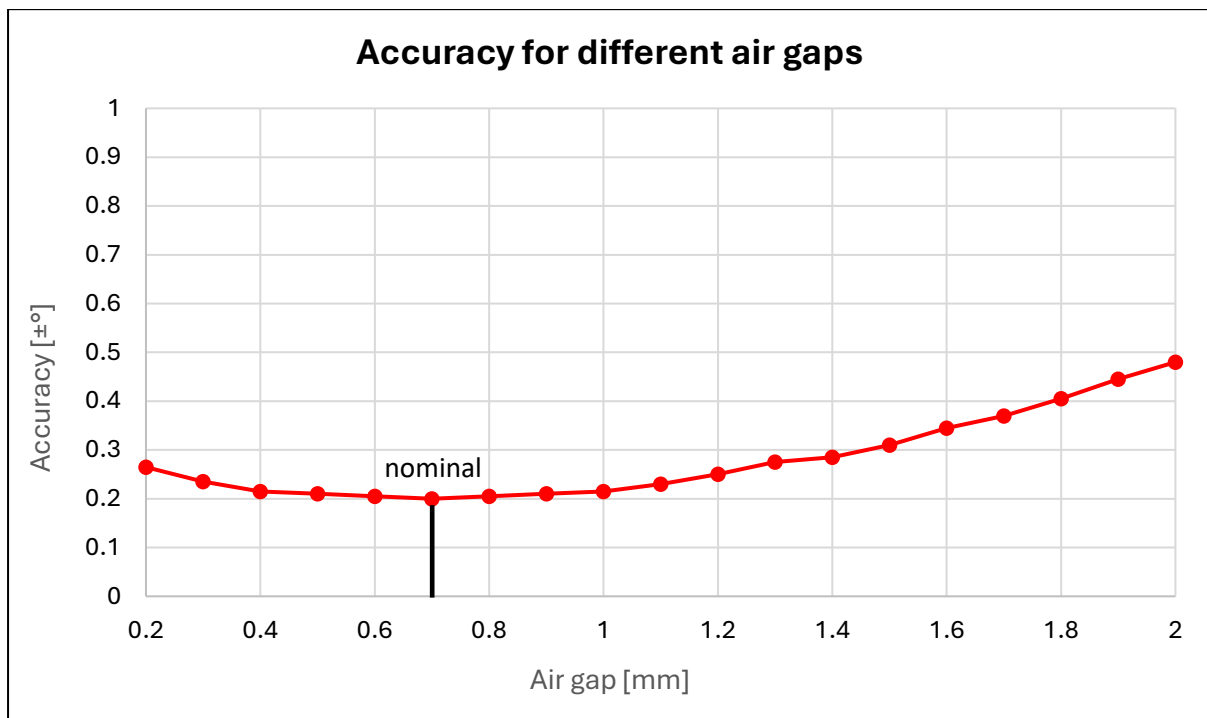


Figure 3: Accuracy for different air gaps, measured at 7'000 rpm

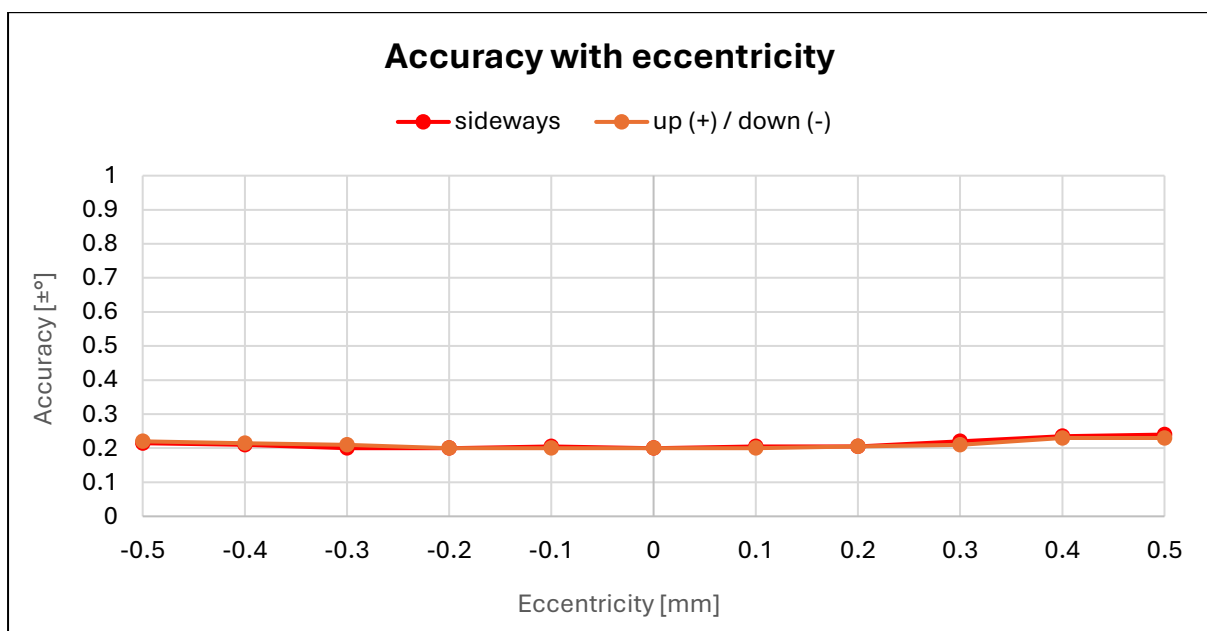


Figure 4: Accuracy with eccentric alignment, measured at nominal air gap with 7'000 rpm



2. Absolute Maximum Ratings

Symbol	Parameter	min.	max.	Unit
V_{cc}	Supply voltage	-0.3	4.0	V
ESD_{HBM}	ESD tolerance according to Human Body Model	-	2000	V
ESD_{CDM}	ESD tolerance according to Charge Device Model	-	250	V
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}	Start time	-	-	16	ms	
τ_{SPI}	Latency SPI interface	-	-	t _{rr} + t _{readout}	-	Internal latency compensation of (2* t _{rr})

4. SPI Interface

Symbol	Parameter	min.	typ.	max.	Unit
f_{SPI} $1 / t_{clock}$	SPI clock (SCK) frequency	-	10	-	MHz
$t_{setup}(!CS)$	!CS setup time	3	-	-	μs
$t_{hold}(!CS)$	!CS hold time	-	50	-	ns
$t_{whigh}(SCK)$	SCK high time	-	25	-	ns
$t_{setup}(MOSI)$	MOSI setup time	3	-	-	ns
$t_{hold}(MOSI)$	MOSI hold time	1	-	-	ns
$t_{enable}(MISO)$	MISO enable time	-	-	3	μs
$t_{disable}(MISO)$	MISO disable time	-	-	3	μs
$t_{setup}(MISO)$	MISO valid time	9	-	12	ns
$t_{whigh}(!CS)$	Time between two transfers	3	-	-	μs

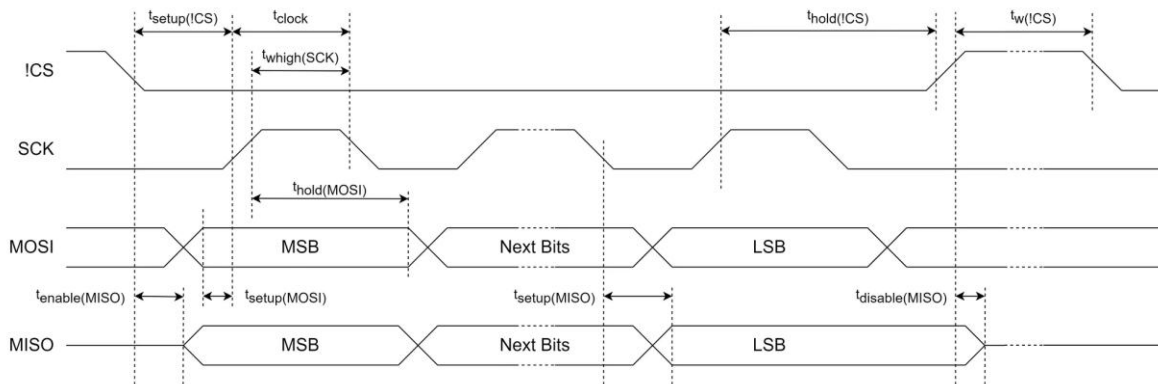


Figure 5: SPI timing diagram

5. ABI / UVW Interface

Symbol	Parameter	min.	typ.	max.	Unit
t_{r_ABI}	Rise time ABI pulse	-	<25	170	ns
t_{f_ABI}	Fall time ABI pulse	-	<25	170	ns

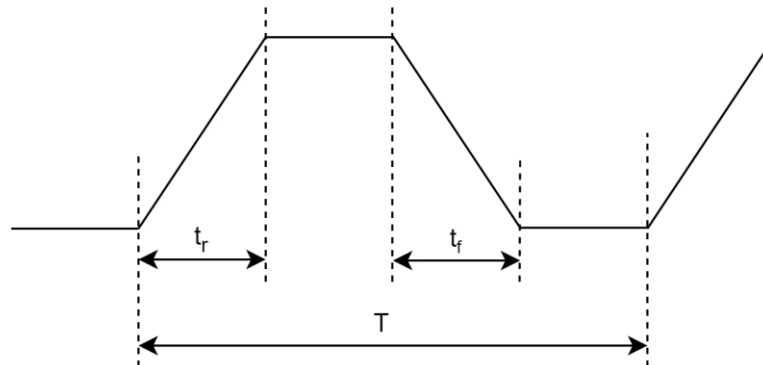


Figure 6: ABI timing diagram

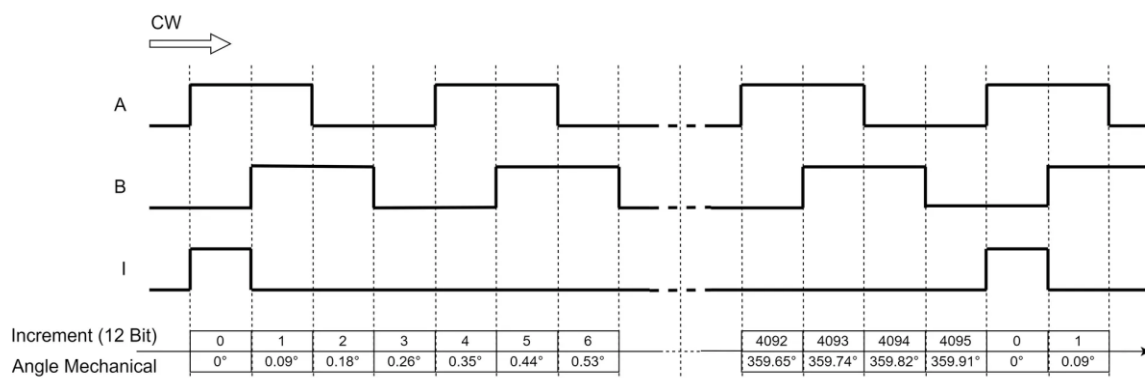


Figure 7: ABI output signal

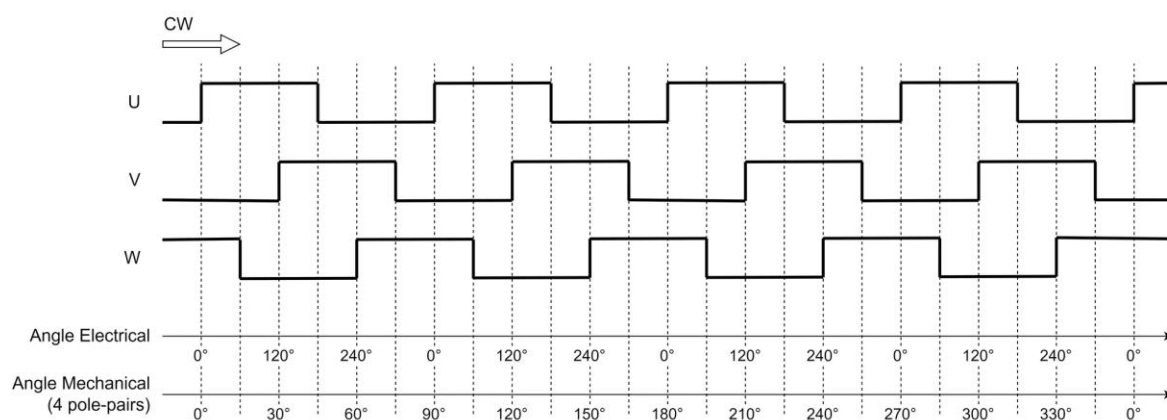


Figure 8: UVW output signal

6. Startup

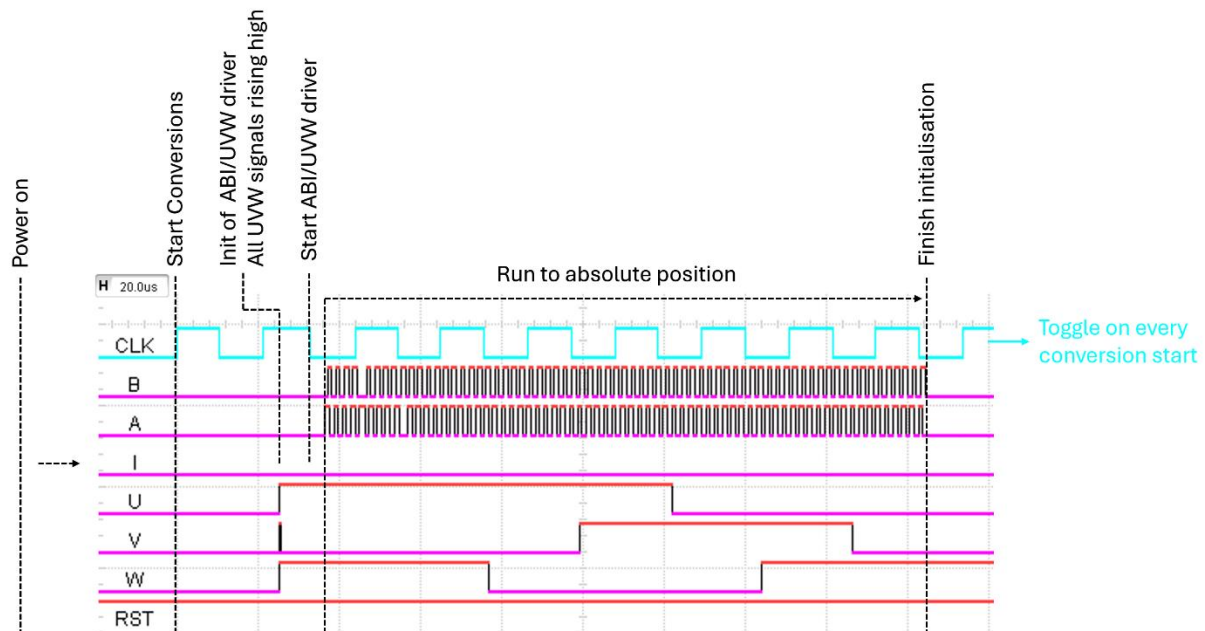


Figure 9: ABI / UVW startup behavior

After power on or reset, the encoder initializes itself. The initialization phase is finished after the TICK (CLK) is starting to toggle. In the first toggle phase, the ABI interface is setting up. The interface starts at position 0 and runs then to the absolute position.

7. 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

*Highest element PCB to magnet surface

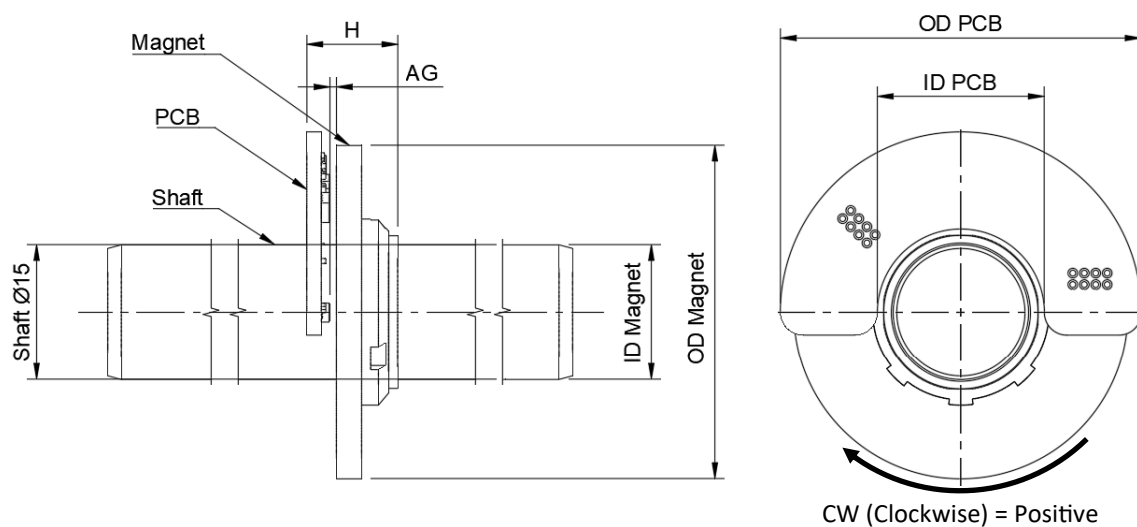


Figure 10: Mechanical dimensions

8. Pinout

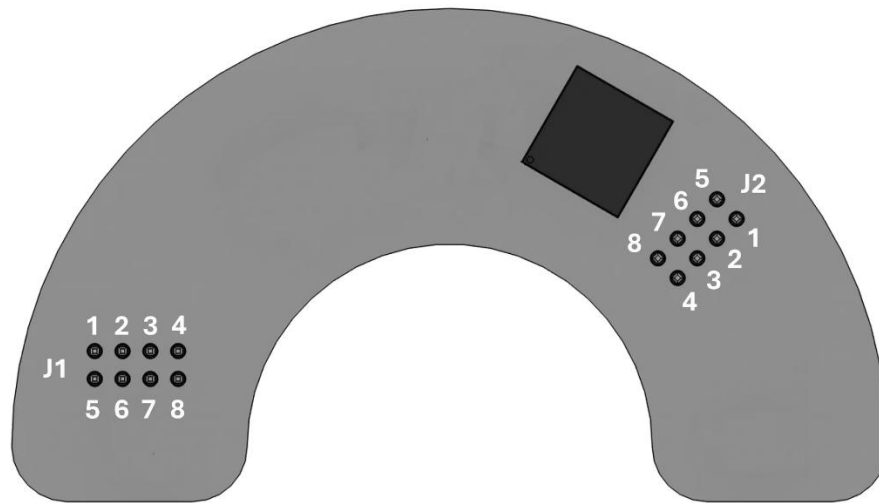


Figure 11: PCB Pinout

Connector	Pin	Signal	Description
J1	1	IO1	IO 1 – Reserved for future use
	2	IO0	IO 0 – Reserved for future use
	3	!RST	Sensor reset (active low)
	4	TICK	Sensor tick (represents t_{rr})
	5	SPI _{MOSI}	SPI MOSI signal
	6	SPI _{MISO}	SPI MISO signal
	7	SPI _{SCK}	SPI clock
	8	SPI _{ICS}	SPI chip select (active low)
J2	1	ABl _A	ABI A signal
	2	ABl _B	ABI B signal
	3	ABl _I	ABI I signal
	4	VDD	Power supply 3.3V
	5	UVW _U	UVW U signal
	6	UVW _V	UVW V signal
	7	UVW _W	UVW W signal
	8	GND	Ground



9. Contact

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*All performance data provided are based on laboratory measurements and are for reference only.
Actual performance may vary depending on application and conditions.*

For additional information, please contact us by e-mail: contact@absolute-magnetics.com



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