

# GURLEY SERIES R176H ROTARY INCREMENTAL ENCODERS

MOTION TYPE:

ROTARY

USAGE GRADE:

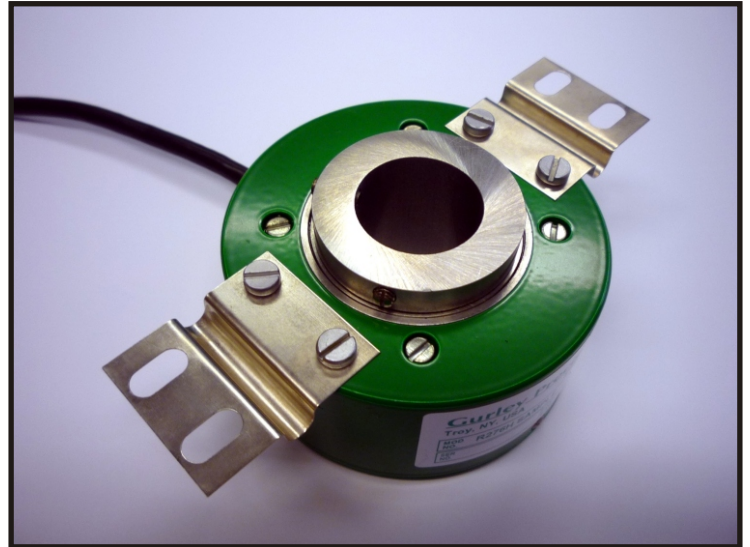
INDUSTRIAL

OUTPUT:

INCREMENTAL

MAX RESOLUTION:

1,000,000 COUNTS/REV.



## STANDARD SIZE - HIGH PERFORMANCE

The Series **R176H** is a family of optical incremental encoders designed for industrial-grade applications that require thru-hollow shafts, high resolution and high accuracy. All R176Hs share these features:

- Resolutions up to 250,000 cycles/rev (1,000,000 counts/rev) at 0 to 70°C and 50,000 cycles/rev (200,000 counts/rev) at -40 to 100°C
- LED illumination for long life (>100,000 hours)
- Differential photo-detectors for signal stability
- Zero index signal
- IP64 sealing for harsh environments

The Series R176H is available in two basic models:

**Model R176H base code A:** Hollow shaft configuration without integral coupling

**Model R176H base code B:** Hollow shaft configuration with integral coupling

ingenuity<sup>®</sup>@work

ISO  
9001  
CERTIFIED

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# R176 SPECIFICATIONS

	See Note	Model R176
Maximum line count on disc		5000
Maximum cycles/rev (quad sq waves)		250,000
Max counts/rev (after quad decode)		1,000,000
Internal square wave interpolation		1X, 2X, 5X, 10X, 25X, 50X
Encoder error, $\pm$ arcsec	1	15, 30 for linecounts >2,500; 75,150 <2,500
Maximum output frequency, kHz		
1X square waves		200
2X square waves		400
5X square waves		1500
10X – 50X square waves		1500
Starting torque, Nm		0.07 – base code A; 0.05 – base code B
Moment of inertia, $\text{kgm}^2$		$4 \times 10^{-5} \text{ kgm}^2$
Maximum acceleration, $\text{rad/s}^2$		$3 \times 10^6$
Operating temperature, $^{\circ}\text{C}$	2	0 to 70
Optional temperature, $^{\circ}\text{C}$	3	-40 to 100
Humidity, % rh, non-condensing		98
Shock		$<300 \text{ m/sec}^2$ , 10 ms
Vibration		$<100 \text{ m/sec}^2$ , 55-2000 Hz
Maximum weight, kg		.55 kg
Sealing		IP64
Bearings		Grease-lubricated and sealed
Maximum radial shaft load, N		20 with base A
Maximum axial shaft load, N		10 with base A
Maximum radial shaft misalignment, mm		+/- 0.1 with base code B
Maximum axial shaft misalignment, mm		+/- 1 with base code B

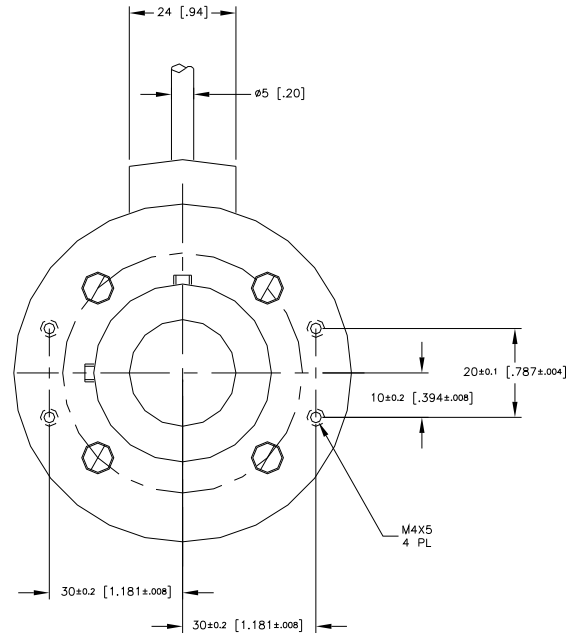
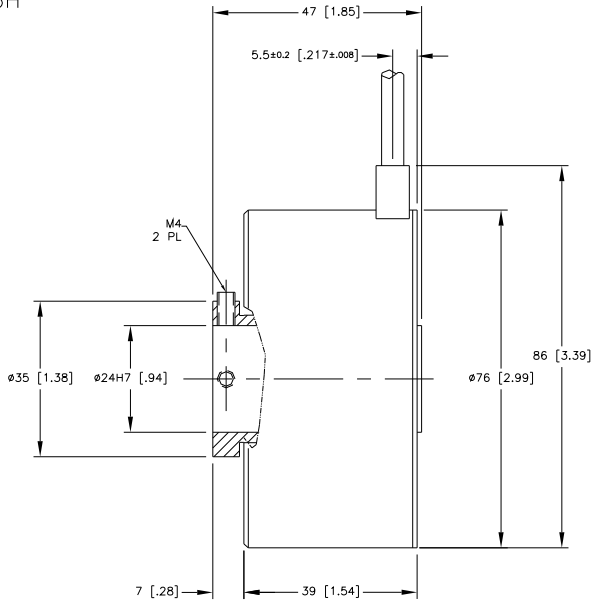
**NOTES:**

1. Total Optical Encoder Error is the algebraic sum of *Instrument Error* + *Quadrature Error* + *Interpolation Error*. Typically, these error sources sum to a value less than the theoretical maximum. Accuracy is guaranteed at 20°C.
2. For encoders with resolutions up to 250,000 cycles.
3. For encoders with resolutions to 50,000 cycles/rev.



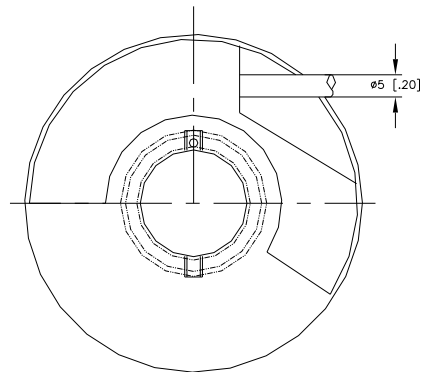
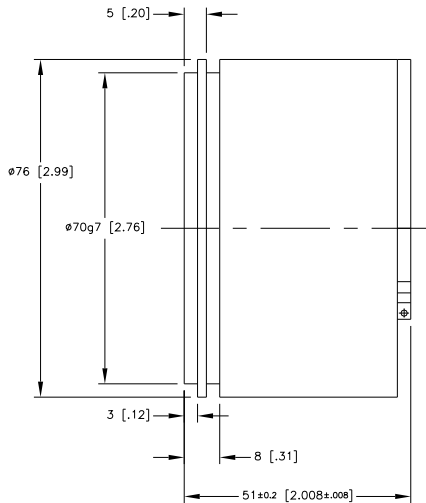
# DIMENSIONS

R176H



BASE CODE A

DIMENSIONS ARE mm [INCHES]



BASE CODE B



## INPUT POWER

Standard: +5 ±5% VDC @100 mA max.

Optional: +10-30 VDC

## OUTPUTS

Output code L is an EIA/RS-422 balanced differential line driver. May be used single-ended for TTL-compatible inputs.

Output code M is buffered sinusoid differential signals (1 V p-p)

## INDEX OPTIONS

Index is available in two formats:

Full cycle wide ±180° electrical (output code M) or quarter-cycle wide gated with high states of A and B (L)

	CONN. CODE	Q	R	S	P
	CONN. TYPE:	DA-15P	DE-15P	DE-9P	None
	FUNCTION:	PIN #	PIN #	PIN #	Color
Square Wave Output (output code L)	A	8	8	4	Yellow
	/A	7	7	8	Brown
	B	5	5	3	Green
	/B	4	4	7	Orange
	IND	2	2	2	Blue
	/IND	1	1	6	White
	+V	10	10	5	Red
	COMM	13	13	9	Black
	CASE	9	9	1	Shield
Sinusoid Output (output codes M and P)	SIN	9			Yellow
	COS	11			Green
	IND	5			Blue
	+V	4			Red
	COMM	15			Black
	CASE	8			Shield
	MATING CONN.	M01	M05	M06	—



# ORDERING INFORMATION

<u>MODEL</u>	<u>SHAFT</u>	<u>LINES</u>	<u>IND</u>	<u>V</u>	<u>OUT</u>	<u>INTERP</u>	<u>BASE</u>	<u>TEMP</u>	<u>CAB</u>	<u>EXIT</u>	<u>CONN</u>	<u>DIA</u>	<u>SPEC</u>

**MODEL**

**R176** standard

**SHAFT** - Shaft type

**H** Hollow shaft

**LINES** - Disc line count

**00250, 00500, 01000, 01024,  
01250, 02000, 02048, 02500,  
03600, 04096, 05000**

Consult factory for other line counts.

**IND** - Index format

**F** Full cycle (M output)  
**Q** Quarter cycle gated (L output)  
**D** Distance Coded Reference Mark

**V** - Input voltage

**5** 5 volts dc  
**R** 10-30 volts dc (L = 1X to 10X only)

**OUT** - Output format

**M** buffered sinusoids differential  
**L** RS-422 Differential line driver

**INTERP** - Interpolation factor

**01** 1X (OUT = M)  
**01, 02, 05, 10, 25, 50X** (OUT = L)

**Accessories** (order separately)

**M01** DA-15S (mates with CONN code **Q**)  
**M05** DE-15S (mates with CONN code **R**)  
**M06** DE-9S (mates with CONN code **S**)

**BASE** - Base

**A** Without integral coupling  
**B** With integral coupling

**TEMP** - Temperature

**N** 0 to 70 Celsius  
**T** -40 to 100 Celsius (limited to 50,000 cycles/rev)

**CAB** - Cable length, inches

**18** Standard

**EXIT** - Cable exit or connector location

**S** Side

**CONN** - Connector

**P** Pigtails (no connector)  
**Q** DA-15P  
**R** DE-15P  
**S** DE-9P

**DIA** - Shaft diameter

**24M** 24 mm

**SPEC** - Special features

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

**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.

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