Autonics

Diameter Ø50mm Shaft type Magnetic Absolute Rotary Encoder
MGA50S SERIES

INSTRUCTION MANUAL

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.

※Safety considerations are categorized as follows.
⚠**Warning** 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.

⚠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

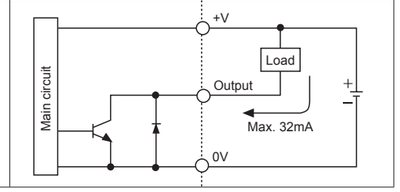
1. Do not drop water or oil on this unit.
Failure to follow this instruction may result in product damage, or mis-control due to malfunction.
2. Use the unit within the rated specifications.
Failure to follow this instruction may result in shortening the life cycle of the unit, or product damage by burning.
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

MGA50S **8** – **1024** – **1** **R** – **N** – **5**

Series	Shaft diameter	Pulse/ 1 revolution	Output code	Revolution direction	Control output	Power supply
Diameter Ø50mm shaft type	Ø8mm	Refer to resolution	1: BCD code 2: Binary code 3: Gray code	F: Output value increases at CW direction R: Output value increases at CCW direction	N: NPN open collector output	5: 5VDC ±5% 24: 12-24VDC ±5%

▣ Control Output Circuit

Output type	NPN open collector output	
Type	Rotary encoder	Load connection
Output circuit		

※The output of each bit is same circuit.
※Be sure that when applying excessive load or being short, the circuit may be damaged.

※**The above specifications are subject to change and some models may be discontinued without notice.**

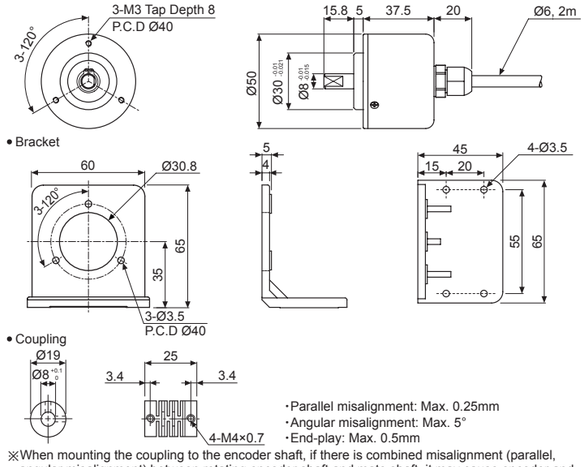
▣ Specifications

Type			Diameter Ø50mm shaft type magnetic absolute rotary encoder		
Model			**MGA50S8-□-□□-N-□**		
Resolution※1			32, 40, 45, 48, 64, 90, 128, 180, 256, 360, 512, 720, 1024-division		
Electrical specification	Output	Hysteresis	±0.1°		
		Positioning error※2	±1bit (LSB: Least Significant Bit)		
		Output code		BCD code	Binary code	Gray code
		Output phase/ Output angle※3	1024-division	TS: 0.3515°±15' (13-bit)	TS: 0.3515°±15' (10-bit)	TS: 0.703°±15' (10-bit)
			720-division	TS: 0.5°±25' (11-bit)	TS: 0.5°±25' (10-bit)	TS: 1°±25' (10-bit)
			512-division	TS: 0.703°±25' (11-bit)	TS: 0.703°±25' (9-bit)	TS: 1.406°±25' (9-bit)
			360-division	TS: 1°±25' (10-bit)	TS: 1°±25' (9-bit)	TS: 2°±25' (9-bit)
			256-division	TS: 1.406°±25' (10-bit)	TS: 1.406°±25' (8-bit)	TS: 2.8125°±25' (8-bit)
			180-division	TS: 2°±25' (9-bit)	TS: 2°±25' (8-bit)	TS: 4°±25' (8-bit)
			128-division	TS: 2.8125°±25' (9-bit)	TS: 2.8125°±25' (7-bit)	TS: 5.625°±25' (7-bit)
			90-division	TS: 4°±25' (8-bit)	TS: 4°±25' (7-bit)	TS: 8°±25' (7-bit)
			64-division	TP1: 4.5°±60' (1-bit) TP2: 1.125°±60' (1-bit) TS: 5.625°±60' (7-bit) EP: 5.625°±60' (1-bit)	TP1: 4.5°±60' (1-bit) TP2: 1.125°±60' (1-bit) TS: 5.625°±60' (6-bit) EP: 5.625°±60' (1-bit)	TP1: 4.5°±60' (1-bit) TP2: 1.125°±60' (1-bit) TS: 11.25°±60' (6-bit) EP: 5.625°±60' (1-bit)
			48-division	TP1: 6°±60' (1-bit) TP2: 1.5°±60' (1-bit) TS: 7.5°±60' (7-bit) EP: 7.5°±60' (1-bit)	TP1: 6°±60' (1-bit) TP2: 1.5°±60' (1-bit) TS: 7.5°±60' (6-bit) EP: 7.5°±60' (1-bit)	TP1: 6°±60' (1-bit) TP2: 15°±60' (1-bit) TS: 1.5°±60' (6-bit) EP: 7.5°±60' (1-bit)
			45-division	TP1: 6.4°±60' (1-bit) TP2: 1.6°±60' (1-bit) TS: 8°±60' (7-bit) EP: 8°±60' (1-bit)	TP1: 6.4°±60' (1-bit) TP2: 1.6°±60' (1-bit) TS: 8°±60' (6-bit) EP: 8°±60' (1-bit)	TP1: 6.4°±60' (1-bit) TP2: 1.6°±60' (1-bit) TS: 16°±60' (6-bit) EP: 8°±60' (1-bit)
			40-division	TP1: 7.2°±60' (1-bit) TP2: 1.8°±60' (1-bit) TS: 9°±60' (6-bit) EP: 9°±60' (1-bit)	TP1: 7.2°±60' (1-bit) TP2: 1.8°±60' (1-bit) TS: 9°±60' (6-bit) EP: 9°±60' (1-bit)	TP1: 7.2°±60' (1-bit) TP2: 1.8°±60' (1-bit) TS: 18°±60' (6-bit) EP: 9°±60' (1-bit)
			32-division	TP1: 9°±60' (1-bit) TP2: 2.25°±60' (1-bit) TS: 11.25°±60' (6-bit) EP: 11.25°±60' (1-bit)	TP1: 9°±60' (1-bit) TP2: 2.25°±60' (1-bit) TS: 11.25°±60' (5-bit) EP: 11.25°±60' (1-bit)	TP1: 9°±60' (1-bit) TP2: 2.25°±60' (1-bit) TS: 22.5°±60' (5-bit) EP: 11.25°±60' (1-bit)
		Output type	NPN open collector output			
		Output capacity	Load current max. 32mA, Residual voltage max. 1VDC			
		Output logic	Negative logic output			
		Response time (rise, fall)	Max. 1μs (cable length: 2m, I sink=32mA)			
	Max. response frequency		30kHz			
	Power supply		5VDC±5% (ripple P-P: max. 5%), 12-24VDC±5% (ripple P-P: max. 5%)			
	Current consumption		Max. 60mA (disconnection of load)			
	Insulation resistance		Over 100MΩ (at 500VDC megger between all terminals and case)			
	Dielectric strength		750VAC 50/60Hz for 1 min (between all terminals and case)			
	Connection		Axial cable type (cable gland)			
Mechanical specification	Starting torque		Max. 70gf·cm (0.007N·m)			
	Moment of inertia		Max. 80g·cm² (8×10⁻⁶kg·m²)			
	Shaft loading		Radial: 10kgf, Thrust: 2.5kgf			
	Max. allowable revolution※4		3,000rpm			
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. 75G			
Environment	Ambient temp.		-10 to 70℃, storage: -25 to 85℃			
	Ambient humid.		35 to 85%RH, storage: 35 to 90%RH			
Protection structure			IP50 (IEC standard)			
Cable			Ø6mm, 17-wire, 2m, Shield cable (AWG28, Core diameter: 0.08mm, Number of cores: 17, Insulator diameter: Ø0.8mm)			
Accessory			Bracket, Coupling			
Approval			CE			
Weight※5			Approx. 400g (Approx. 270g)			

※1: Not indicated resolutions are customizable.
※2: When turning ON/OFF the unit, there may be ±1-bit(LSB) error at present position by hysteresis.
※3: TP1, TP2 other output angles are available as option.
※4: Make sure that Max. response revolution should be lower than or equal to max. allowable revolution when selecting the resolution.
【Max. response revolution (rpm)= $\frac{\text{Max. response frequency}}{\text{Resolution}}$ × 60 sec】
※5: The weight includes packaging. The weight in parentheses is for unit only.
※Environment resistance is rated at no freezing or condensation.

▣ Dimensions

(unit: mm)

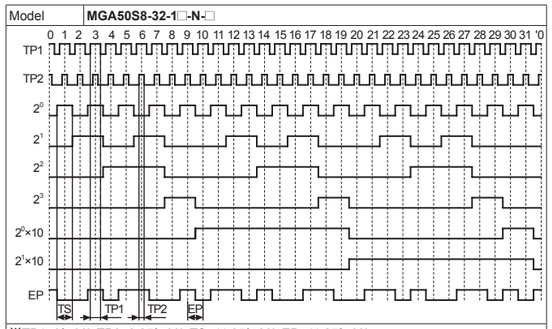


・Parallel misalignment: Max. 0.25mm
・Angular misalignment: Max. 5°
・End-play: Max. 0.5mm

※When mounting the coupling to the 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 shorten.
※Do not load overweight on the shaft.
※For more information about flexible coupling (ERB Series), please refer to the catalogue.

▣ 32-Division Output Waveform (BCD Code Output)

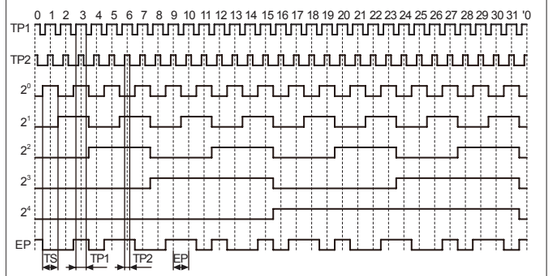
Model: **MGA50S8-32-1□-N-□**



※TP1=9°±60', TP2=2.25°±60', TS=11.25°±60', EP=11.25°±60'
※The above waveform is based on the positive logic.
(The output waveform of negative logic is opposed.)

▣ 32-Division Output Waveform (Binary Code Output)

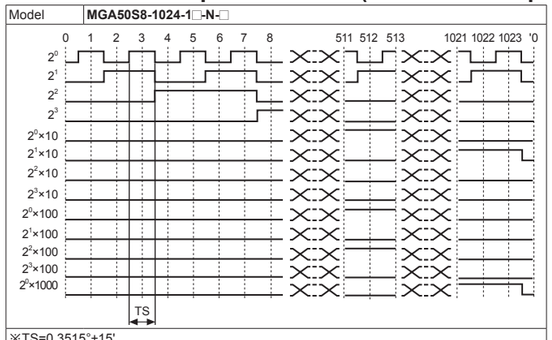
Model: **MGA50S8-32-2□-N-□**



※TP1=9°±60', TP2=2.25°±60', TS=11.25°±60', EP=11.25°±60'
※The above waveform is based on the positive logic.
(The output waveform of negative logic is opposed.)

▣ 1024-Division Output Waveform (BCD Code Output)

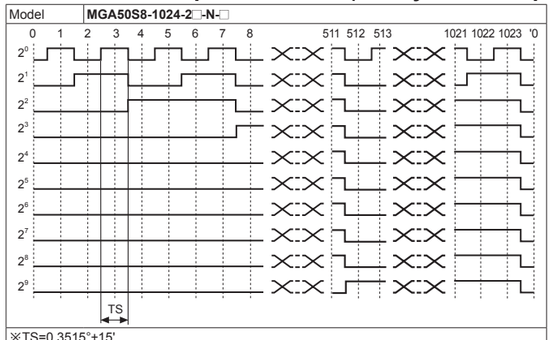
Model: **MGA50S8-1024-1□-N-□**



※TS=0.3515°±15'
※The above waveform is based on the positive logic.
(The output waveform of negative logic is opposed.)

▣ 1024-Division Output Waveform (Binary Code Output)

Model: **MGA50S8-1024-2□-N-□**



※TS=0.3515°±15'
※The above waveform is based on the positive logic.
(The output waveform of negative logic is opposed.)

▣ Connection

• BCD Code

Color	Resolution	32-division	40-division	45-division	48-division	64-division	90-division	128-division	180-division	256-division	360-division	512-division	720-division	1024-division
Power	White	+V												
	Black	0V												
Output cable	Brown	2^0												
	Red	2^1												
	Orange	2^2												
	Yellow	2^3												
	Green	2^0×10												
	Blue	2^1×10												
	Purple	N·C	2^2×10											
	Gray	TP1	2^3×10											
	Pink	TP2	N·C	2^0×100										
	Transparent	EP	N·C	2^1×100										
	Light Brown	N·C	2^2×100											
	Light Yellow	N·C	2^3×100											
	Light Green	N·C	2^0×1000											
	Light Blue	N·C												
	Light Purple	N·C												
	Shield cable	Signal shield cable (F.G.)												

• Binary Code/Gray Code

Color	Resolution	32-division	40-division	45-division	48-division	64-division	90-division	128-division	180-division	256-division	360-division	512-division	720-division	1024-division
Power	White	+V												
	Black	0V												
Output cable	Brown	2^0												
	Red	2^1												
	Orange	2^2												
	Yellow	2^3												
	Green	2^4												
	Blue	N·C	2^5											
	Purple	N·C	2^6											
	Gray	TP1	N·C	2^7										
	Pink	TP2	N·C	2^8										
	Transparent	EP	N·C	2^9										
	Light Brown	N·C												
	Light Yellow	N·C												
	Light Green	N·C												
	Light Blue	N·C												
	Light Purple	N·C												
	Shield cable	Signal shield cable (F.G.)												

※Non-using wires must be insulated.
※Encoder case and shield cable must be grounded.
※N·C (Not Connected) : Not using.
※Please make sure not to short when wiring output cables because the dedicated driver IC is used at output circuit.

▣ Cautions During Use

1. Installation
①Handle the unit with care since it consists of precision components.
②Be careful not to make eccentricity and deflection angle larger, it may shorten the life cycle.
③Do not put strong impact when inserting coupling into shaft.
2. For using
①Please connect shield wire to F.G. terminal.
②Do not connect and cut circuit during power on, or it may cause damage to the unit.
③When using 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.
①Place where this unit or component may be damaged by strong vibration or impact.
②Place where there are lots of flammable or corrosive gases.
③Place where strong magnet field or electric noise occurs.
④Place where is beyond of rating temperature or humidity.
⑤Place where strong acids or alkali near by.
4. Vibration and Impact
①When the strong impact loads on this unit, it may cause an error.
②Please use Bracket for more stable unit mounting.
③Please use the metallic coupling when the application needs severe acceleration or deceleration frequently.
5. Wire connection
①Do not draw the wire with over strength 30N after wiring.
②If 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
■ Fiber Optic Sensors
■ Door Sensors
■ Door Side Sensors
■ Area Sensors
■ Proximity Sensors
■ Pressure Sensors
■ Rotary Encoders
■ Connectors/Sockets
■ Switching Mode Power Supplies
■ Control Switches/Lamps/Buzzers
■ I/O Terminal Blocks & Cables
■ Stepper Motors/Drivers/Motion Controllers
■ Graphic/Logic Panels
■ Field Network Devices
■ Laser Marking System (Fiber, Co_2, Nd: YAG)
■ Laser Welding/Cutting System
■ Temperature Controllers
■ Temperature/Humidity Transducers
■ SSRs/Power Controllers
■ Counters
■ Timers
■ Panel Meters
■ Tachometer/Pulse (Rate)Meters
■ Display Units
■ Sensor Controllers

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