

# GURLEY MODELS R119 & R120 INCREMENTAL ENCODERS

MOTION TYPE:

ROTARY

USAGE GRADE:

LIGHT INDUSTRIAL

OUTPUT:

INCREMENTAL

MAX RESOLUTION:

1,048,576 COUNTS/REV



## MINIATURE HIGH-RESOLUTION ENCODER

The Models **R119** and **R120** optical incremental encoders are designed for light industrial applications that require high resolution in a very small package. The two models share these features:

- Resolutions from 1 to 262,144 cycles/rev (4 to 1,048,576 counts/rev)
- -40C to +85C extended operating temperature available
- Represent either shafted or blind-hollow shaft version
- Single-board, surface-mount electronics for reliability
- RS-422 differential line driver output for noise immunity
- Zero index signal

**R119:**  $\phi$ 19-mm body; ribbon cable

**R120:**  $\phi$ 20-mm body; round cable with shielded twisted pairs

ingenuity<sup>®</sup>@work

ISO  
9001  
CERTIFIED

Gurley Precision Instruments  
514 Fulton Street  
Troy, NY 12180 U.S.A.  
(800) 759-1844, (518) 272-6300, fax (518) 274-0336,  
Online at [www.gurley.com](http://www.gurley.com), e-mail: [info@gurley.com](mailto:info@gurley.com)



# SPECIFICATIONS

	Units	Limiting Values	See Note
<b>Mechanical Specifications</b>			
Moment of Inertia	in-oz-s <sup>2</sup> (g-cm <sup>2</sup> )	5.7 x 10 <sup>-6</sup> (0.4)	
Starting Torque	in-oz (N x m)	0.07 (5 x 10 <sup>-4</sup> )	
Radial Shaft Load	lb (N)	.067 (3)	
Axial Shaft Load	lb (N)	.067 (3)	
Bearing Arrangement		2 pre-loaded bearings	
Bearings		Grease lubricated and sealed	
Measuring Rotational Element		Etched chrome on glass disc	
Non-Operating Slew	RPM	10,000	
Shock 11 (ms)	g (m/s <sup>2</sup> )	30 (300)	
Vibration (55-2000Hz)	g (m/s <sup>2</sup> )	10 (100)	
Sealing		IP50	
Acceleration	rad/s <sup>2</sup>	3 x 10 <sup>6</sup>	
Maximum Operational Speed	RPM	10000	
Maximum Weight	oz (g)	1.0 (30)	
<b>Environmental Specifications</b>			
Operating Temperature	°F (°C)	Standard is +32 to +158 (0 to +70)	
	°F (°C)	Extended is -40 to +185 (-40 to +85)	
Relative Humidity	%	90	1
<b>Electrical Specifications</b>			
Supply Voltage	VDC	4.7 to 5.3, 5.00 nominal	
Current Consumption	mA	≤ 100	
Output Format		Up to 1,048,576 counts/rev	
Output Device		RS422	
Accuracy		+/-100 arc seconds	

### Notes

1. Non-condensing

*As part of our continuing product improvement program, all specifications are subject to change without notice*

**R 1 1 9/R 1 2 0**

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# SPECIFICATIONS & WIRING

## INPUT POWER

+5 VDC  $\pm 0.25$  V @100 mA max.

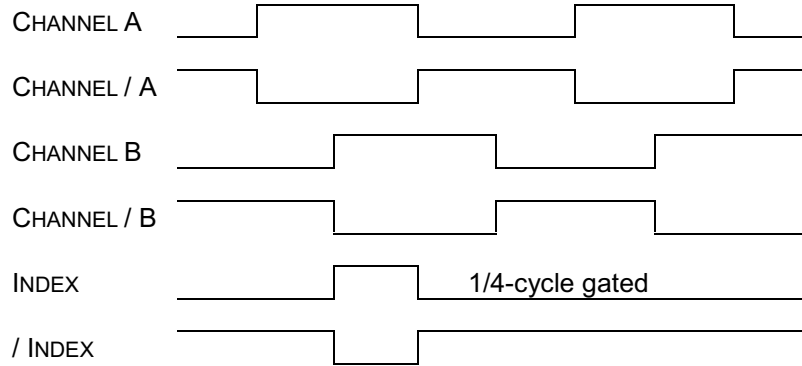
## SQUARE WAVE OUTPUT

Quadrature square waves from 1 to 262,144 cycles/rev.

On all channels:

EIA/RS-422 balanced differential line driver, protected to survive an extended-duration short circuit across its output. May be used single-ended for TTL-compatible inputs. Index is 1/4-cycle wide, gated with the high states of channels A and B.

## OUTPUT WAVEFORMS (CW rotation shown)



## ELECTRICAL CONNECTIONS

Output Functions	R119		R120	
	Wire Colors Conn. Code P	Ribbon conn Conn. Code Y	Wire Colors Conn. Code P	Ribbon conn Conn. Code Y
<b>A</b>	Gray	2	Yellow	4
<b>/ A</b>	Gray	3	Brown	8
<b>B</b>	Gray	6	Green	3
<b>/ B</b>	Gray	7	Orange	7
<b>IND</b>	Gray	4	Blue	2
<b>/ IND</b>	Gray	5	White	6
<b>+V</b>	Gray	1	Red	5
<b>COMMON</b>	Blue	8	Black	9
<b>CASE</b>			Bare (shield)	1

NOTE: Channel A leads Channel B for clockwise rotation, looking at the shaft end.

# R 1 1 9 / R 1 2 0

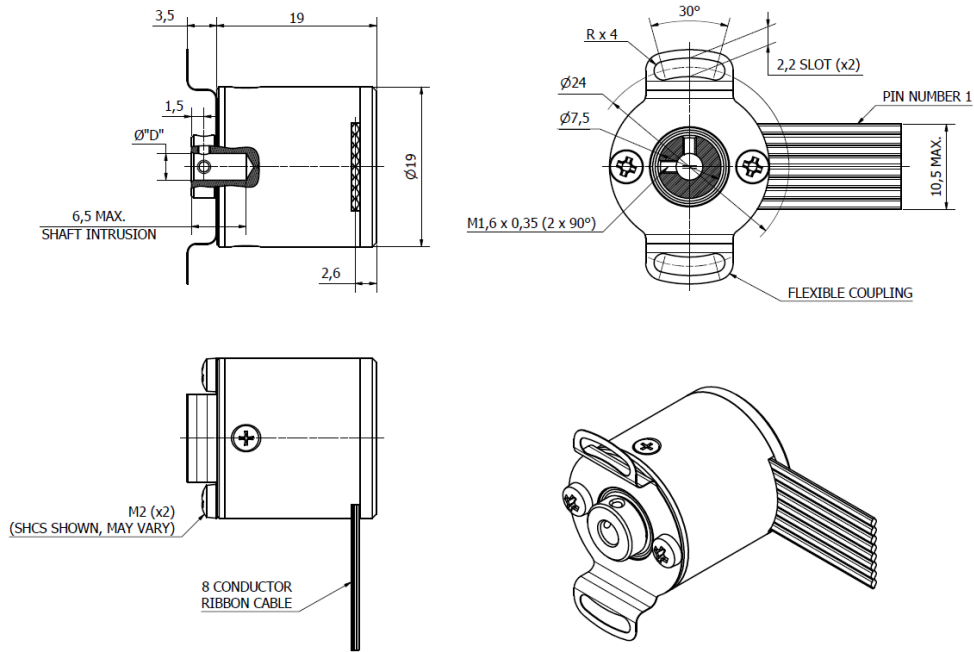
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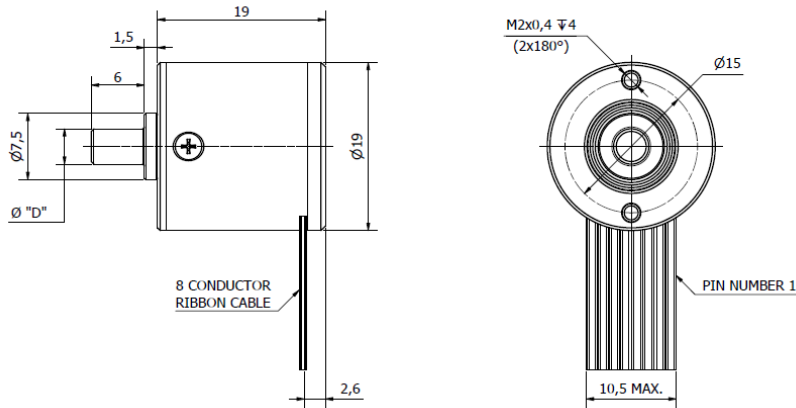


# R 1 1 9 DIMENSIONS

## R119B (BASE CODE A)



## R119S (BASE CODE B)



ø "D" TABLE		
"DIA" CODE	R119S	R119B
04M	ø4mm h6	N/A
03M	ø3mm h6	ø3mm H7
02E	ø0.125" +.0000 -.0003	ø0.125" +.0005 -.0000

# R 1 1 9 / R 1 2 0

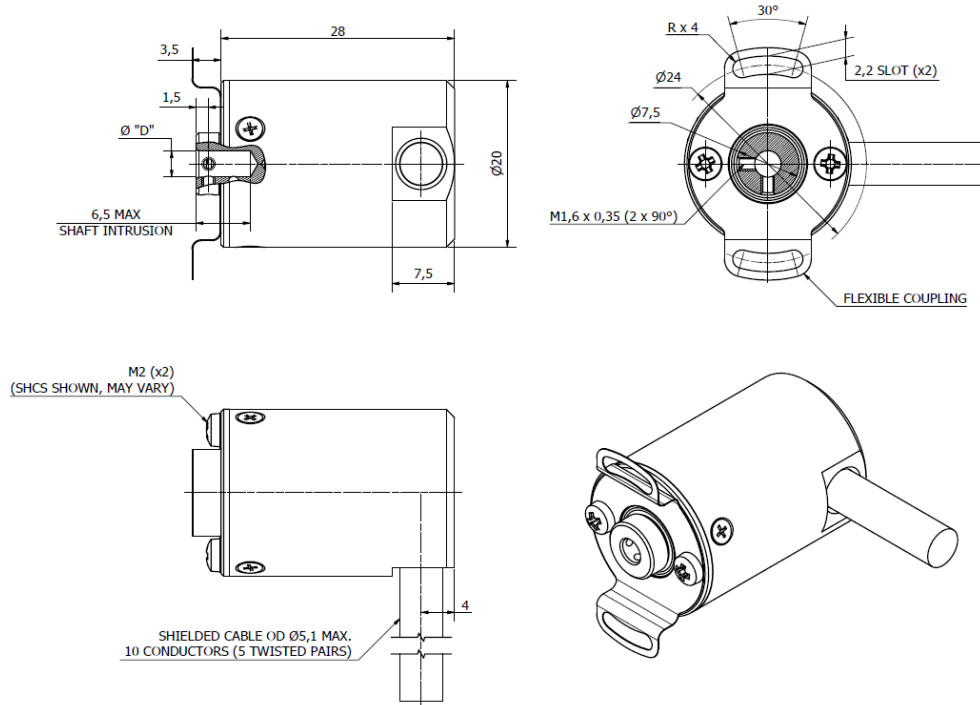
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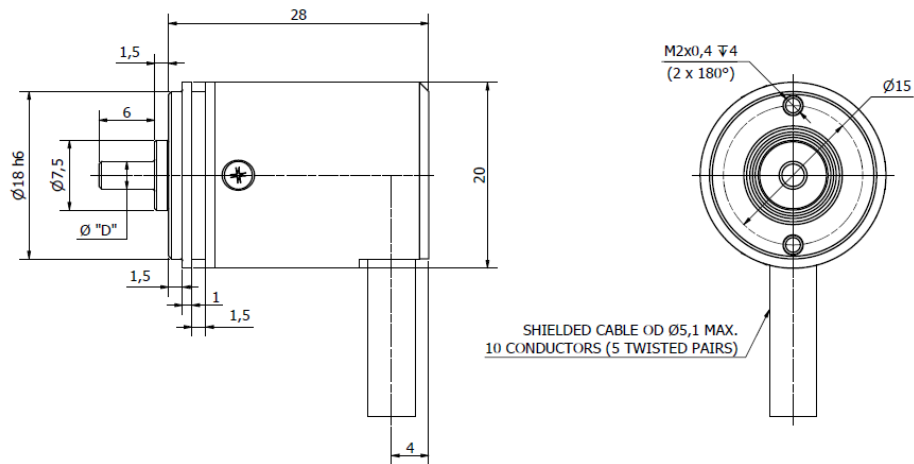


# R 120 DIMENSIONS

## R120B (BASE CODE A)



## R120S (BASE CODE C)



ø "D" TABLE

"DIA" CODE	R120S	R120B
04M	ø4mm_h6	N/A
03M	ø3mm_h6	ø3mm_H7
02E	ø0.125" +.0000 -.0003	ø0.125" +.0005 -.0000

# R 1 1 9 / R 1 2 0

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# ORDERING INFORMATION

MODEL	SHAFT	CYCLES	IND	OUT	BASE	TEMP	CAB	EXIT	CONN	DIA	SPEC
				5							

**MODEL**

**R119**  $\phi$ 19-mm body, ribbon cable  
**R120**  $\phi$ 20-mm body, round cable

**SHAFT** – Shaft Type

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

**CYCLES** – Cycles/rev

**000001 - 262144**

**IND** - Index format

**Q** Quarter-cycle gated index

**V** - Input voltage

**5** +5 Vdc

**OUT** – Output format

**L** RS422 differential line driver

**BASE**

**A** Use with **R119B** or **R120B**  
**B** Use with **R119S**  
**C** Use with **R120S**

**TEMP** - Temperature

**N** 0C to +70C  
**T** -40C to +85C

**CAB** - Cable length, inches

**18** Standard

**EXIT**

**S** Side-exit cable

**CONN** - Connector

**P** Pigtails (no connector)  
**Y** 8-pos ribbon cable socket connector  
 (Berg 71602-308 or equal) (**R119** only)  
**S** DE-9P (**R120** only)

**DIA** - Shaft diameter

**02E** 1/8" (SHAFT = **S** or **B**)  
**03M** 3 mm (SHAFT = **S** or **B**)  
**04M** 4 mm (SHAFT = **S**)

**SPEC** - Special features

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

**ACCESSORIES** (order separately)

**SCD-xxx-xxx** Shaft coupling (see separate data sheet)  
**M06** Mating connector for DE-9P

**SPECIAL CAPABILITIES**

For special situations, we can optimize catalog encoders to provide higher frequency response, greater accuracy, wider temperature range, reduced torque, 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.

R 1 1 9 / R 1 2 0

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