

MGAM50S Series Ø50mm Shaft Magnetic Multi-Turn Absolute Type

Diameter Ø50mm Shaft Type Magnetic Multi-Turn Absolute Rotary Encoder

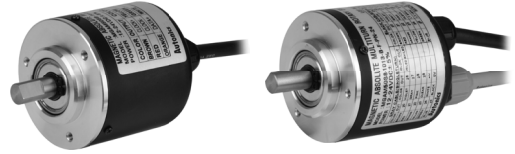
■ Features

- Higher resistant to vibration and impact by magnetic elements than optical encoder
- Total 23bit resolution (8388608-division) of 10bit single-turn (1024-division) and 13bit multi-turn (8192-division)
- Compact size of diameter Ø50mm
- Parallel data / SSI data transmission type
- Power supply : 12-24VDC ±5%
- Protection structure IP50(IEC standard)

■ Applications

- Precision machine tool, Fabric machinery, Robot, Parking system

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



NEW

■ Ordering Information

MGAM50S	8	-	10	-	13	-	B	-	F	-	PN	-	24
Series	Shaft diameter	Single-turn	Multi-turn	Output code	Rotation direction	Control output	Power supply						
Diameter Ø50mm Shaft type	Ø8mm	10bit (1024 division)	13bit (8192 revolution)	Binary Code	F: Output increases by CW rotation direction at the shaft R: Output increases by CCW rotation direction at the shaft	PN: Parallel NPN open collector output S: SSI Line Driver output	12-24VDC±5%						

■ Specifications

Type		Diameter Ø50mm shaft type magnetic multi-turn absolute rotary encoder		
Model		MGAM50S8-1013-B-F-S-24	MGAM50S8-1013-B-F-PN-24	
Resolution	Single-turn	1024-division (10-bit)		
	Multi-turn	8192 revolution (13-bit)		
Rotation limit when power off *1		±90°		
Electrical specification	Output	Hysteresis	±0.1°	
		Positioning error*2	±1-bit (LSB: Least Significant -bit)	
		Output code	24-bit, Binary 2 code	
		Control output	SSI (Synchronous Serial Interface) Line driver output -Low: Sink current - Max. 20mA, Residual voltage - Max. 0.5VDC -High: Sink current - Max. -20mA, Output voltage - Min. 2.5VDC	
		Control output	Parallel NPN open collector output Sink current : Max. 20mA, Residual voltage : Max. 1VDC	
		Output signal	Single-turn data, Multi-turn count, over flow alarm (OVF)*3	
	Output logic	—	Negative logic output	
	Response time (rise/fall)	—	Max. 1µs (cable: 2m, I sink = 20mA)	
	Input	Input signal	Multi-turn count reset*4	
		Input level	Low: 0-1VDC	
Input logic		Low Active, OPEN for common use		
Input time		Over 100ms		
SSI Clock input frequency		100kHz to 1MHz	—	
Max. response frequency		—	30kHz	
Power supply		12-24VDC ±5% (ripple P-P: Max. 5%)		
Current consumption		Max. 150mA (disconnection of the load)	Max. 100mA (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 type (cable gland)		
Mechanical specification	Starting torque	Max. 70gf·cm (0.007N·m)		
	Moment of inertia	Max. 80g·cm ² (8×10 ⁻⁶ kg·m ²)		
	Shaft loading	Radial: 10kgf, Thrust: 2.5kgf		
	Max. revolution*5	3000rpm		

(A) Photoelectric Sensors

(B) Fiber Optic Sensors

(C) Door/Area Sensors

(D) Proximity Sensors

(E) Pressure Sensors

(F) Rotary Encoders

(G) Connectors/ Connector Cables/ Sensor Distribution Boxes/Sockets

(H) Temperature Controllers

(I) SSRs / Power Controllers

(J) Counters

(K) Timers

(L) Panel Meters

(M) Tacho / Speed / Pulse Meters

(N) Display Units

(O) Sensor Controllers

(P) Switching Mode Power Supplies

(Q) Stepper Motors & Drivers & Controllers

(R) Graphic/ Logic Panels

(S) Field Network Devices

(T) Software

MGAM50S Series

Specifications

Type	Diameter Ø50mm shaft type magnetic multi-turn absolute rotary encoder	
Model	MGAM50S8-1013-B-F-S-24	MGAM50S8-1013-B-F-PN-24
Vibration	1.5mm amplitude at frequency of 10 to 55Hz (for 1 min.) in each X, Y, Z direction for 2 hours	
Shock	Approx. Max. 50G	
Environment	Ambient temperature	-10 to 70°C, storage: -25 to 85°C
	Ambient humidity	35 to 85%RH, storage: 35 to 90%RH
Protection	IP50 (IEC standard)	
Cable	Ø6mm 10-wire, Length: 2m, Shield cable (AWG 28, Core diameter: 0.08mm, Number of cores: 19, Insulator diameter: Ø0.8mm)	Ø6mm 17-wireX2, Length: 2m, Shield cable (AWG 28, Core diameter: 0.08mm, Number of cores: 17, Insulator diameter: Ø0.8mm)
	Accessories	
Approval	CE	
Weight*6	Approx. 391g (approx. 261g)	Approx. 523g (approx. 393g)

※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 overrated revolution occurred since proper multi-turn counts may not be available if any revolutions occurred over ±90° from the position when power is off.

※2: When turning ON/OFF the unit, there may be ±1-bit (LSB) error at present position by hysteresis.

※3: OVF alarm is ON when multi-turn count is out of counting range (0 to 8191 revolution).

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

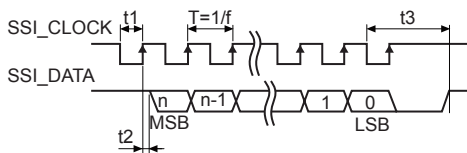
※5: In case of Parallel type model, Make sure that Max. response revolution should be lower than or equal to max. allowable revolution when selecting the resolution.

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

※6: The weight includes packaging. The weight in parentheses is for unit only.

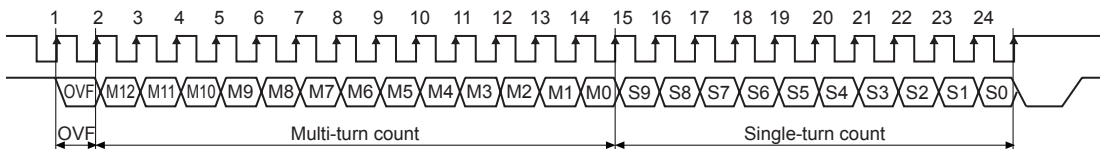
※Environment resistance is rated at no freezing or condensation.

Synchronous Serial Interface (SSI) Output Timing Diagram



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

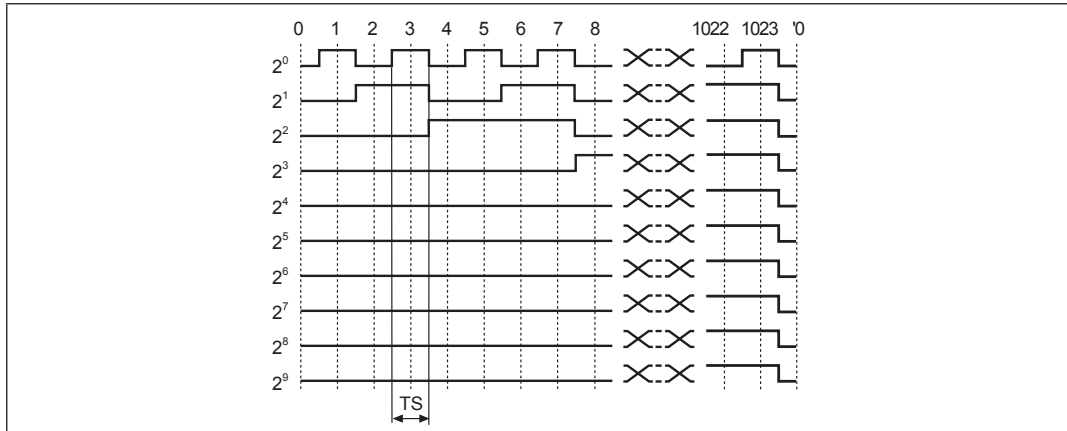
Synchronous Serial Interface (SSI) Data Output



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)			

Ø50mm Shaft Magnetic Multi-Turn Absolute Type

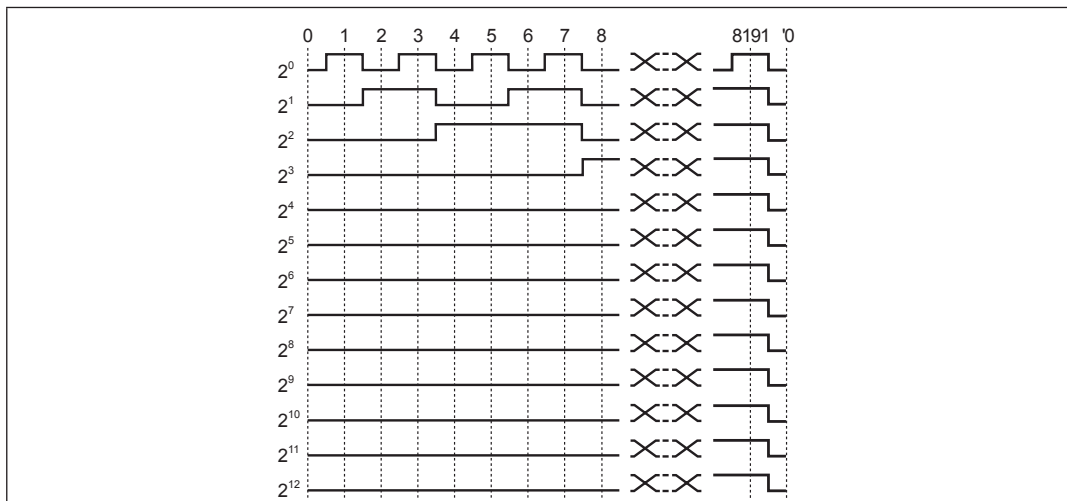
■ Parallel Interface 1024-Division Single-Turn Data Output Waveform (Binary Code)



※TS=0.3515625°±15'

※Above waveform is based on the positive logic. (The output waveform of negative logic is opposite.)

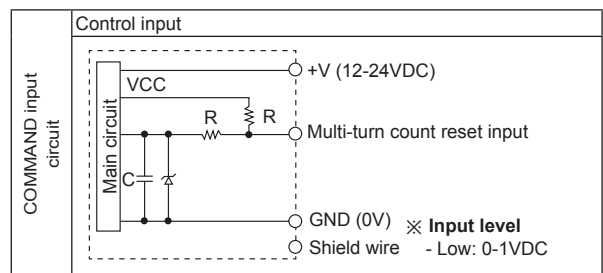
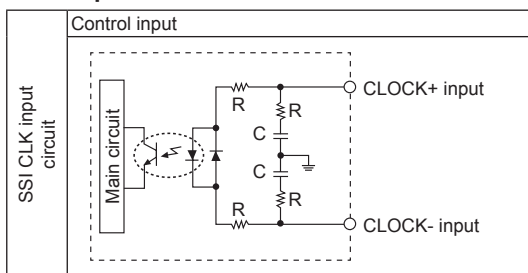
■ Parallel Interface 8192-Revolution Multi-Turn Count Data Output Waveform (Binary Code)



※Above waveform is based on the positive logic. (The output waveform of negative logic is opposite.)

■ Control Output I/O Circuit

● SSI input



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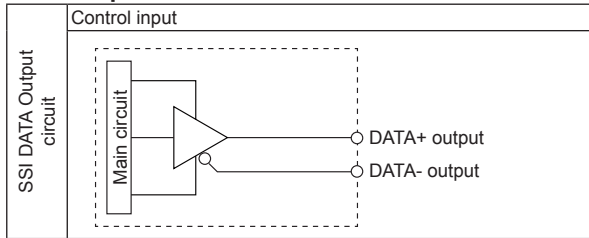
(S) Field Network Devices

(T) Software

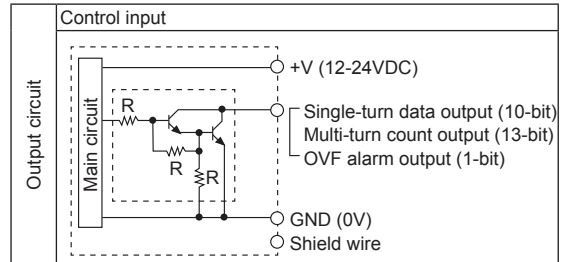
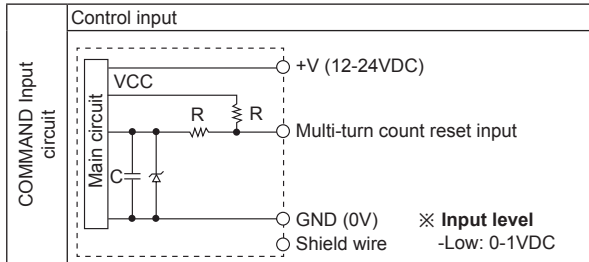
MGAM50S Series

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	SSI	CLOCK+	Green	COMMAND	Multi-turn count reset
Red		CLOCK-	Blue		N.C.
Orange		DATA+	Purple		N.C.
Yellow		DATA-	Gray		N.C.
White	+V (12-24VDC)				
Black	GND (0V)				
Shield wire	Signal shield cable (F.G.)				

• Parallel output

Multi-turn count cable (Sheath color: Black)		
Cable color	Description	
Brown	Multi-turn count	2 ⁰
Red		2 ¹
Orange		2 ²
Yellow		2 ³
Green		2 ⁴
Blue		2 ⁵
Purple		2 ⁶
Gray		2 ⁷
Pink		2 ⁸
Clear		2 ⁹
Light brown		2 ¹⁰
Light yellow		2 ¹¹
Light green	2 ¹²	
Light blue	OVF	
Light purple	Multi-turn count reset	
White	N.C.	
Black	N.C.	
Shield wire	Signal shield cable (F.G.)	

Single-turn data cable (Sheath color: Gray)		
Cable color	Description	
Brown	Single-turn data	2 ⁰
Red		2 ¹
Orange		2 ²
Yellow		2 ³
Green		2 ⁴
Blue		2 ⁵
Purple		2 ⁶
Gray		2 ⁷
Pink		2 ⁸
Clear	2 ⁹	
Light brown	N.C.	
Light yellow	N.C.	
Light green	N.C.	
Light blue	N.C.	
Light purple	N.C.	
White	+V (12-24VDC)	
Black	GND (0V)	
Shield wire	Signal shield cable (F.G.)	

※Not used cables should be insulated.

※Do the wiring properly.

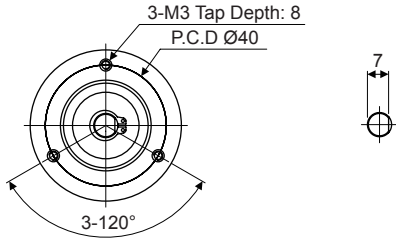
※Encoder's metal case and shield cable must be grounded (F.G.).

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

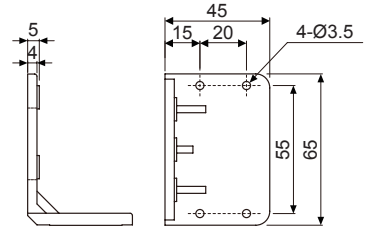
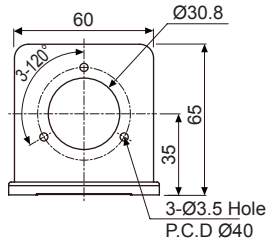
Ø50mm Shaft Magnetic Multi-Turn Absolute Type

■ Dimensions

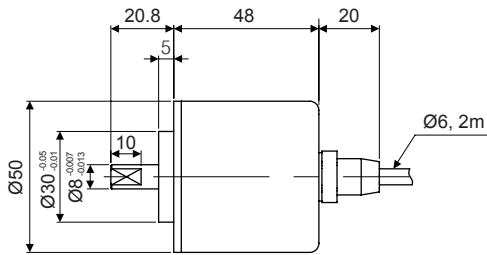
(unit: mm)



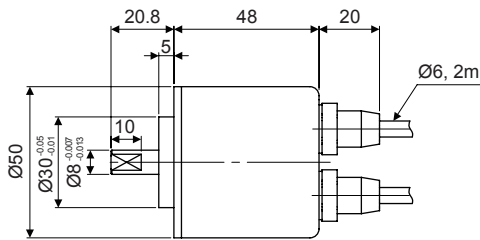
● Bracket



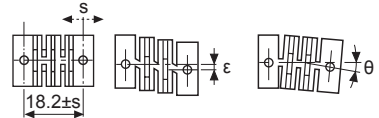
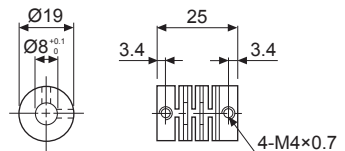
● SSI output



● Parallel output



● Coupling (EPM50)



- Parallel misalignment(θ): Max. 0.25mm
- Angular misalignment(s): Max. 5°
- End-play: Max. 0.5mm

※For parallel misalignment, angular misalignment, end-play terms, refer to the F-71.
 ※For flexible coupling (ERB Series) information, refer to the F-64.

■ Functions

◎ Multi-turn count reset

Multi-turn data will be reset as 「revolution 0」 when multi-turn count reset cable (light purple) is inputted 0 to 1V (over 100ms).

◎ Overflow alarm (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 (light purple) is inputted.

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