Autonics Ø50mm Shaft Type Multi-turn **Absolute Rotary Encoder** EPM50S SERIES INSTRUCTION MANUAI CE Thank you for choosing our Autonics product. Please read the following safety considerations before use. Safety Considerations %Please observe all safety considerations for safe and proper product operation to avoid hazards. ations are categorized as follows ※Safety consid Marning Failure to follow these instructions may result in serious injury or death Caution Failure to follow these instructions may result in personal injury or product damage *The symbols used on the product and instruction manual represent the following ▲ symbol represents caution due to special circumstances in which hazards may occur. \Lambda Warning 1. Fail-safe device must be installed when using the unit with machinery that may cause serious injury or substantial economic loss. (e.g. nuclear power control medical equipment, ships, vehicles, railways, aircraft, combustion apparatus, safety equipment, crime/disaster prevention devices, etc.) Failure to follow this instruction may result in personal injury, fire, or economic loss ▲ Caution Do not drop water or oil on this unit. Failure to follow this instruction may result in product damage, or mis-control due to malfunction. 2. Use the unit within the rated specifications Failure to follow this instruction may result in shortening the life cycle of the unit, or product damage by burning. 3. Please check the polarity of power and wrong wiring. Failure to follow this instruction may result in product damage by burning 4. Do not short circuit the load. Failure to follow this instruction may result in product damage by burning Ordering Information EPM50S 8 – 10 13 – B – PN 24 Shaft Single Output ower supply Cable Multi-turn Control output N: Parallel NPN lo-mark 10-bit 13-bit Binary open collector 12-24VDC S: SSI line ±5% Axial cable type 50mm Shaft type 1024 (8192 Code driver output adial cable typ Synchronous Serial Interface (SSI) Output Timing Diagram 100kHz to 1MHz **Clock Frequency f** SSI_CLOCK T: 1 to 10µs 0.5µs < t1 < 5µs SSI_DATA Time lag t2 t2 < 0.3µs X 1 X 0 **Monoflop Time t3** 15μs < t3 < 30μs Synchronous Serial Interface (SSI) Data Output ______ ¹/0v7/M112/M112/M10/M9/M8/M7/M6/M5/M4/M3/M2/M1/M0/S9/S8/S7/S6/S5/S4/S3/S2/S1/S0¹ OVF Multi-turn count Single-turn data Clock Clock Data Data output name Data output name output bit output bit nput bit input bit Over flow error bit 9-bit (MSB))-bit 12-bit (MSB 16 8-bit 7-bit 11-bit 10-bit 18 6-bit 9-bit 5-bit Single-turn data 8-bit 4-bit 7-bit 3-bit Multi-turn coun 6-bit 2-bit 5-bit 1-bit 10 4-bit 0-bit (LSB) 11 3-bit

Parallel Interface 1024-division Single-Turn Data

2-bit

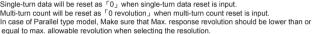
1-bit 0-bit (LSB)

12

13 14

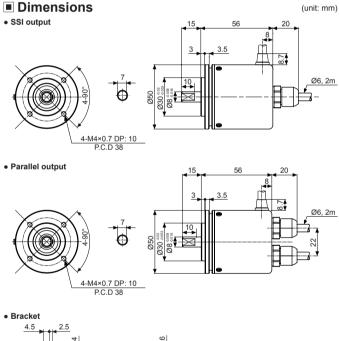
Output Waveform

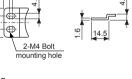
Тур	e			Ø50mm shaft type multi-turn absol	ute rotary encoder	
Model				EPM50S8-1013-B-S-24 EPM50S8-1013-B-PN-24		
20	Single-turn		e-turn	1024-division (10-bit)		
Re	Multi-turn		turn	8192-revolution (13-bit)		
Rot	otation limit when power off ^{**1}			±90°		
		Output code		24-bit, Binary 2 code	Binary 2 code	
	Output	Control output		SSI (Synchronous Serial Interface) Line driver • [Low]-Sink current: Max. 20mA, Residual voltage: Max. 0.5VDC • [High]-Sink current: Max20mA, Output voltage: Min. 2.5VDC	Parallel NPN open collector outpu Sink current: Max. 32mA, Residual voltage: Max. 1VDC-	
		Output signal		Single-turn data, Multi-turn count, C	OVF alarm ^{∞2}	
		Output logic		—	Negative logic output	
		Response time		_	Max. 1µs (cable: 2m, I sink = 32mA)	
Ľ		(rise/fall)		Single-turn data reset ^{x3} , Multi-turn		
catic		Input signal			Latch	
cific		Input level		0-1VDC		
spe		Input logic		Low active, Open or High for common use		
Electrical specification	Input	Input time		Single-turn data reset ^{×3} , Multi-turn count reset ^{×4} , Direction, Clear : Over 100ms		
₿				—	Latch: Over 500µs	
		SSI	Input level	5VDC ±5%	—	
		clock input	Input frequency	100kHz to 1MHz	—	
	Max. re:	sponse	frequency	<u> </u>	50kHz	
	Power s	upply		12-24VDC- ±5% (ripple P-P: max.	5%)	
	Current	consu	mption	Max. 150mA	Max. 100mA	
			-	(disconnection of the load)	(disconnection of the load)	
	Insulatio			Over 100MΩ (at 500VDC megger t	,	
	Dielectr		igth	750VAC 50/60Hz for 1 minute (betw	,	
	Connec		- 4	Axial/Radial cable type (cable gland)		
			ng torque ent of inertia	Max. 70gf·cm (0.0069N·m)		
	chanical cification			Max. 40g·cm ² (4×10 ⁻⁶ kg·m ²)		
spe	enication			Radial: 10kgf, Thrust: 2.5kgf 3,000rpm		
Vibration			evolution	1.5mm amplitude at frequency of 10 to 55Hz (for 1 min) in each X, Y, Z direction for 2 hours		
Sh	ock			Approx. Max. 50G		
			temperature	-10 to 70°C, storage: -25 to 85°C		
me				35 to 85%RH, storage: 35 to 90%RH		
				Axial cable type: IP64 (IEC standard), Radial cable type: IP50 (IEC standard)		
Cable				Ø6mm, 10-wire, 2m, Shield cable (AWG28, core diameter: 0.08mm, number of cores: 19, insulator diameter: Ø0.8mm)	Ø6mm, 17-wire×2, 2m, Shield cabl (AWG28, core diameter: 0.08mm, number of cores: 17, insulator diameter: Ø0.8mm)	
				Bracket, coupling		
Approval				CE		
_	ight ^{×6}			Approx. 409g (approx. 324g) Approx. 560g (approx. 475g)		
%2 %3	countin revoluti over ±9 OVF ala Single-t	g multi ion occ 90° fror arm is (arm da	turn counts arred since the positio N when mit ta will be res	counts by comparing single-turn dat when power is off. It shall be used proper multi-turn data may not be a in when power is off. ulti-turn count is out of counting rang set as ^r 0 _J when single-turn data re et as ^r 0 revolution_J when multi-tur	on the condition that no overrated vailable if any revolutions occurred ge (0 to 8191 revolution). set is input.	



[Max. response revolution (rpm) = $\frac{Max. response frequency}{Resolution} \times 60 \text{ sec}$]

- 6: The weight includes packaging. The weight in parenthesis is for unit only
- *Environment resistance is rated at no freezing or condensation





• Coupling Ø19

Ø8*0

3.4

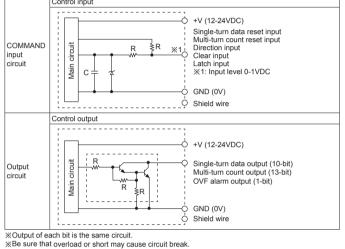
=‡

Parallel misalignment (ε): Max. 0.25mm
 Angular misalignment (θ): Max. 5°

End-play (s); Max. 0.5mm

 SSI output Control input CLOCK+ input SSI clock С input circuit CLOCK- input KInput level 5VDC ±5% Control input +V (12-24VDC) R<u>≹ %1</u> Single-turn data reset input Multi-turn count reset input COMMANE input Direction input Clear input circuit Main C ※1: Input level 0-1VDC GND (0V) O Shield wire Control output SSI DATA output circuit DATA+ output Main O DATA- output Parallel output Control input

Control Output I/O Circuit



Connections

• SSI bulput						
Cable						
Cable color	Description	Cable color	Description			
Brown	CLOCK+	Gray	Single-turn data reset			
Red	Red CLOCK- Blu		Multi-turn count reset			
Orange	DATA+	Purple	Clear			
Yellow	DATA-	Green	Direction			
White	+V (12-24VDC) GND (0V)					
Black						
Shield wire	Signal shield cable (F.G.)					

Parallel output

Multi-turn cour	nt cable (Sheath color:	Black)	Single-turn da	Single-turn data cable (Sheath color: Gray)		
Cable color	Description		Cable color	Description		
Brown		2°	Brown		2°	
Red		2 ¹	Red		2 ¹	
Orange		2 ²	Orange	 Single-turn data	2 ²	
Yellow		2 ³	Yellow		2 ³	
Green		2 ⁴	Green		2 ⁴	
Blue		2 ⁵	Blue		2 ⁵	
Purple	Multi-turn count	2 ⁶	Purple		2 ⁶	
Gray		27	Gray		27	
Pink		2 ⁸	Pink		2 ⁸	
Clear		2 ⁹	Clear		2 ⁹	
Light brown		2 ¹⁰	Light brown	N.C.		
Light yellow		2 ¹¹	Light yellow	Direction		
Light green		2 ¹²	Light green	Latch		
Light blue	OVF		Light blue	Clear		
Light purple	Multi-turn count res	et	Light purple	Single-turn data reset		
White	+V (12-24VDC)		White	+V (12-24VDC)		
Black	GND (0V)		Black	GND (0V)		
Shield wire	Signal shield cable	(F.G.)	Shield wire	Signal shield cable (F.G.)		
*Do the wiring Encoder's m Do the wiring	etal case and shield ca with care for short sin el output, it is recomm	able must b nce dedicat	ed Driver IC is use	d for I/O circuit.	unt cable a	

Cautions During Use

1. Installation

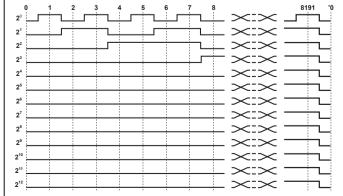
(D'Handle the unit with care since it consists of precision components.
 (D'Be careful not to make eccentricity and deflection angle larger, it may shorten the life cycle.
 (Do not put strong impact when inserting coupling into shaft.

- 2. For using



%TS=0.3515625°±15′ *Above waveform is based on the positive logic. (The output waveform of negative logic is in reverse.)

Parallel Interface 8192-revolution Multi-Turn Count **Output Waveform**



*Above waveform is based on the positive logic. (The output waveform of negative logic is in reverse.)

 $\% \mbox{The above specifications are subject to change and some models may be discontinued$ without notice.



 When mounting the coupling to encoder shaft, if there is combined misalignment (parallel, angular misalignment) between rotating encoder shaft and mate shaft, it may cause encoder and coupling's life cycle to be shorten. Do not load overweight on the shaft.

• For more information about flexible coupling (ERB Series), please refer to the catalogue

Functions

O Single-turn data reset

Single-turn data will be reset as [0] when single-turn data reset cable is inputted 0 to 1V (over 100ms). In case of not using single-turn data reset cable, connect the line to OPEN or + V.

O Multi-turn count reset

Multi-turn data will be reset as 「0 revolution」 when multi-turn count reset cable is inputted 0 to 1V (over 100ms). In case of not using multi-turn count reset cable, connect the line to OPEN or + V. OVF alarm will be reset with multi-turn count reset input.

O Direction

Connect the direction cable to OPEN or +V and turn on the power. Output will increase when rotation direction is CW from shaft axis. In case of connecting 0 to 1 V (over 100ms), output will increase when rotation direction is CCW. If direction setting is reset, single-turn data, multi-turn count and OVF will be reset together since direction setting is initial setting which is set with Power ON.

O Clear

Single-turn data will be reset as ^r0_J and multi-count will be also reset as ^r0 revolution_J when clear cable is inputted 0 to 1V (over 100ms). In case of not using clear cable, connect the cable to OPEN or + V. OVF alarm will be reset with clear input.

◯ Latch (Parallel output model only)

When the latch cable is inputted 0 to 1V (over 500µs), outputs for single-turn data, multi-turn count and OVF at latch point will be remained. When latch cable is connected to OPEN or +V, output will be returned to operating mode output.

OVF

It is an alarm function when multi-turn count is out of rotation ranges (0 to 8191 revolutions). Over flow alarm is also reset with multi-turn count value when multi-turn count reset signal is inputted.

 ②Please connect shield wire to F.G. terminal.
 ③Do not connect and cut circuit during power on, or it may cause damage to the unit. 3When using a switching mode power supply, install the surge absorber on power line for absorbing surge and make the wire as short as possible to avoid noise.

3. Environment

Please do not use this unit with below environment, it may cause malfunction OPlace where this unit or component may be damaged by strong vibration or impact. @Place where three are lots of flammable or corrosive gases. @Place where strong magnet field or electric noise occurs. @Place where is beyond of rating temperature or humidity. 6Place where strong acids or alkali near by.

Vibration and Impact

①When the strong impact loads on this unit, it may cause an error. 2 Please use bracket for more stable unit mounting ③Please use flexible coupling (ERB Series) when the application needs severe acceleration or deceleration frequently

5. Wire connection

©Do not draw the wire with over strength 30N after wiring. ©If wire encoder cable with high voltage line or power cable in the same conduit, it may cause a malfunction or mechanical problem. Please wire it separately or use separated conduit.

%Failure to follow these instructions may result in product damage.

Major Products

Photoelectric Sensors	Temperature Controllers				
Fiber Optic Sensors	Temperature/Humidity Transducers				
Door Sensors	SSR/Power Controllers				
Door Side Sensors	Counters				
Area Sensors	Timers				
Proximity Sensors	Panel Meters				
Pressure Sensors	Tachometer/Pulse (Rate)Meters				
Rotary Encoders	 Display Units 	Autonics Corporation			
Connector/Sockets	Sensor Controllers	http://www.autonics.com			
Switching Mode Powe					
Control Switches/Lam	os/Buzzers	HEADQUARTERS:			
I/O Terminal Blocks &	Cables	18, Bansong-ro 513 beon-gil, Haeundae-gu, Busan, South Korea, 48002			
Stepper Motors/Driver	s/Motion Controllers	TEL: 82-51-519-3232			
Graphic/Logic Panels		E-mail: sales@autonics.com			
Field Network Devices					
 Laser Marking System 	(Fiber, Co ₂ , Nd: YAG)	DRW170202AA			
Laser Welding/Cutting	System				