



Absolute
Encoder



Hollow Shaft



SSI protocol



BiSS protocol



The AR50 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.

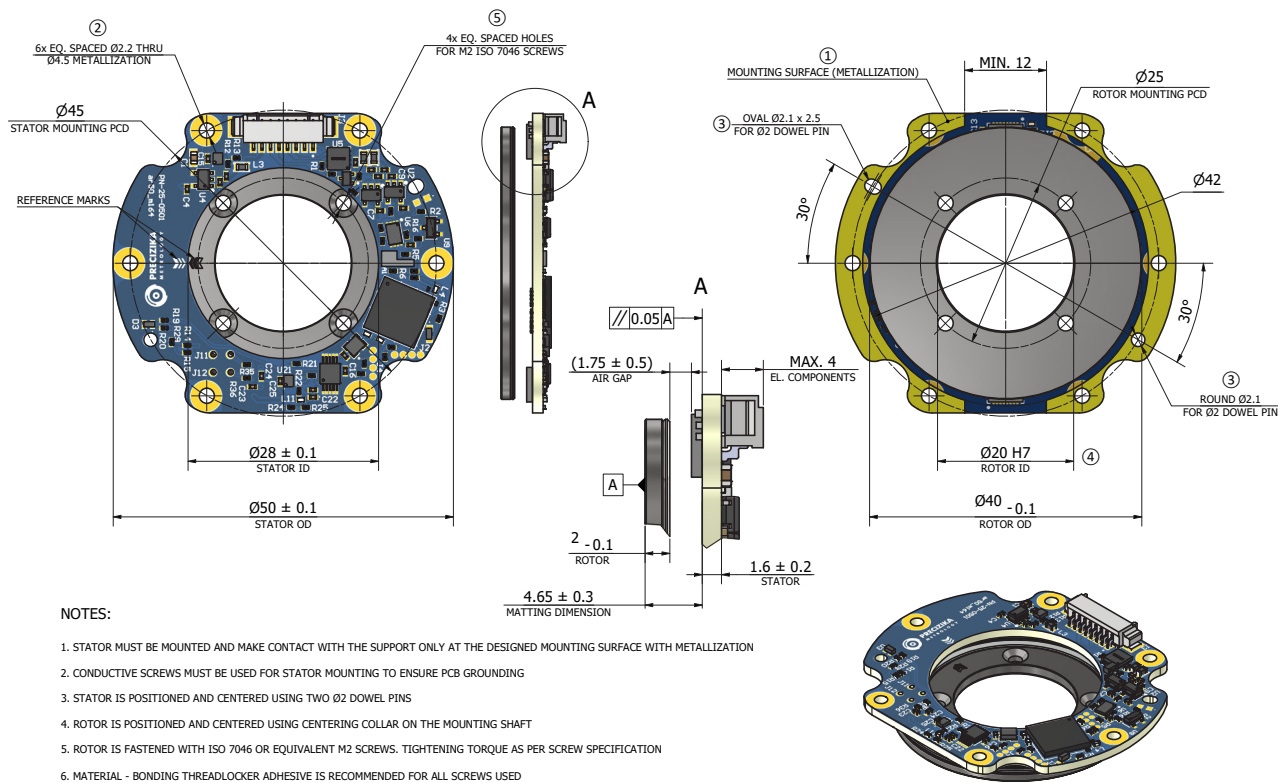
- Modular lightweight design
- Zero set and direction control
- Dual LED feedback
- Enhanced by OrbiSync™ dual sensor technology

SYSTEM SPECIFICATIONS

Reading type	Single Turn absolute
Electrical interface	SSI / BiSS
Output code	Binary
Resolution	up to 23 bit
Accuracy*	±15"
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 can reach values up to the specified value.

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



MECHANICAL SPECIFICATIONS

STATOR	
Material	FR4
Outside diameter (OD)	50 mm
Inside diameter (ID)	28 mm
Weight (without cable)	5 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)	40 mm
Inside diameter (ID)	20 H7 mm
Mass moment of inertia	< 3.5 x 10 ⁻⁶ kg.m ²
Weight	15 g
Max mechanical speed	5000 RPM
INSTALLATION TOLERANCES (between stator and rotor)	
Axial displacement (Air gap)	1.75 ± 0.5 mm
Tangential displacement of the stator	± 0.3 mm
Radial displacement of the stator	± 0.3 mm
Permissible radial runout of customer shaft	15 µm
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 ± 10%
Current consumption (without load)	< 220 mA

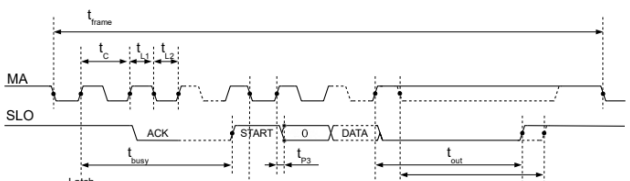
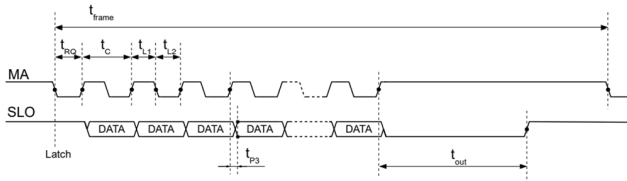
ABSOLUTE DIGITAL INTERFACE



DESCRIPTION	DATA
T _{timeout}	typical 20 µs
Clock frequency	50 kHz - 5 MHz



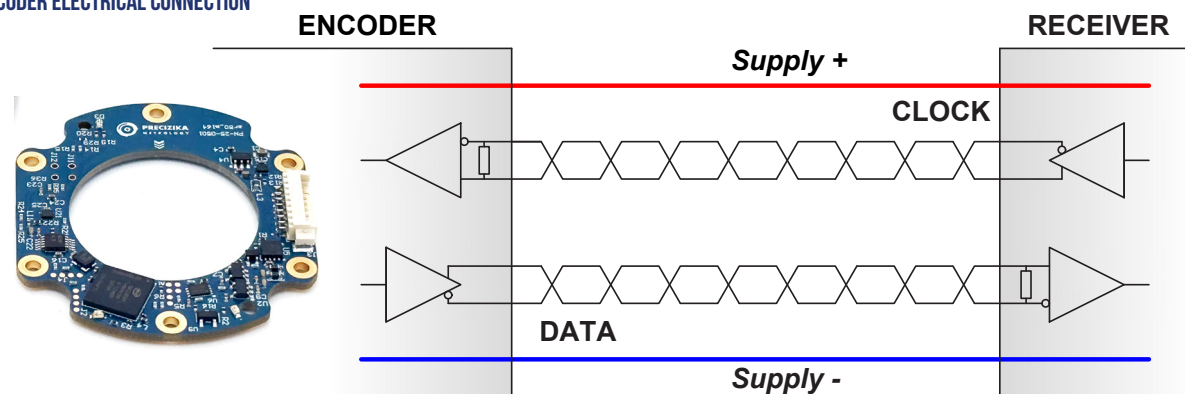
DESCRIPTION	DATA
T _{timeout}	0.8 µs - 20 µs
Clock frequency	50 kHz - 10 MHz



SYMBOL	PARAMETER	CONDITIONS	MIN	MAX	UNIT
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_{RQ}	REQ Signal lo Level Duration		50		ns
t_{P3}	Propagation Delay: SLO stable after MA lo → hi			60	ns
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_{busy}	Processing Time with Start Bit Delay			$9t_c$	
t_{P3}	Propagation Delay: SLO stable after MA lo → hi			60	ns

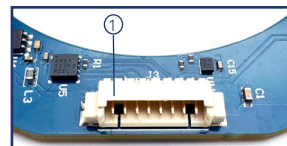
ELECTRICAL CONNECTION

ENCODER ELECTRICAL CONNECTION



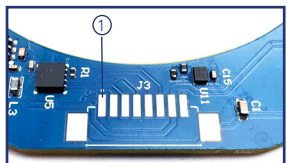
The encoder offers two flexible options for electrical connection, allowing users to choose the most suitable method based on installation needs and environmental conditions. Both options provide reliable signal and power transmission, allowing for seamless integration into a wide range of systems and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



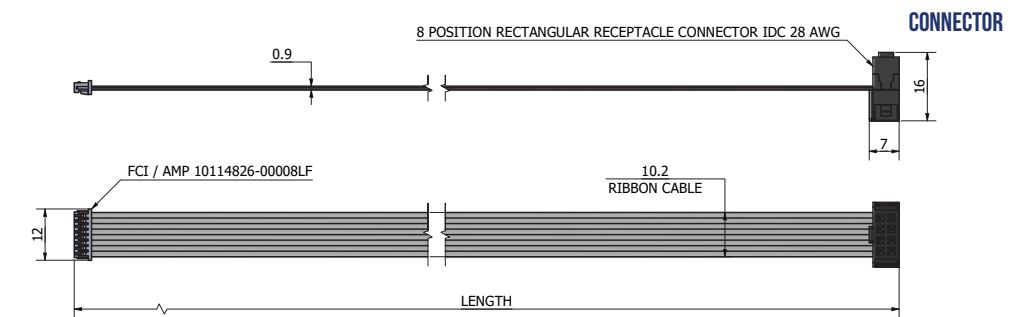
For more compact or rugged installations, wires can be soldered directly to the designated connector pads on the stator PCB. To enhance mechanical durability and ensure strain relief, the soldered wires are secured using epoxy adhesive. This method is especially useful in applications with vibration,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

*select when ordering.

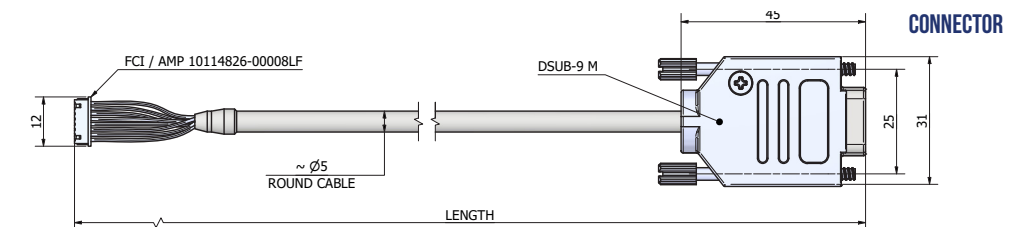
ENCODER PIN-OUT

Connector	Soldering pads	SSI / BiSS-C
①	①	+5 V supply
2	2	0 V (GND)
3	3	Counting direction set ¹⁾
4	4	Zero position set ²⁾
5	5	Clock+
6	6	Clock-
7	7	Data+
8	8	Data-

RIBBON CABLE*



ROUND CABLE*



*select when ordering.

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

ZERO POSITION SETTING FUNCTION²⁾

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 CONFIGURATION¹⁾

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.

DIRECTION / ZERO POSITION PROGRAMMING

PROGRAMMING

To program the rotation direction or set a new zero position, assert the corresponding input low prior to device power-up. The input state must remain stable for a minimum of 3 s after power is applied. The input may be released thereafter. The updated configuration becomes effective 10 s after power-up.

FACTORY RESET

If both configuration inputs are held low during power-up, the encoder performs a factory reset and restores all parameters to default values.

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.

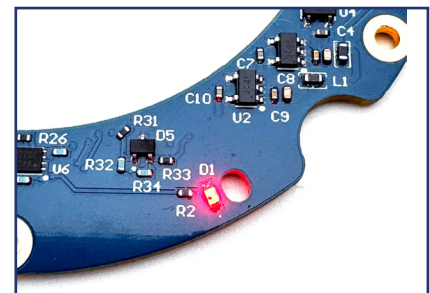
LED	STATUS
RED	An internal error has been detected
OFF*	No errors present; the encoder is functioning normally

*Latched status, in order to reset power cycle should be applied.

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 CAPABILITIES

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 shaft 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.

ORDER CODE

AR50		-	X1	-	X2	-	X3	-	X4	-	X5	-	X6
Output signals interface (X1):		Bit number (X2):		Connection type (X3):		Cable assembly (X4):		Cable length (X5):		Connector (X6):			
S - SSI B - BiSS-C		B01 - 1 bit ... B23 - 23 bits		C - Connector-based D - Direct wire soldering		RI - Ribbon cable RO - Round cable W - without cable		RC005 - 500 mm RC01 - 1 000 mm RC02 - 2 000 mm		W - without connector IDC - 8-pins connector (only for ribbon cable) D9 - DSUB-9, 9 pins B12 - round, 12 pins C12 - round, 12 pins C9 - round, 9 pins			
ORDER EXAMPLES: 1) AR50-S-B13-B-02M-RC02-W 2) AR50-B-B01-G-13M-RC01-W													

ORDER EXAMPLES: 1) AR50-S-B13-B-02M-RC02-W
2) AR50-B-B01-G-03M-RC01-W