

Autonics

Diameter Ø50mm Shaft type Magnetic
Single-turn Absolute Rotary Encoder

MGA50S SERIES

INSTRUCTION MANUAL



Safety Considerations

※Please observe all safety considerations for safe and proper product operation to avoid hazards.

※⚠ symbol represents caution due to special circumstances in which hazards may occur.

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.

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, economic loss or fire.

2. **Do not use the unit in the place where flammable/explosive/corrosive gas, high humidity, direct sunlight, radiant heat, or salinity may be present.**
Failure to follow this instruction may result in explosion or fire.

3. **Install on a device panel to use.**
Failure to follow this instruction may result in fire.

4. **Do not connect, repair, or inspect the unit while connected to a power source.**
Failure to follow this instruction may result in fire.

5. **Check 'Connections' before wiring.**
Failure to follow this instruction may result in fire.

6. **Do not disassemble or modify the unit.**
Failure to follow this instruction may result in fire.

Caution

1. **Use the unit within the rated specifications.**
Failure to follow this instruction may result in fire or product damage.

2. **Do not short the load.**
Failure to follow this instruction may result in product damage by fire.

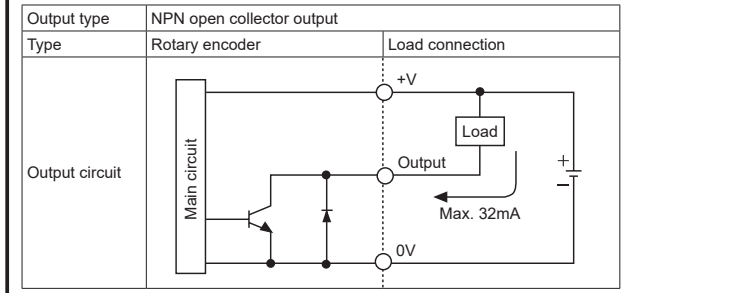
3. **Do not use the unit near the place where there is the equipment which generates strong magnetic force or high frequency noise and strong alkaline, strong acidic exists.**
Failure to follow this instruction may result in product damage.

MGA50S 8 1024 1 R N 5					
Series	Shaft diameter	Pulses/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.

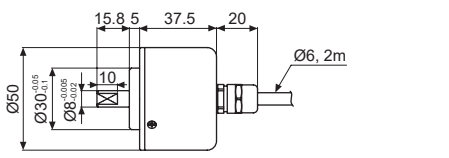
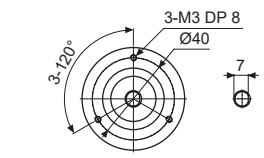
※The above specifications are subject to change and some models may be discontinued without notice.
※Be sure to follow cautions written in the instruction manual, and the technical descriptions (catalog, website).

Specifications

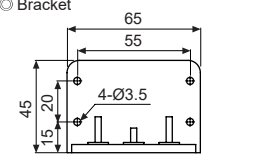
Type	Diameter Ø50mm shaft type magnetic single-turn absolute rotary encoder		
Model	MGA50S8-□□□-N-□		
Resolution ^{*1}	32, 40, 45, 48, 64, 90, 128, 180, 256, 360, 512, 720, 1024-division		
Electrical specification	Hysteresis	±0.1°	
	Positioning error ^{*2}	±1bit (LSB: Least Significant Bit)	
	Output code	BCD code	Binary code Gray code
	1024-division	TS: 0.3515°±15' (13-bit)	TS: 0.3515°±15' (10-bit) TS: 0.703°±15' (10-bit)
		TS: 0.5°±25' (11-bit)	TS: 0.5°±25' (10-bit)
		TS: 0.703°±25' (11-bit)	TS: 1.406°±25' (9-bit)
		TS: 1°±25' (10-bit)	TS: 2°±25' (9-bit)
		TS: 1.406°±25' (10-bit)	TS: 2.8125°±25' (8-bit)
		TS: 2°±25' (9-bit)	TS: 4°±25' (8-bit)
	128-division	TS: 2.8125°±25' (9-bit)	TS: 5.625°±25' (7-bit)
		TS: 4°±25' (8-bit)	TS: 8°±25' (7-bit)
		TS: 4.5°±60' (1-bit)	TS: 4.5°±60' (1-bit)
	64-division	TS: 1.125°±60' (1-bit)	TS: 1.125°±60' (1-bit)
		TS: 5.625°±60' (7-bit)	TS: 11.25°±60' (6-bit)
		EP: 5.625°±60' (1-bit)	EP: 5.625°±60' (1-bit)
	48-division	TP1: 6°±60' (1-bit)	TP1: 6°±60' (1-bit)
		TP2: 1.5°±60' (1-bit)	TP2: 15°±60' (1-bit)
		TS: 7.5°±60' (7-bit)	TS: 1.5°±60' (6-bit)
Mechanical specification	45-division	TP1: 6.4°±60' (1-bit)	TP1: 6.4°±60' (1-bit)
		TP2: 1.6°±60' (1-bit)	TP2: 1.6°±60' (1-bit)
		TS: 8°±60' (7-bit)	TS: 16°±60' (6-bit)
	40-division	TP1: 7.2°±60' (1-bit)	TP1: 7.2°±60' (1-bit)
		TP2: 1.8°±60' (1-bit)	TP2: 1.8°±60' (1-bit)
		TS: 9°±60' (6-bit)	TS: 18°±60' (6-bit)
	32-division	TP1: 9°±60' (1-bit)	TP1: 9°±60' (1-bit)
		TP2: 2.25°±60' (1-bit)	TP2: 2.25°±60' (1-bit)
		TS: 11.25°±60' (5-bit)	TS: 22.5°±60' (5-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)	
	Starting torque	Max. 70gf·cm (0.007N·m)	
	Moment of inertia	Max. 80g·cm ² (8×10 ⁻³ kg·m ²)	
	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	
	Environ-ment	Ambient temp.	-10 to 70°C, storage: -25 to 85°C
		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 ±1bit (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)= $\frac{\text{Max. response frequency}}{\text{Resolution}} \times 60 \text{ sec}$ 】
※5: The weight includes packaging. The weight in parenthesis is for unit only.
※Environment resistance is rated at no freezing or condensation.

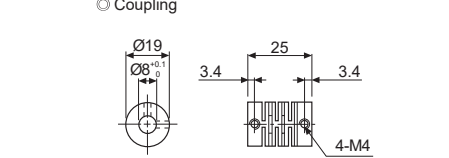
Dimensions



○ Bracket



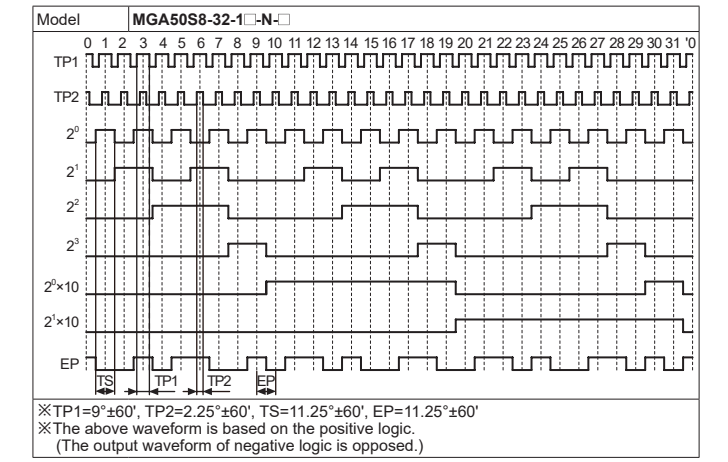
○ Coupling



• Parallel misalignment: max. 0.25mm
• Angular misalignment: max. 5°
• End-play: max. 0.5mm

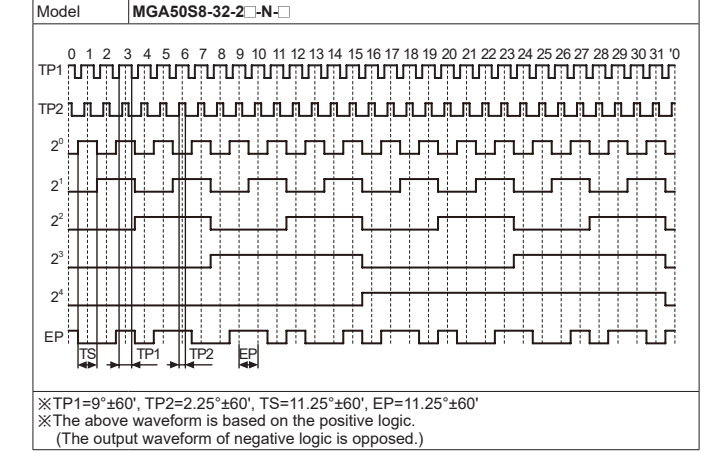
※Do not load overweight on the shaft.
※For more information about flexible coupling (ERB Series), please refer to the catalogue.
※Do not put strong impact when insert a coupling into shaft.
Failure to follow this instruction may result in product damage.
※Fix the unit or a coupling by a wrench under 0.15 N·m of torque.
※When you install this unit, if eccentricity and deflection angle are larger, it may shorten the life cycle of this unit.

32-Division Output Waveform (BCD Code Output)



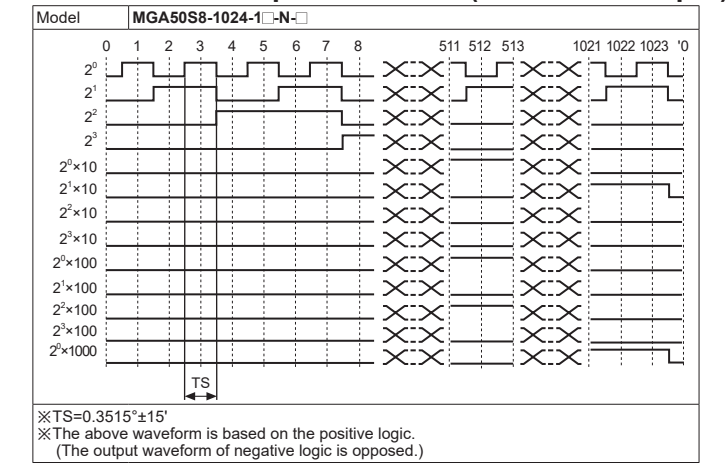
※TP1=9°±60', TP2=2.25°±60', TS=11.25°±60', EP=11.25°±60'
※The above waveform is based on the positive logic.
(The output waveform of negative logic is opposed.)

32-Division Output Waveform (Binary Code Output)



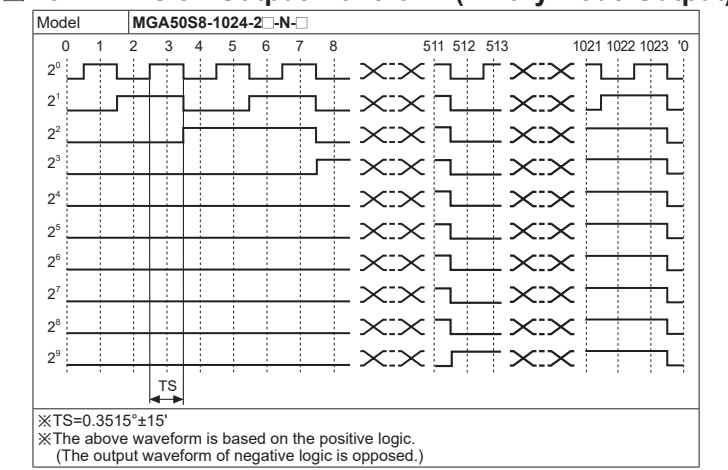
※TP1=9°±60', TP2=2.25°±60', TS=11.25°±60', EP=11.25°±60'
※The above waveform is based on the positive logic.
(The output waveform of negative logic is opposed.)

1024-Division Output Waveform (BCD Code Output)



※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)



※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 ^x 10
	Blue													2 ^x 100
Output cable	Purple	N-C												2 ² ×10
	Gray		TP1											2 ³ ×10
	Pink		TP2											2 ⁶ ×100
	Transparent		EP											2 ¹ ×100
	Light Brown													2 ² ×100
	Light Yellow													2 ³ ×100
	Light Green													2 ⁶ ×1000
	Light Blue													N-C
	Light Purple													N-C
	Shield cable													Signal shield cable (F.G.)
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
Output cable	Blue	N-C												2 ⁵
	Purple		N-C											2 ⁶
	Gray		TP1											2 ⁷
	Pink		TP2											2 ⁸
	Transparent		EP											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.)

Cautions during Use

1. Follow instructions in 'Cautions during Use'. Otherwise, It may cause unexpected accidents.

2. 5VDC, 12-24VDC power supply should be insulated and limited voltage/current or Class 2, SELV power supply device.

3. For using the unit with the equipment which generates noise (switching regulator, inverter, servo motor, etc.), ground the shield wire to the F.G. terminal.

4. Ground the shield wire to the F.G. terminal.

5. When using switching mode power supply, frame ground (F.G.) terminal of power supply should be grounded.

6. Wire as short as possible and keep away from high voltage lines or power lines, to prevent inductive noise.

7. Check the wire type and response frequency when extending wire because of distortion of waveform or residual voltage increment etc by line resistance or capacity between lines.

8. This unit may be used in the following environments.

①Indoors (in the environment condition rated in 'Specifications')
②Altitude max. 2,000m
③Pollution degree 2
④Installation category II

Major Products

■ Photoelectric Sensors
■ Fiber Optic Sensors
■ Door Sensors
■ Door Side Sensors
■ Area Sensors
■ Proximity Sensors
■ Pressure Sensors
■ Rotary Encoders
■ Connector/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, CO₂, 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

Autonics Corporation

http://www.autonics.com

■ HEADQUARTERS:
18, Bansong-ro 513 beam-gil, Haendae-gu, Busan, South Korea, 48002
TEL: 82-51-519-3232
■ E-mail: sales@autonics.com

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