

GURLEY SERIES M122 MAGNETIC ROTARY ENCODERS

MOTION TYPE:

ROTARY

USAGE GRADE:

LIGHT INDUSTRIAL

OUTPUT:

THREE CHOICES

MAX RESOLUTION:

8192 COUNTS

OR

13 BITS



SMALL PACKAGE - BIG PERFORMANCE

The series **M122** magnetic rotary encoders are designed for light industrial applications that require up to thirteen bits of resolution (8192 words or counts/turn) in a very small package. The three models share these features:

- Shafted & non-contact, frictionless; bi-directional
- Maximum rotating speed: 30,000 RPM for blind shaft; 20,000 RPM for shaft
- Protection: IP53 to IP64 standard (IP 68 optional)
- Shock: 1000 m/s²; 6 ms, ½ sine
- Vibration: 100 m/s²; 55 to 2,000 Hz
- 22-mm body

Models Available:

M122-S	Synchro-serial interface (SSI) to 13 bits
M122-I	Incremental 8192 counts/rev (after quadrature decode)
M122-A	Analog (one SIN and COS wave over 360°)

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ISO
9001
CERTIFIED

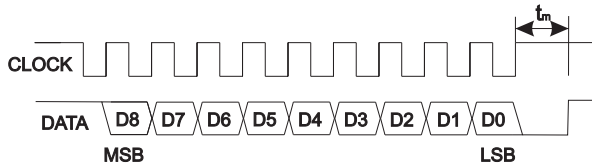
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SPECIFICATIONS

M122 S Binary Synchro-Serial Interface (SSI)

Timing diagram:

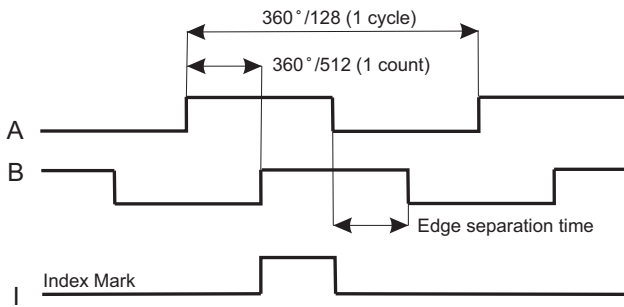


Clock $\leq 1\text{MHz}$
 $T_m = 20\mu\text{s}$ to $40\mu\text{s}$
 Output increases with CW rotation

Power Supply: $5\text{V} \pm 5\%$
 Power Consumption: 23 mA for 9-bit resolution
 35 mA for all other resolutions
 Resolution: max. 13 bits (8192 words/turn)
 Hysteresis: see table below
 Accuracy: see table below
 Repeatability: ≤ 0.07 degrees
 Output signals: Serial data (RS 422) - natural binary
 Data inputs: Clock (RS422)
 Max. Cable length: 100m (at 1 mHz)
 Connection: DE-9P
 Temp. Range: -25 C to 85 C ; (-40 C to $+85\text{ C}$ optional)
 Max. Weight: 83 g (with 1m cable and D-type connector)

M122 I Incremental Output

Output diagram:



B leads A for CW rotation

Power Supply: $5\text{V} \pm 5\%$
 Power Consumption: 23 mA for 9-bit resolution
 35 mA for all other resolutions
 Output TTL signals: A, B, I, /A, /B, /I, (RS 422)
 Resolution: 8192 counts/rev. (after quadrature decode)
 Accuracy: see table below
 Max. cable length: 50m
 Connection: DE-9P
 Temp. Range: -25 C to 85 C
 Max. Weight: 83 g (with 1 m cable and D-type connector)
 Edge separation time: 1 μsec minimum

Resolution options (Counts per rev)	Maximum Speed (RPM)		Accuracy (in degrees)		Hysteresis (in degrees)
	Blind Shaft	Shaft	Blind Shaft	Shaft	
320, 400, 500	30,000	20,000	± 0.7	± 0.5	± 0.7
512	30,000	20,000	± 0.7	± 0.5	± 0.7
800, 1000, 1024	20,000	20,000	± 0.5	± 0.3	± 0.7
1600, 2000, 2048	10,000	10,000	± 0.5	± 0.3	± 0.7
4096	5,000	5,000	± 0.5	± 0.3	± 0.7
8192	2,500	2,500	± 0.5	± 0.3	± 0.7

M122

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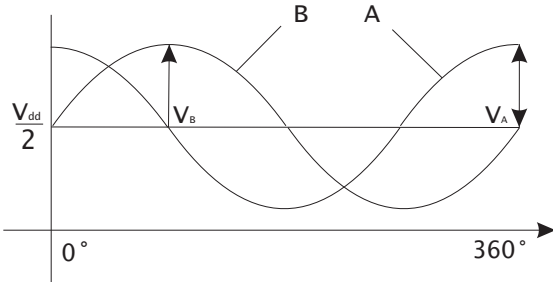
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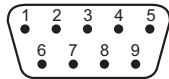
M122 A Analog Sinusoidal Outputs



Power Supply:	$V_{dd} = 5V \pm 5\% / 20 \text{ mA}$
Output, single ended	
Signal amplitude:	$2 V_{pp} \pm 0.1 \text{ V}$
Signal offset:	$V_{dd}/2 \pm 5 \text{ mV}$
Signal Characteristic:	
$ V_A - V_B \leq 5 \text{ mV}$	$V_A = \text{sine amplitude}$
$ V_{0A} - V_{0B} \leq 5 \text{ mV}$	$V_B = \text{cosine amplitude}$
$ \phi_A - \phi_B = 90^\circ \pm 1^\circ$	$V_{0A} = \text{sine offset}$
	$V_{0B} = \text{cosine offset}$
Max. Output frequency:	Blind shaft: 500Hz Shaft: 333Hz
Max. Cable length:	3 m
Connection:	DE-9P
Temp. Range:	-25 C to 125 C
Weight:	75 g (with 1 m cable & D type connector)

Pin Assignment / Wire Color

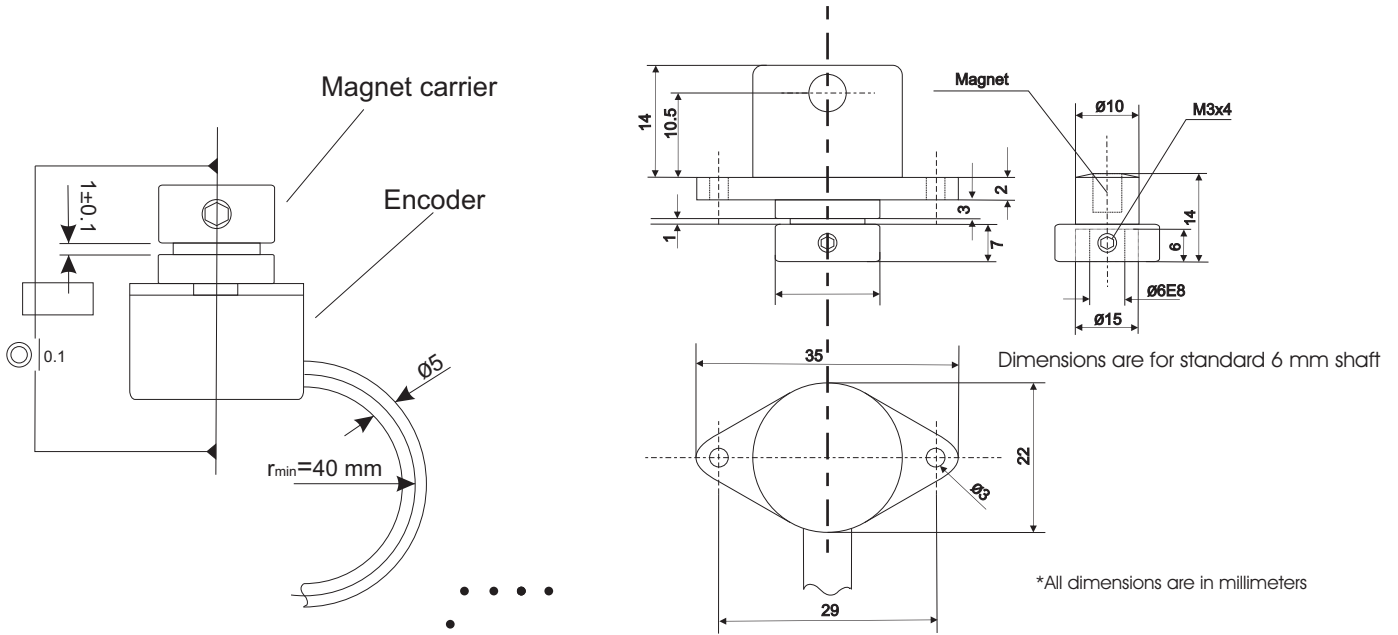
DA9P



M122 S/I/A

Nr. Pin	M122 S		M122 I		M122 A	
	Function	Wire Color	Function	Wire Color	Function	Wire Color
1	Shield		Shield		Shield	
2	Clock	White	I	White	V_A	Green
3	$\overline{\text{Clock}}$	Brown	B	Green	V_B	Brown
4	NC	-	A	Gray	NC	-
5	V_{dd}	Red	V_{dd}	Red	V_{dd}	Red
6	$\overline{\text{Data}}$	Green	$\overline{\text{I}}$	Brown	NC	-
7	$\overline{\text{Data}}$	Yellow	$\overline{\text{B}}$	Yellow	NC	-
8	NC	-	$\overline{\text{A}}$	Pink	NC	-
9	GND	Blue	GND	Blue	GND	Blue

M122B Mounting & Dimensions



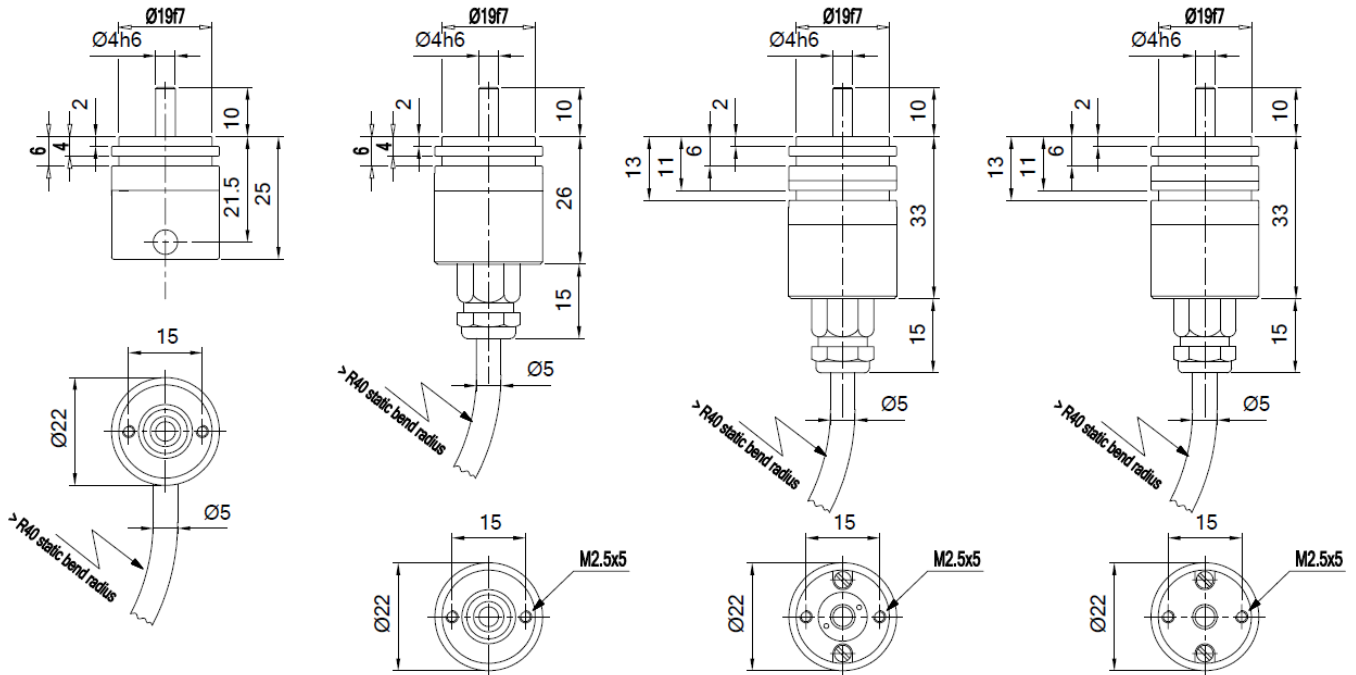
M122S Mounting & Dimensions

IP 53- radial cable exit

IP 53 - axial cable exit

IP 64 - axial cable exit

IP 68 - axial cable exit



ORDERING INFORMATION

MODEL	SHAFT	RES	IND	V	OUT	TEMP	BASE	CAB	EXIT	CONN	DIA	SF

MODEL

M122 22-mm body

SHAFT

- B** Blind hollow shaft
- S** Solid shaft

LINES - Disc line count

- 00128, 00256** (OUT = I)
- 00512, 01024** (BEFORE 4x)
- 02048**
- 00001** (OUT = A)
- 00512, 01024** (OUT = S)
- 02048, 04096**
- 08192**

IND - Index format

- Q** Quarter-cycle gated index (OUT = I)
- N** None (OUT = S, or A)

V - Input voltage

- 5** +5 Vdc

OUT Output format

- S** SSI natural binary
- I** Incremental
- A** Analog

TEMP - Temperature

- A** -25°C to +125°C (OUT = P, A)
- B** -25°C to +85°C (OUT = I, S)

BASE

- A** Shaft, IP53, standard EMC grade
- E** Blind shaft, IP64, standard EMC grade
- F** Blind shaft, IP68, standard EMC grade
- B** Blind shaft, IP64, high EMC grade
- C** Blind shaft, IP68, high EMC grade

CAB - Cable length, meters

- 10** 1.0 meters(Standard)
- 30** 3.0 meters
- XX** X.X meters; 9.9 meters is maximum

EXIT

- S** Side-exit cable
- T** Top-exit cable

CONN - Connector

- P** Pigtails (no connector)
- S** DE-9P (OUT = S, I, A) (standard)

DIA - Shaft diameter

- 04M** 4mm (standard for **S** solid shaft)
- 05M** 5 mm
- 06M** 6 mm (standard for **B** blind hollow shaft)
- 08M** 8 mm
- 10M** 10 mm
- 03E** 3/16"
- 04E** 1/4"
- 06E** 3/8"
- 000** supplied without a magnet carrier

SF - Special features

- N** No special features
- #** Issued at time of order to cover special customer requirements

ACCESSORIES (order separately)

- M01** Mating connector for DA-15P
- M06** Mating connector for DE-9P
- Magnet carrier: Call factory

SPECIAL CAPABILITIES

For special situations, we can optimize catalog encoders to provide higher frequency response, greater accuracy, wider temperature range, reduced torque, non-standard line counts, or other modified characteristics. In addition, we regularly design and manufacture custom encoders for user-specific requirements. These range from high-volume, low-cost, limited-performance commercial applications to encoders for military, aerospace and similar high-performance, high-reliability conditions. We would welcome the opportunity to help you with your encoder needs.

WARRANTY

Gurley Precision Instruments offers a limited warranty against defects in material and workmanship for a period of one year from the date of shipment.

