

# RGH24 series readhead



## Renishaw's RG2 linear encoder system is a non-contact optical encoder designed for position feedback solutions.

The system uses a common reflective tape scale scanned by a readhead chosen from a range of options offering industry standard digital square wave or analogue sinusoidal output signal formats.

Renishaw's unique patented optical scheme is used in all readhead series to provide high tolerance to scale contamination.

RGH24 is an ideal feedback solution wherever precision controlled movement is required.

The RGH24 readheads offer a wide selection of output configurations and their compact size and low mass makes the system ideal for small XY stages and actuators.

An integral set-up LED enables quick and easy installation.

Common applications include semiconductor/electronics manufacturing and inspection, coordinate measuring and layout machines, height gauges, linear motors, pre-press printing and a variety of custom linear motion solutions.

### Digital range

RGH24D - 5  $\mu\text{m}$  resolution

RGH24X - 1  $\mu\text{m}$  resolution

RGH24Z - 0.5  $\mu\text{m}$  resolution

RGH24W - 0.2  $\mu\text{m}$  resolution

RGH24Y - 0.1  $\mu\text{m}$  resolution

RGH24H - 0.05  $\mu\text{m}$  resolution

### Analogue range

RGH24B - 1 Vpp differential

RGH24C - 12  $\mu\text{A}$  differential

- Non-contact open optical system
- Compact size
- Low mass
- Integral interpolation
- Digital and analogue output options
- Resolutions from 5  $\mu\text{m}$  to 0.05  $\mu\text{m}$
- Integral set-up LED
- Uses RGS20-S self-adhesive scale
- Reference mark or limit switch capability



## Operating and electrical specifications

### Clocked outputs

The RGH24W (0.2 µm), RGH24Y (0.1 µm) and RGH24H (0.05 µm) readheads have clocked outputs. These are designed to prevent fine edge separations being missed by receiving electronics utilising slower clock speeds. The table below shows the maximum speed and associated minimum recommended counter clock frequency for these readheads.

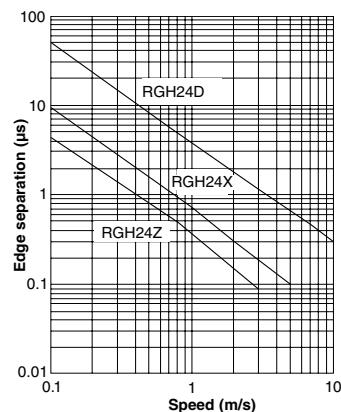
Head type	Maximum speed (m/s)	Minimum recommended counter clock frequency (MHz)
D (5 µm)	10	$\left( \frac{\text{encoder velocity (m/s)}}{\text{resolution (µm)}} \right) \times 4 \text{ safety factor}$
X (1 µm)	5	
Z (0.5 µm)	3	

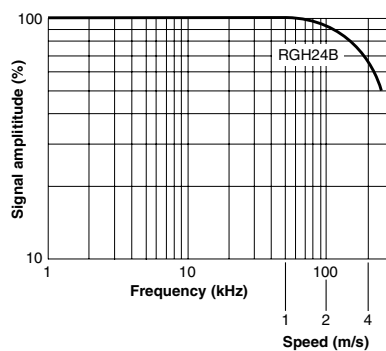
Std. option	JST option	Maximum speed (mm/s)			Minimum recommended counter clock frequency (MHz)
		W (0.2 µm)	Y (0.1 µm)	H (0.05 µm)	
30	35	–	700	350	12
31	36	–	500	250	8
32	37	700	–	–	6
33	38	500	250	120	4

**NOTE:** Maximum speeds of clocked output variants assume 3 m maximum cable length and minimum 5 V supply at readhead connector.

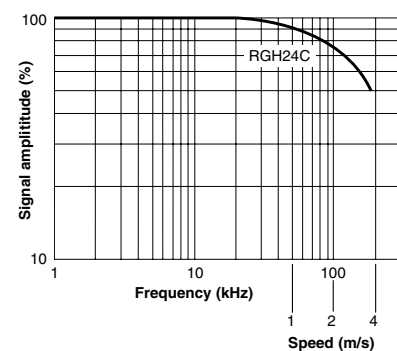
### Edge separation - digital readheads



### Speed - analogue type B readheads (1Vpp)



### Speed - analogue type C readheads (12µA)

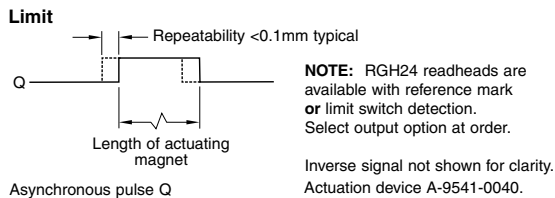
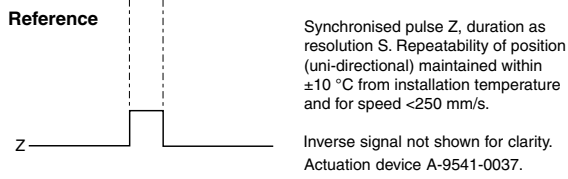
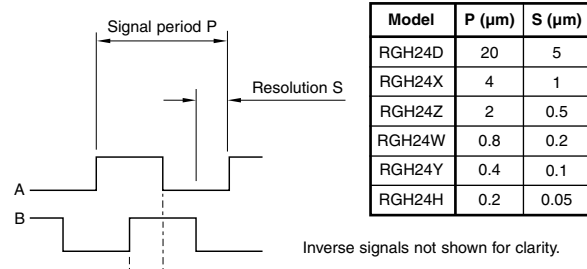


<b>Power supply</b>	5 V ± 5%    120 mA	<b>NOTE:</b> For digital outputs, current consumption figures refer to unterminated readheads/interfaces. A further 25 mA per channel will be drawn when terminated with 120 Ω. Current consumption to BS EN 61010
	Ripple	200 mVpp @ frequency up to 500 kHz maximum
<b>Temperature</b>	Storage -20 °C to +70 °C    Operating 0 °C to +55 °C	
<b>Humidity</b>	Storage 95% maximum relative humidity (non-condensing) (BS EN 61010-1) Operating 80% maximum relative humidity (non-condensing) (BS EN 61010-1)	
<b>Sealing</b>	IP40	
<b>Acceleration</b>	Operating 500 m/s <sup>2</sup> BS EN 60068-2-7:1993 (IEC 68-2-7:1983)	
<b>Shock (non-operating)</b>	1000 m/s <sup>2</sup> , 6 ms, ½ sine    BS EN 60068-2-27:1993 (IEC 68-2-27:1987)	
<b>Vibration (operating)</b>	100 m/s <sup>2</sup> max @ 55 Hz to 2000 Hz    BS EN 60068-2-6:1996 (IEC 68-2-6:1995)	
<b>Mass</b>	Readhead 11 g    Cable 34 g/m	
<b>EMC compliance (system)</b>	BS EN 61326	
<b>Cable</b>	Double-shielded diameter 4.2 mm cable. Flex life >20 x 10 <sup>6</sup> cycles at 20 mm bend radius	
<b>Connector options</b>	<b>Code - connector type</b>	<b>Application</b>
	A - 9 pin D type plug	All readheads
	C - 9 pin circular plug	RGH24C
	D - 15 pin D type plug	RGH24D, X, Z, W, Y, H
	L - 15 pin D type plug	RGH24B
	F - Flying lead	All readheads
	Z - JST Connector	RGH24D, X, Z, W, Y, H
	X - 16 pin in line connector	All readheads
<b>Electrical integration (JST connector versions)</b>	The RGH24 JST connector series readheads have been designed to the relevant EMC standards but must be correctly integrated to achieve EMC compliance. In particular attention to shielding and earthing arrangements is critical. Renishaw recommends the use of a double screened cable as used in the cable variants of the RGH24. Refer to RGH24 readhead installation guide for electrical connection information for these readheads.	

## Output specifications

### Digital output signals - type RGH24D, X, Z, W, Y, H Form - Square wave differential line driver to EIA RS422A

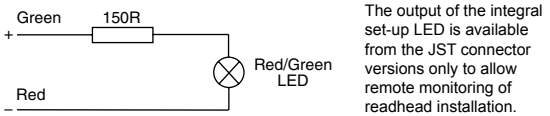
**Incremental** 2 channels A and B in quadrature (90° phase shifted)



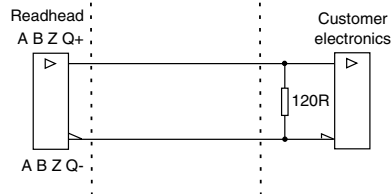
**Alarm**

3-state alarm  
 Incremental channels forced open circuit for >20 ms when signal too low for reliable operation. For RGH24W, Y and H only, incremental channels forced open circuit for >10ms when signal too low or speed too high for reliable operation.

**Remote LED driver**  
 Recommended termination

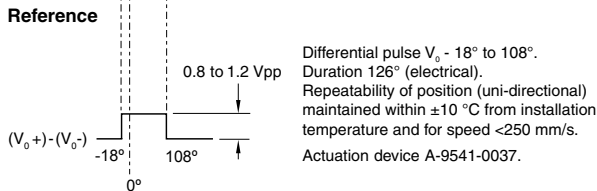
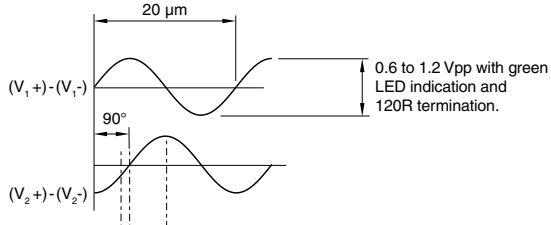


**Recommended signal termination**

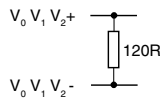


### Analogue output signals type RGH24B (1Vpp)

**Incremental** 2 channels  $V_1$  and  $V_2$  differential sinusoids in quadrature (90° phase shifted)

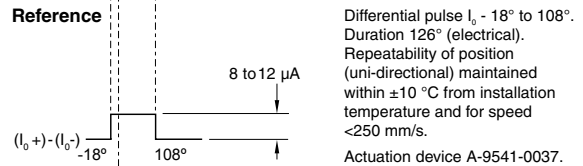
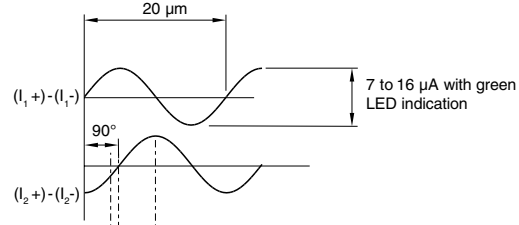


**Termination**



### Analogue output signals type RGH24C (12µA)

**Incremental** 2 channels  $I_1$  and  $I_2$  differential sinusoids in quadrature (90° phase shifted)



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