



Absolute
Encoder



Modular



SSI protocol



BiSS protocol



The AR38 modular optical encoder is a compact and precise solution designed for integration into rotary systems where space, performance, and flexibility are critical. The encoder features a lightweight PCB-based stator and a compact rotor with precision circular scale, enabling seamless integration into motors, robotic joints, and automation equipment.

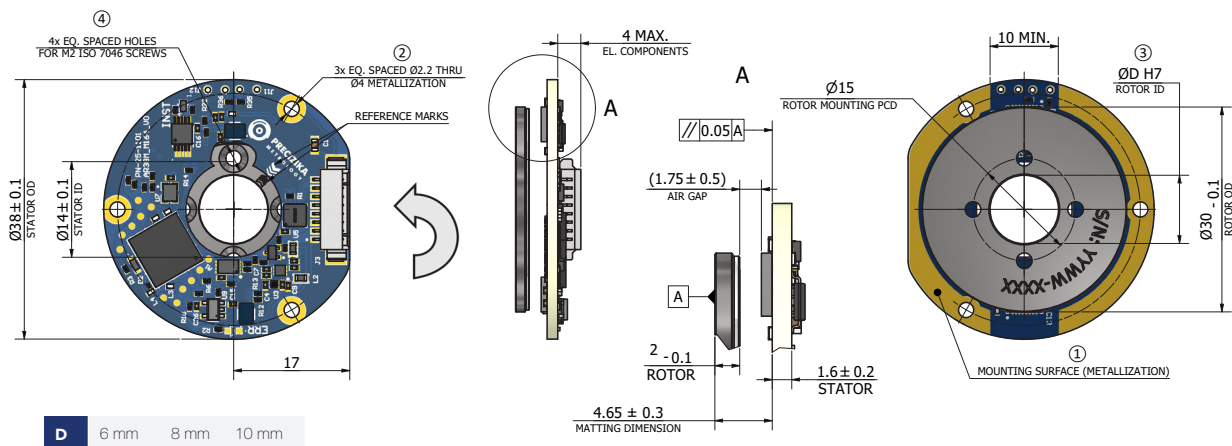
- Modular lightweight design
- Zero set and direction control
- Dual LED feedback
- Enhanced by OrbiSync™ dual sensor technology

SYSTEM SPECIFICATIONS

Reading type	Single Turn absolute
Electrical interface	SSI / BiSS
Output code	Binary
Resolution	up to 22 bit
Nominal position accuracy*	±20"
Repeatability	2.5"

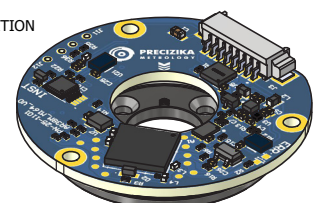
*the overall system accuracy depends on the mechanical mounting conditions, including stator-to-rotor alignment, axial and radial positioning, and rotor eccentricity. Under recommended installation practices, typical system accuracy reaches the specified value.

Note: Deviation from recommended mounting tolerances may lead to increased measurement error.



NOTES:

1. STATOR MUST BE MOUNTED AND MAKE CONTACT WITH THE SUPPORT ONLY AT THE DESIGNED MOUNTING SURFACE WITH METALLIZATION
2. CONDUCTIVE SCREWS MUST BE USED FOR STATOR MOUNTING TO ENSURE PCB GROUNDING
3. ROTOR IS POSITIONED AND CENTERED USING CENTERING COLLAR ON THE MOUNTING SHAFT
4. ROTOR IS FASTENED WITH ISO 7046 OR EQUIVALENT M2 SCREWS. TIGHTENING TORQUE AS PER SCREW SPECIFICATION
5. MATERIAL - BONDING THREADLOCKER ADHESIVE IS RECOMMENDED FOR ALL SCREWS USED



MECHANICAL SPECIFICATIONS

STATOR	
Material	FR4
Outside diameter (OD)	38 mm
Inside diameter (ID)	14 mm
Weight (without cable)	< 6 g
PCB fabrication	per IPC-A-600 Class 3
PCB assembly	per IPC-A-610 Class 3
Soldering process	per J-STD-001 Class 3
Conformal coating (top side el. components)	per IPC-CC-830
ROTOR	
Material	Stainless-steel hub + chromium circular scale on glass disc
Outside diameter (OD)	30 mm
Inside diameter (ID)	øD H7 mm
Mass moment of inertia	$< 1.5 \times 10^{-6} \text{ kg.m}^2$
Weight	< 10 g
Max mechanical speed	5000 RPM
INSTALLATION TOLERANCES (between stator and rotor)	
Nominal air gap between optical sensor and glass disc	$(1.75 \pm 0.5 \text{ mm})$
Matting dimension (between mounting surfaces)	$4.65 \pm 0.3 \text{ mm}$
Tangential displacement of the stator	$\pm 0.3 \text{ mm}$
Radial displacement of the stator	$\pm 0.3 \text{ mm}$
Permissible radial runout of customer shaft	< 0.1 mm
ENVIRONMENTAL DATA	
Operating temperature	-40 °C to 100 °C
Storage temperature	-40 °C to 100 °C
Relative humidity	98% (non-condensing)
Permissible vibration (10 to 2000 Hz)	20G sweep (EN 60068-2-6:2008)
Permissible shock (6 ms)	100G saw-tooth (EN 60068-2-27:2009)
Protection	IP00
Environmental compliance	RoHs

ELECTRICAL DATA

Supply voltage	+ 5V $\pm$ 10%
Current consumption*	< 200 mA

* Specified current consumption at room temperature and nominal installation. Higher temperatures or deviation from nominal airgap could increase draw current.

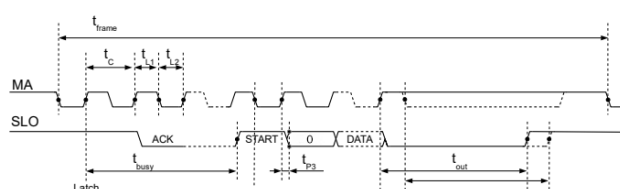
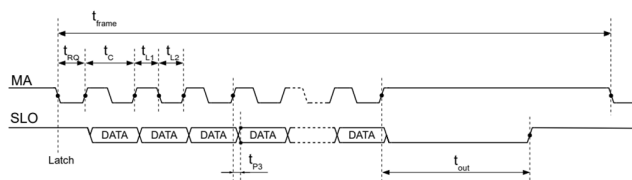
ABSOLUTE DIGITAL INTERFACE



DESCRIPTION	DATA
t_{out}	typical 20 μ s
Clock frequency	50 kHz - 5 MHz



DESCRIPTION	DATA
t_{out}	0.8 μ s - 20 μ s
Clock frequency	50 kHz - 10 MHz

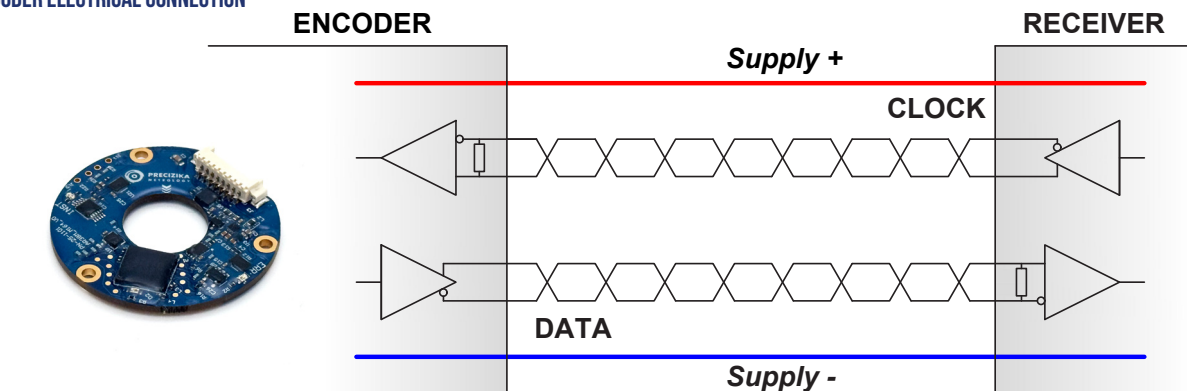


SYMBOL	PARAMETER	MIN	MAX	UNIT
SSI Protocol				
t_{frame}	Permissible Frame Repetition	(*)	indefinite	
t_c	Permissible Clock Period	200		ns
t_{L1}	Clock Signal hi Level Duration	100	t_{out}	ns
t_{L2}	Clock Signal lo Level Duration	100	t_{out}	ns
t_{RQ}	REQ Signal lo Level Duration	100		ns
BISS C Protocol				
t_{frame}	Permissible Frame Repetition	(*)	indefinite	
t_c	Permissible Clock Period	100		ns
t_{L1}	Clock Signal hi Level Duration	50	t_{out}	ns
t_{L2}	Clock Signal lo Level Duration	50	t_{out}	ns
t_{busy}	Processing Time with Start Bit Delay		5	μs

*Allow t_{out} to elapse.

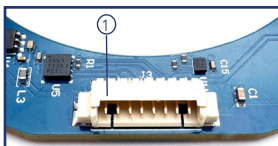
ELECTRICAL CONNECTION

ENCODER ELECTRICAL CONNECTION



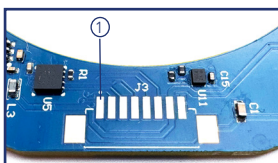
The encoder offers two flexible options for electrical connection, allowing users to choose the most suitable method based on installation needs and environmental conditions. Both options provide reliable signal and power transmission, allowing for seamless integration into a wide range of systems and environments.

CONNECTOR-BASED CONNECTION*



A standard horizontal 8-pin low profile (FCI / AMP 10114830-11108LF) connector is integrated directly onto the stator PCB. This option provides a convenient plug-and-play interface for cable harnesses, ensuring fast and reliable installation. It is ideal for applications where modularity and serviceability are important.

DIRECT WIRE SOLDERING*



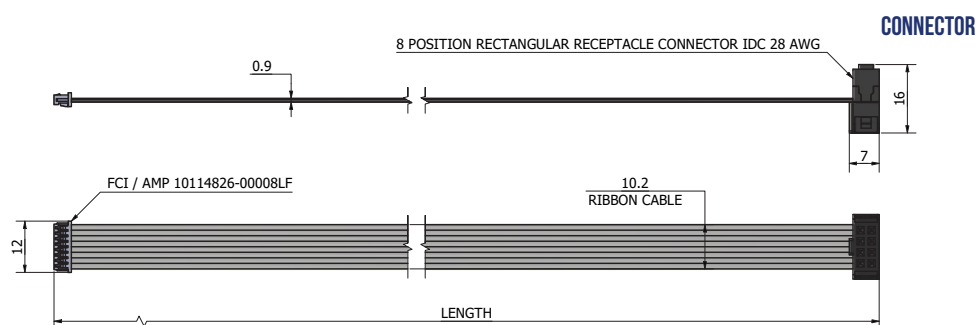
For more compact or rugged installations, wires can be soldered directly to the designated connector pads on the stator PCB. To enhance mechanical durability and ensure strain relief, the soldered wires are secured using epoxy adhesive. This method is especially useful in applications with vibration, limited space, or fixed wiring.

*select when ordering.

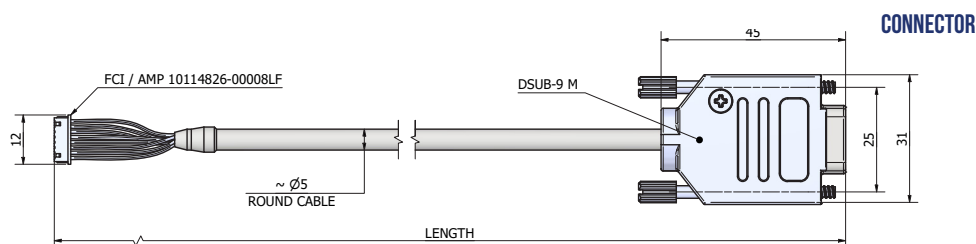
ENCODER PIN-OUT

PCB Connector	Soldering pads	SSI/BISS-C	IDC Connector (on ribbon cable)	D9 Connector (on round cable)
①	①	5 V supply	1	4
2	2	0 V (GND)	2	6
3	3	Counting direction set ²⁾	3	9
4	4	Zero position set ¹⁾	4	5
5	5	Clock+ (MA+)	5	2
6	6	Clock- (MA-)	6	3
7	7	Data+ (SLO+)	7	7
8	8	Data- (SLO-)	8	8

RIBBON CABLE*



ROUND CABLE*



*select when ordering.

NOTE: both type of cables might be connected to encoder via direct wire soldering or through the matting connector (AMP 10114826-00008LF) depending on the selected type of connection.

ZERO POSITION SETTING FUNCTION¹⁾

To enhance flexibility in system integration, the encoder includes a dedicated Zero Set input wire, allowing users to define the absolute zero position according to the specific requirements of their application. By activating this input at any desired mechanical position, the encoder reassigns that position as the new absolute zero, ensuring seamless alignment with the machine's coordinate system. This feature eliminates the need for mechanical repositioning or external software tools, streamlining both installation and commissioning processes. This functionality is especially useful in applications where mechanical reference points vary between builds, or where field recalibration is needed after maintenance or replacement.

COUNTING DIRECTION CONFIGURATION²⁾

To support flexible integration with various mechanical systems, the encoder features an additional input wire that allows users to configure the absolute position counting direction. By toggling this input, the encoder can be set to count position values in either a clockwise (CW) or counterclockwise (CCW) direction — ensuring compatibility with the specific rotational logic of the application. This feature enables quick adaptation without requiring mechanical changes or firmware reconfiguration, simplifying installation and improving alignment with system control schemes.

DUAL LED STATUS INDICATORS

To provide immediate visual feedback during setup and operation, the encoder stator is equipped with two integrated LED indicators: ERR and INST. These indicators assist in both installation accuracy and runtime diagnostics.

ERR (ERROR INDICATOR)

The ERR LED provides real-time error feedback from the encoder.

LED	STATUS
RED	An internal error has been detected
OFF	No errors present; the encoder is functioning normally

The ERR LED also provides visual feedback for encoder diagnostics and initialization procedures. Detailed LED "status" description is provided in the encoder manual.

INST (INSTALLATION ACCURACY INDICATOR)

The INST LED indicates the correctness of the rotor's mechanical alignment and signal quality.

LED	STATUS
GREEN	The rotor is correctly mounted, and the encoder signals are within acceptable limits.
RED	Misalignment or poor signal quality detected - adjustment of the rotor position is necessary.



These intuitive indicators simplify installation and maintenance, helping ensure optimal encoder performance without the need for external tools or diagnostics.

ORBISYNC™ TECHNOLOGY

Orbisync™ is a next-generation optical encoder platform developed by Precizika Metrology for high-precision absolute rotary sensing. Leveraging a dual-sensor architecture with built-in intelligence, it continuously calibrates itself to maintain accuracy over time and varying conditions. Advanced onboard processing ensures clean, reliable position data, even in dynamic environments. Its modular design supports both compact open-frame and fully housed configurations, making it a versatile solution for modern motion systems.



SPECIAL FEATURES*

Precizika Metrology offers exceptional flexibility in our design and manufacturing processes, allowing us to create tailor-made encoders to meet specific customer needs. We can also modify our standard encoders to accommodate different rotor diameters or designs, special wiring configurations, different mechanical interfaces, etc. Additionally, we can incorporate other custom features, such as specialized connectors, couplings, and various accessories, to ensure seamless integration into your application. Furthermore, we can adapt the design and conduct testing for various environmental conditions, including higher ingress protection levels, extended temperature ranges, and resistance to intensive mechanical vibrations or shock.

*if required, please indicate the special feature to the manufacturer before ordering.

ORDER CODE

AR38	X1	X2	X3	X4	X5	X6	X7	X8
Output signals interface (X1):	Bit number (X2):	Rotor inner diameter "D" (X3):	Connection type (X4):	Cable assembly (X5):	Cable length (X6):	Connector (X7):	Special feature (X8)	
S - SSI B - BiSS-C	B01 - 1 bit ... B22 - 22 bits	06 - ø 6 mm 08 - ø 8 mm 10 - ø 10 mm	C - Connector-based D - Direct wire soldering W - empty pads soldering (ready for customer soldering)	RI - Ribbon cable RO - Round cable W - without cable	00 - use if no cable assembly is selected (VV) 10 - 100 mm 25 - 250 mm 100 - 1 000 mm	W - without connector IDC - 8-pins connector (only for ribbon cable) D9 - DSUB-9, 9 pins	C0 - no special feature	
ORDER EXAMPLES: 1) AR38-S-B13-08-D-RI-25-W-C0 2) AR38-S-B16-08-W-W-00-W-C0								

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2) AR38-S-B16-08-W-W-00-W-C0