

ϕ 50mm Shaft Multi-turn Absolute Type

Diameter ϕ 50mm Shaft type Absolute Multi-turn Rotary encoders

NEW

■ Features

- Synchronous output available for both absolute position data per revolution and revolution count data
- ϕ 50mm compact body
- Parallel data / Serial data transmission type
- **23bit resolution**
- Easy zero adjustment using single-turn / multi-turn data separate reset function
- Memorizing revolution data up to $\pm 90^\circ$ after blackout using memory back up function
- CW / CCW direction setting possible with direction function
- Maximizing users convenience with latch, clear, overflow alarm function
- Protection structure IP64
- Provides Latch function (Parallel output model only)



■ Applications

Precision machine tool, Fabric machinery, Robot, Parking system

⚠ Please read "Caution for your safety" in operation manual before using.



■ Ordering information

Series	Shaft diameter	Single-turn	Multi-turn	Output code	Control output	Power supply
EPM50S	8	10	13	B	PN	24
Diameter ϕ 50mm	ϕ 8mm	10bit (1024 division)	13bit (8192 division)	Binary Code	PN: Parallel NPN open collector output S : SSI	12-24VDC $\pm 5\%$

■ Specifications

Type		ø 50mm Multi—turn absolute encoder		
Model		EPM50S8-1013-B-S-24	EPM50S8-1013-B-PN-24	
Resolution	Single—turn	1024 division(10Bit)		
	Multi—turn	8192 revolution(13Bit)		
Rotation limit when power is off		(★1) ±90°		
Electrical specification	Output	Output code	24bit, Binary 2 code	Binary 2 code
		Output Interface	SSI(Synchronous Serial Interface)	Parallel
		Output type	Line driver	NPN open collector output
		Output signal	Single—turn data, Multi—turn count, (★2) OVF alarm	
		Line driver output	• Low: Sink current – max. 20mA, Residual voltage – max. 0.5VDC • High: Sink current – max. –20mA, Output voltage – max. 2.5VDC	——
		NPN open collector output	——	Sink current : Max. 32mA, Residual voltage : Max. 1VDC
		Logic	——	Negative logic output
		Response time	——	Max. 1μs (Cable: 2m, I sink = 32mA)
	Input	Input signal	(★3) Single—turn data reset, (★4) Multi—turn count reset, Direction, Clear	
			——	Latch
		Input level	High : 5–24VDC, Low : 0–1.2VDC	
		Input logic	(★5) Low Active, HIGH or OPEN for common use	
		Input time	Direction : Over 100ms	
			Single—turn data reset : Over 100ms	
			Multi—turn count reset : Over 100ms	
			Clear : Over 100ms	
SSI Clock Input Frequency	No Latch function	Latch : Over 500μs		
	100kHz~1MHz	——		

※ (★1) It calibrates the multi-turn counts by comparing single-turn data before/after power off without counting multi-turn counts when power is off. It shall be used on the condition that no over-rated revolution occurred since proper multi-turn data may not be available if any revolutions occurred over $\pm 90^\circ$ from the position when power is off.

※ (★2) OVF alarm is ON when multi-turn count is out of counting range (0~8191 revolution).

It shall be initialized by changing the setting of Direction or applying multi-turn count reset or Clear signals.

※ (★3) Single-turn data shall be initialized as 「0」 when single-turn data reset is input.

※ (★4) Multi-turn count shall be initialized as 「0 revolution」 when multi-turn count reset is input.

※ (★5) High Active is optional.

(A) Counter

(B) Timer

(C) Temp. controller

(D) Power controller

(E) Panel meter

(F) Tacho/Speed/Pulse meter

(G) Display unit

(H) Sensor controller

(I) Switching power supply

(J) Proximity sensor

(K) Photo electric sensor

(L) Pressure sensor

(M) Rotary encoder

(N) Stepping motor & Driver & Controller

(O) Graphic panel

(P) Field network device

(Q) Production stoppage models & replacement

EPM50 SERIES

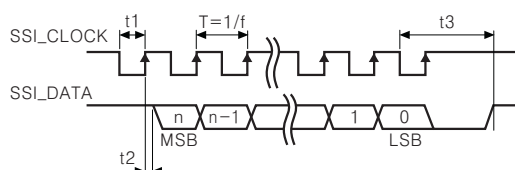
Specifications

Type	ø 50mm Multi-turn absolute encoder	
Model	EPM50S8-1013-B-S-24	EPM50S8-1013-B-PN-24
Electrical specification	Max. Response frequency	50kHz
	Power supply	12-24VDC, ±5%(Ripple P-P : Max. 5%)
	Current consumption	Max. 150mA(Disconnection of the load) Max. 70mA(Disconnection of the load)
	Insulation resistance	Min. 100MΩ (At 500VDC between all terminals and case)
	Dielectric strength	750VAC 50/60Hz for 1 minute(Between all terminals and case)
	Connection	Cable outgoing type(Cable gland)
Mechanical specification	Starting torque	Max. 40gf · cm(0.004N · m)
	Moment of inertia	Max. 40g · cm ² (4×10 ⁻⁶ kg · m ²)
	Shaft loading	Radial : 10kgf, Thrust : 2.5kgf
	Max. revolution	(★6) 3000rpm
Vibration	1.5mm amplitude at frequency of 10 to 55Hz (for one minute cycle) in each of X, Y, Z direction for 2 hours	
Shock	Max. 50G	
Ambient temperature	-10 to 70℃(At non-freezing status), Storage: -25 to 85℃	
Ambient humidity	35 ~ 85%RH	
Protection	IP64	
Cable	ø 6mm 10P, Length:2m, Shield cable	ø 6mm 17P, LengthX2:2m, Shield cable
Accessories	Mounting bracket, coupling	
Approval	CE	
Unit weight	Approx. 322g	Approx. 475g

※ (★6) In case of Parallel type model, select the resolution to make max. Response revolution is lower than max. Allowable revolution.

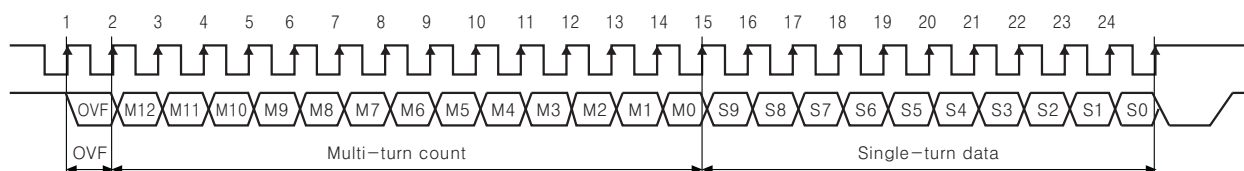
$$\text{【Max. Response Revolution (rpm) = } \frac{\text{Max. Allowable Revolution}}{\text{Resolution}} \times 60 \text{ sec】}$$

Synchronous serial interface(SSl) Output Timing diagram



Clock Frequency f	100kHz ~ 1MHz
T	T : 1 ~ 10μs
Time lag t2	0.5μs < t1 < 5μs
Monoflop Time t3	t2 < 0.3μs
	15μs < t3 < 30μs

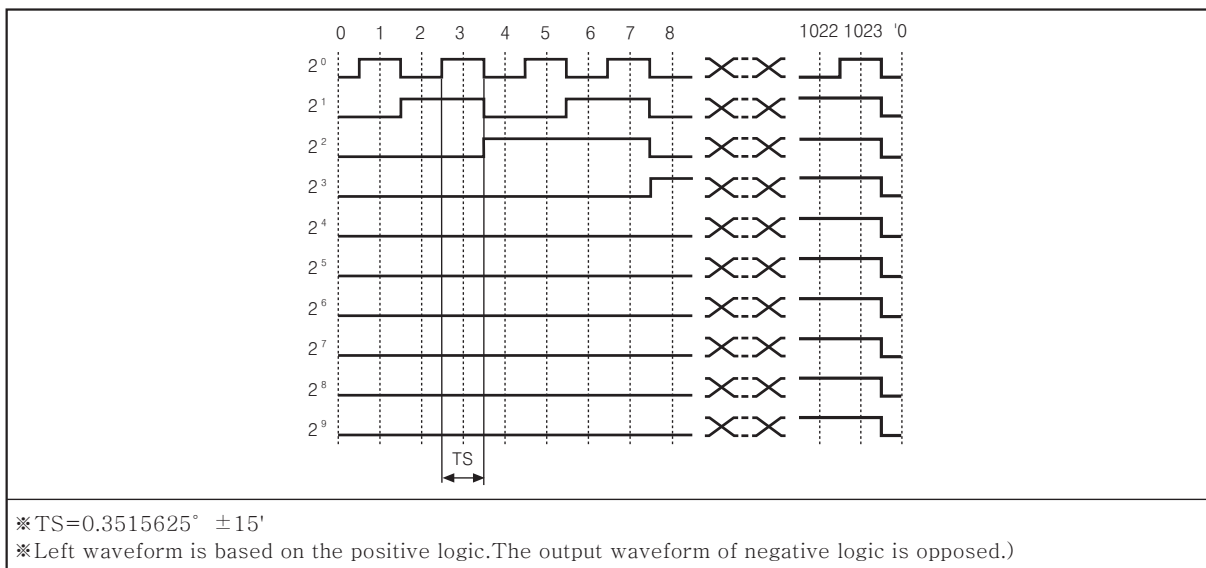
Synchronous serial interface(SSl) Data Output



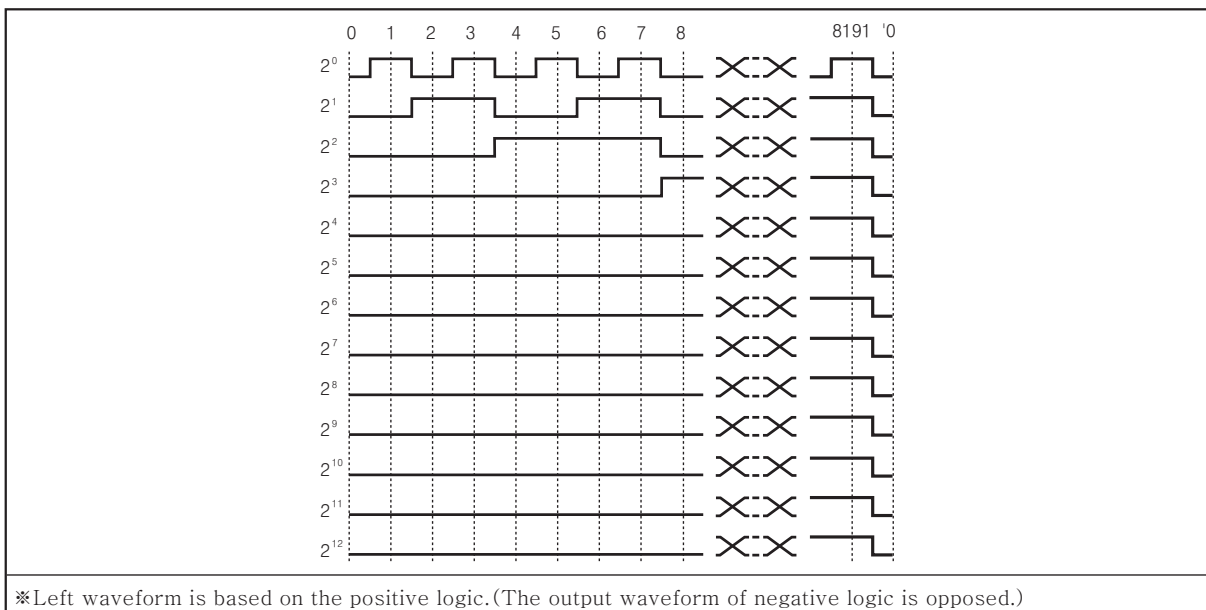
Clock input bit	Data output name	Data output bit	Clock input bit	Data output name	Data output bit
1	Over flow error bit	0 bit	15	Single-turn data	9 bit(MSB)
2	Multi-turn count	12 bit(MSB)	16		8 bit
3		11 bit	17		7 bit
4		10 bit	18		6 bit
5		9 bit	19		5 bit
6		8 bit	20		4 bit
7		7 bit	21		3 bit
8		6 bit	22		2 bit
9		5 bit	23		1 bit
10		4 bit	24		0 bit(LSB)
11		3 bit			
12		2 bit			
13		1 bit			
14		0 bit(LSB)			

ϕ 50mm Shaft Multi-turn Absolute Type

■ Parallel Interface 1024 division single-turn data output waveform (Binary code)

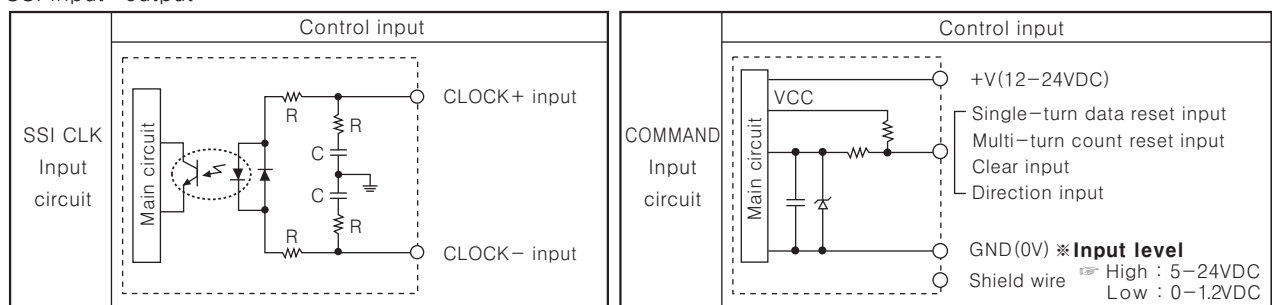


■ Parallel Interface 8192 revolution multi-turn count data output waveform (Binary code)



■ Control output I/O circuit

● SSI input • output



(A)
Counter

(B)
Timer

(C)
Temp.
controller

(D)
Power
controller

(E)
Panel
meter

(F)
Tacho/
Speed/
Pulse
meter

(G)
Display
unit

(H)
Sensor
controller

(I)
Switching
power
supply

(J)
Proximity
sensor

(K)
Photo
electric
sensor

(L)
Pressure
sensor

(M)
Rotary
encoder

(N)
Stepping
motor &
Driver &
Controller

(O)
Graphic
panel

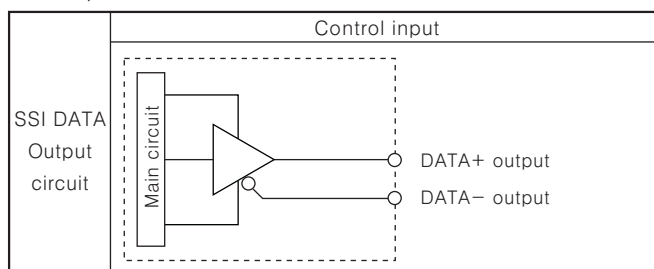
(P)
Field
network
device

(Q)
Production
stoppage
models &
replacement

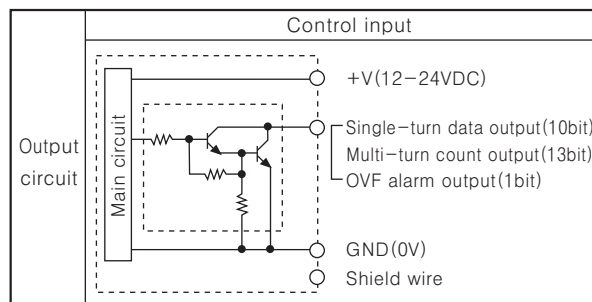
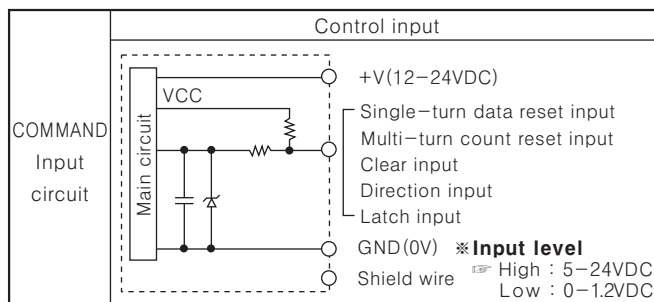
EPM50 SERIES

■ Control output I/O circuit

● SSI output



● Parallel input • output



*Output of each bit is the same circuit.

*Overload or short may cause circuit break.

■ Connections

● SSI output

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

● Parallel output

Multi-turn count cable(Sheath color : Black)			Single-turn data cable(Sheath color : Gray)		
Cable color	Description		Cable color	Description	
Brown	Multi-turn count	2 ⁰	Brown	Single-turn data	2 ⁰
Red		2 ¹	Red		2 ¹
Orange		2 ²	Orange		2 ²
Yellow		2 ³	Yellow		2 ³
Green		2 ⁴	Green		2 ⁴
Blue		2 ⁵	Blue		2 ⁵
Purple		2 ⁶	Purple		2 ⁶
Gray		2 ⁷	Gray		2 ⁷
Pink		2 ⁸	Pink		2 ⁸
Clear		2 ⁹	Clear		2 ⁹
Light brown		2 ¹⁰	Light brown	NC	
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 reset		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 properly.

*Encoder's metal case and shield cable must be grounded (F.G).

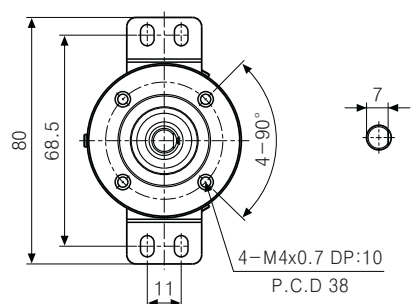
*Do the wiring with care for short since dedicated Driver IC is used for I/O circuit.

*As for Parallel output, it is recommended to connect +V and GND of both multi-turn count cable and single-turn data cable.

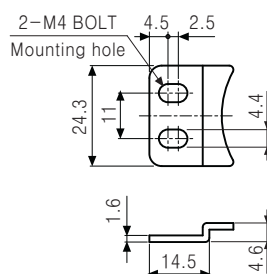
Ø 50mm Shaft Multi-turn Absolute Type

▣ Dimensions

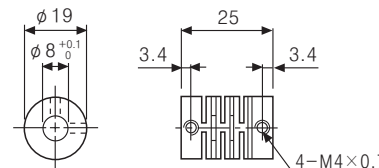
(Unit:mm)



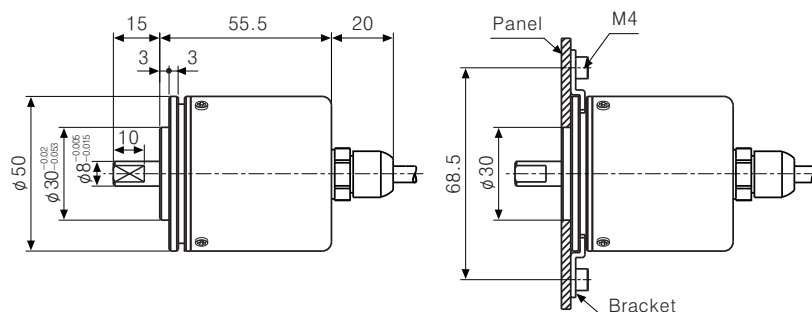
- Bracket



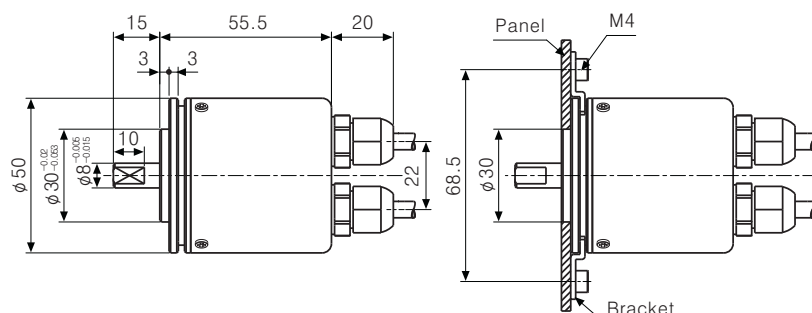
- Coupling(EPM50)



- SSI output



- Parallel output



■ Functions

©Single-turn data reset

Single-turn data will be initialized as '0' when GND (low level) is input over 100ms on single-turn data reset line. In case of not using single-turn data reset line, connect the line to OPEN or +V (High level).

©Multi-turn count reset

Multi-turn data will be initialized as 「revolution 0」 when GND(Low level) is input over 100ms on multi-count reset line. In case of not using multi-turn count reset line, connect the line to OPEN or + V (High level). OVf alarm will be initialized with multi-turn count reset input.

©Clear

Single-turn data will be initialized as 「0」 and multi-count will be also initialized as 「revolution 0」 when GND (Low level) is input over 100ms on Clear line. In case of not using clear line, connect the line to OPEN or + V (High level). OVf alarm will be initialized with clear input.

© **Direction**

Connect Direction line to OPEN or +V (High level) and turn on the power. Output will increase when rotation direction is CW from shaft axis. In case of connecting to GND (Low level), 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.

©Latch(Parallel output model only)

When connecting latch line to GND(Low level) over $500\mu s$, outputs for single-turn data, multi-turn count and OVF at latch point will be remained. When latch line is connected to OPEN or +V (High level), output will be returned to operating mode output.

©OVF

It is an alarm function providing output when multi-turn count is out of rotation ranges(0~8191 revolutions). OVF will be initialized through direction setting change, multi-turn count reset or clear input.

(A)	Counter
(B)	Timer
(C)	Temp. controller
(D)	Power controller
(E)	Panel meter
(F)	Tacho/ Speed/ Pulse meter
(G)	Display unit
(H)	Sensor controller
(I)	Switching power supply
(J)	Proximity sensor
(K)	Photo electric sensor
(L)	Pressure sensor
(M)	Rotary encoder
(N)	Stepping motor & Driver & Controller
(O)	Graphic panel
(P)	Field network device
(Q)	Production stoppage models & replacement