

# GURLEY SERIES R158 ROTARY INCREMENTAL ENCODERS

**MOTION TYPE:**

**ROTARY**

**USAGE GRADE:**

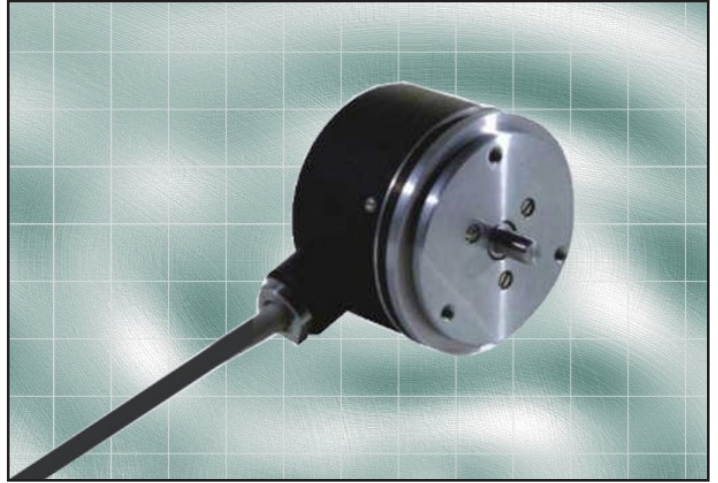
**INDUSTRIAL**

**OUTPUT:**

**INCREMENTAL**

**MAX RESOLUTION:**

**1,000,000 COUNTS/REV.**



## STANDARD SIZE - HIGH PERFORMANCE

The Series **R158** is a family of optical incremental encoders designed for industrial-grade applications that require high resolution and high accuracy. All R158s 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 (IP65 available for base codes A and B)

The Series R158 is available in four basic models:

**Model R158 base code A:** Three mounting hole configuration

**Model R158 base code B:** Four mounting hole configuration

**Model R158 base code C:** Heavy duty version; 40/60N radial/axial loads; three mounting hole configuration

ingenuity<sup>®</sup>@work

ISO  
9001  
CERTIFIED

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	See Note	Model R158	
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, 16X, 25X, 50X	
Encoder error, ± arcsec	1	15, 30 for line counts >2,500; 75 <2,500	
Maximum output frequency, kHz		<2,000 line count	>2,000 line count
1X square waves		160 kHz	
2X square waves			400 kHz
3X square waves			750 kHz
5X square waves			1.5 MHz
8X square waves			1.6 MHz
10X square waves			2.5 MHz
12X square waves			2.5 MHz
16X square waves			2.5 MHz
25X square waves			1.2 MHz
50X square waves			2.5 MHz
Starting torque, Nm		<0.01	
Moment of inertia, oz-in-s <sup>2</sup> (kg-m <sup>2</sup> )		2.4x10 <sup>-4</sup> oz-in-s <sup>2</sup> (1.7 <sup>-6</sup> kg-m <sup>2</sup> )	
Maximum acceleration, rad/s <sup>2</sup>		3 x 10 <sup>6</sup>	
Operating temperature, °F (°C)		32 to 158 (0 to 70)	
Optional temperature, °F (°C)	2	-40 to 212 (-40 to 100)	
Humidity, % rh, non-condensing		98	
Shock		<300 m/sec <sup>2</sup> , 10 ms	
Vibration		<100 m/sec <sup>2</sup> , 55-2000 Hz	
Maximum weight, lbs (kg)		.51-.55 (0.23 - 0.25)	
Sealing		IP64	
Bearings		Grease-lubricated and sealed	
Maximum radial shaft load, N	3	20 with base A or B; 60 with C or D	
Maximum axial shaft load, N	3	10 with base A or B; 40 with C or D	

**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 to 50,000 cycles/rev.
3. Base codes A and B have radial/axial loads to 20/10N; base codes C and D have radial/axial loads to 60/40N



## INPUT POWER

Standard: +5 ±5% VDC @100 mA max.

Optional: +10-30 VDC

## OUTPUTS

Output code H is HTL (high logic);  $U_1 > (U_r - 2.5V)$  at I output < 20 mA  
 $U_0 < 0.5 V$  at I output < 20 mA

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)

Output code P is current sinusoid signals (11 micro amps)

## INDEX OPTIONS

Index is available in two formats:

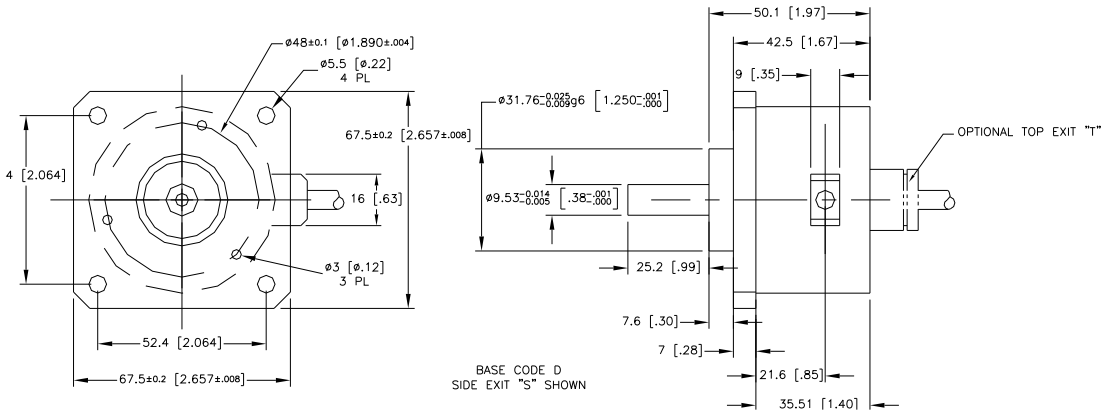
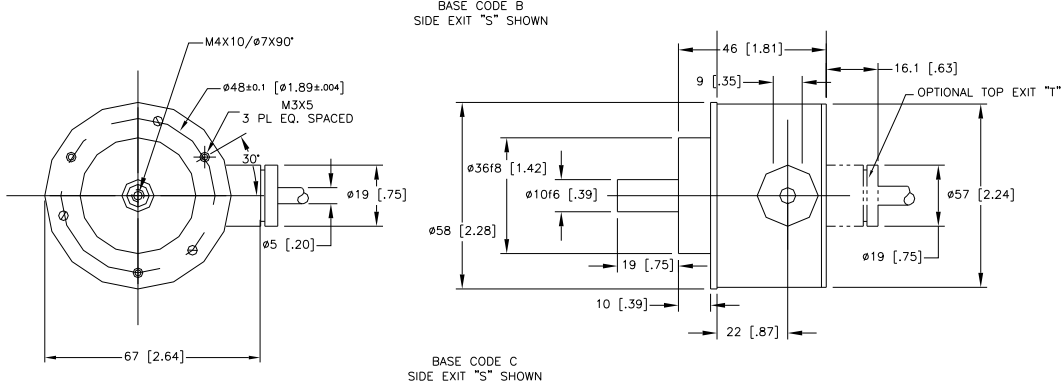
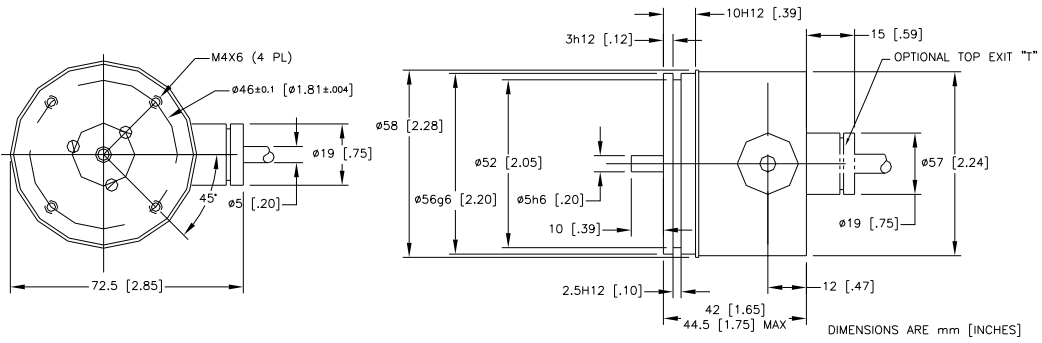
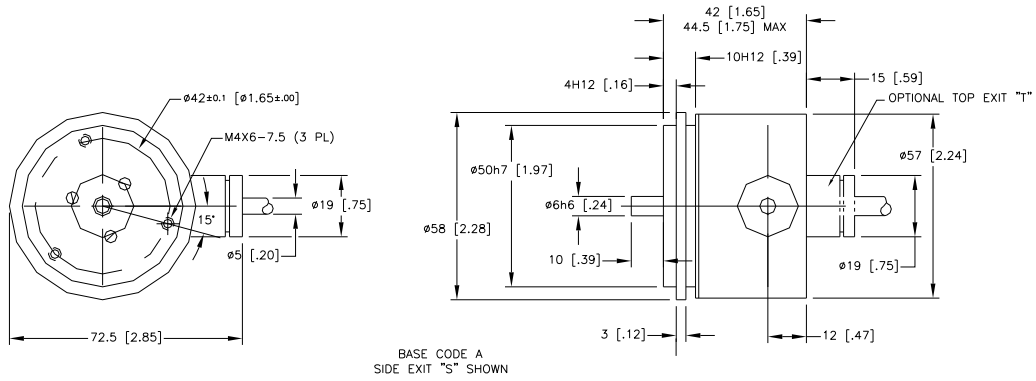
Full cycle wide ±180° electrical (output codes M and P)

Quarter-cycle wide gated with high states of Ch. A and Ch. B (output code L)

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



Base types A, B, C and D shown with standard shaft sizes



# 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**

**R158** standard

**SHAFT** - Shaft type

**S** Solid shaft

**LINES** - Disc line count

**00100, 00120, 00200, 00250, 00256, 00300, 00360, 00400, 00500, 00512, 00600, 00800, 00900, 01000, 01024, 01200, 01250, 01800, 02000, 02048, 02500, 02540, 03000, 03600, 04096, 04500, 05000**

Consult factory for other line counts.

**IND** - Index format

**F** Full cycle (M and P output)  
**Q** Quarter cycle gated (L output)

**V** - Input voltage

**5** 5 volts dc  
**R** 10-30 volts dc (w/OUT = L or H)

**OUT** - Output format

**H** HTL (high logic)  
**M** buffered sinusoids differential  
**L** RS-422 Differential line driver  
**P** photodiode sinusoids

**INTERP** - Interpolation factor

**01** OUT = M, P  
**01, 02, 03, 05, 08, 10, 12, 16, 25, 50 X** square waves, OUT = L

**BASE** - Base

**A** Synchro/face mount  
**B** Synchro/face mount  
**C** Heavy duty, synchro/face mount  
**D** Heavy duty, square flange

**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

**T** Top  
**S** Side

**CONN** - Connector

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

**DIA** - Shaft diameter

**05M** 5 mm - (Base code **B** only)  
**06M** 6 mm - (Base code **A** only)  
**10M** 10 mm - (Base codes **C & D** only)  
**04E** 1/4" - (Base code **A** only)  
**06E** 3/8" - (Base codes **C & D** only)

**SPEC** - Special features

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

**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**)

**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.

R158

PAGE 5 OF 5

0718

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