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Find the *Renishaw RGH24Y* at our website: *Click HERE*

Data sheet
L-9517-0166-07-A

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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 µm resolution

RGH24X - 1 µm resolution

RGH24Z - 0.5 µm resolution

RGH24W - 0.2 µm resolution

RGH24Y - 0.1 µm resolution

RGH24H - 50 nm resolution

RGH24I - 20 nm resolution

RGH24O - 10 nm resolution

Analogue range

RGH24B - 1 Vpp differential

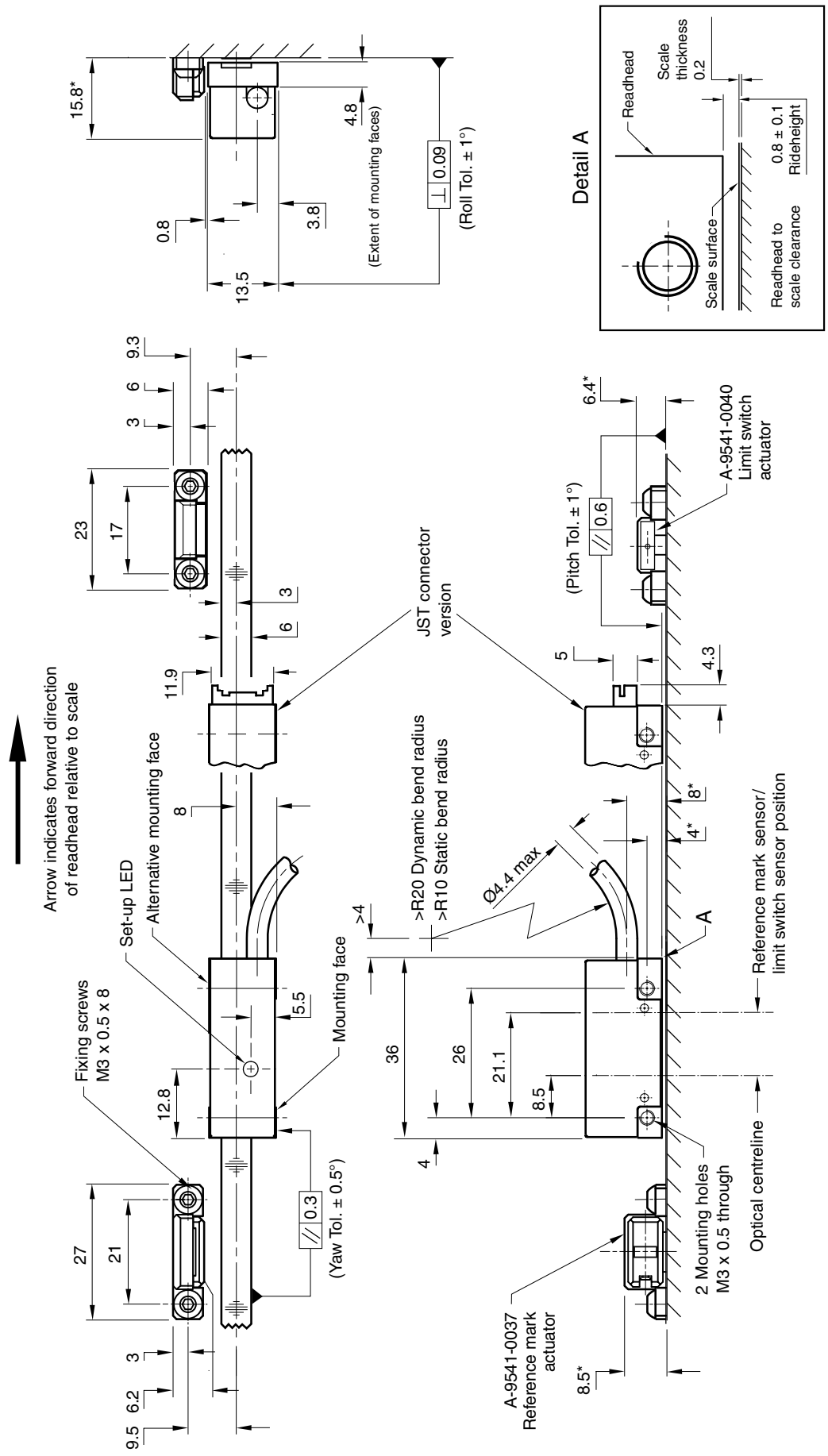
RGH24C - 12 µA differential

- **Non-contact open optical system**
- **Compact size**
- **Low mass**
- **Integral interpolation**
- **Digital and analogue output options**
- **Resolutions from 5 µm to 10 nm**
- **Integral set-up LED**
- **Uses RGS20-S self-adhesive scale**
- **Reference mark or limit switch capability**

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RGH24 installation drawing

Dimensions and tolerances in mm



*Dimensions measured from substrate.

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Operating and electrical specifications

Clocked outputs

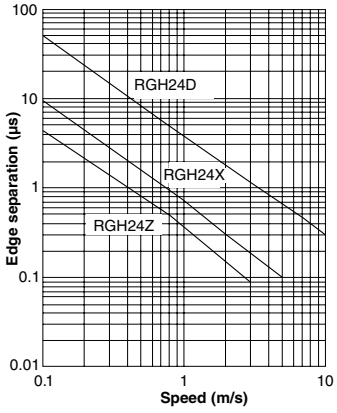
The RGH24W (0.2 µm), RGH24Y (0.1 µm), RGH24H (50 nm), RGH24I (20 nm) and RGH24O (10 nm) readheads have clocked outputs. These are designed to prevent fine edge separations being missed by receiving electronics utilising slower clock speeds. The table below shows the maximum speed and associated minimum recommended counter clock frequency for these readheads.

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

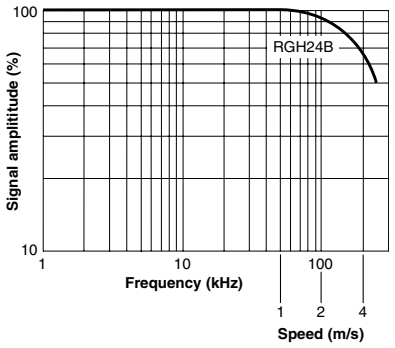
Std. option	JST option	Head type ⟩	Maximum speed (mm/s)					Minimum recommended counter clock frequency (MHz)
			W (0.2 µm)	Y (0.1 µm)	H (50 nm)	I (20 nm)	O (10 nm)	
30	35		–	700	350	130	65	12
31	36		–	500	250	90	45	8
32	37		700	–	–	–	–	6
33	38		500	250	120	40	20	4

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

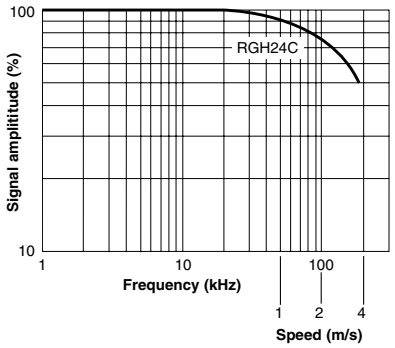
Edge separation - digital readheads



Speed - analogue type B readheads (1Vpp)



Speed - analogue type C readheads (12µA)



Power supply	5 V± 5% Ripple	120 mA 200 mVpp maximum @ frequency up to 500 kHz maximum **NOTE:** For digital outputs, current consumption figures refer to unterminated readheads. A further 25 mA per channel pair (eg A+, A-) will be drawn when terminated with 120 Ω. For analogue type B readheads, a further 20 mA will be drawn when terminated with 120 Ω. Renishaw encoder systems must be powered from a 5 V dc supply complying with the requirements for SELV of standard EN (IEC) 60950.
Temperature	Storage -20 °C to +70 °C Operating 0 °C to +55 °C	
Humidity	Storage 95% maximum relative humidity (non-condensing) Operating 80% maximum relative humidity (non-condensing)	
Sealing	IP40	
Acceleration	Operating 500 m/s² BS EN 60068-2-7:1993 (IEC 68-2-7:1983)	
Shock (non-operating)	1000 m/s², 6 ms, ½ sine BS EN 60068-2-27:1993 (IEC 68-2-27:1987)	
Vibration (operating)	100 m/s² max @ 55 Hz to 2000 Hz BS EN 60068-2-6:1996 (IEC 68-2-6:1995)	
Mass	Readhead 11 g Cable 34 g/m	
EMC compliance (system)	BS EN 61000 BS EN 55011	
Cable	Double-shielded maximum diameter 4.4 mm cable. Flex life >20 x 10^6 cycles at 20 mm bend radius	
Connector options	**Code - connector type** A - 9 pin D type plug C - 9 pin circular plug D - 15 pin D type plug L - 15 pin D type plug F - Flying lead Z - JST Connector	**Application** All readheads RGH24C RGH24D, X, Z, W, Y, H, I, O RGH24B All readheads RGH24D, X, Z, W, Y, H, I, O
Electrical integration (JST connector versions)	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.	

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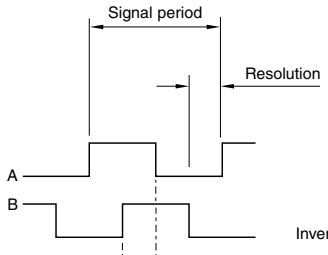
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Output specifications

Digital output signals - type RGH24D, X, Z, W, Y, H, I, O

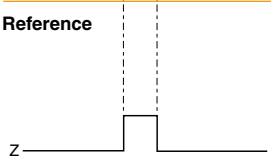
Form - Square wave differential line driver to EIA RS422A

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



Inverse signals not shown for clarity

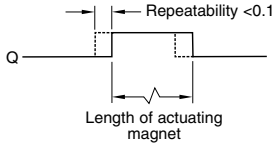
Reference



Synchronised pulse Z, duration equal to the resolution. Repeatability of position (uni-directional) maintained within ±10 °C from installation temperature and for speed <250 mm/s.

Inverse signal not shown for clarity
Actuation device A-9541-0037

Limit



Asynchronous pulse Q

NOTE: RGH24 readheads are available with reference mark **or** limit switch detection.
Select output option at order

Inverse signal not shown for clarity
Actuation device A-9541-0040

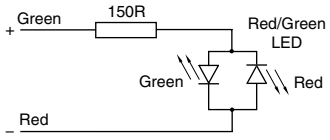
Alarm

3-state alarm

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

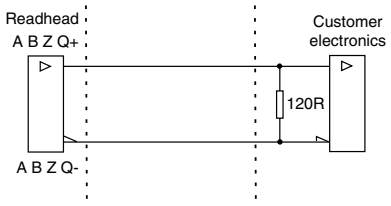
Remote LED driver

Recommended termination



The output of the integral set-up LED is available from the JST connector versions only to allow remote monitoring of readhead installation.

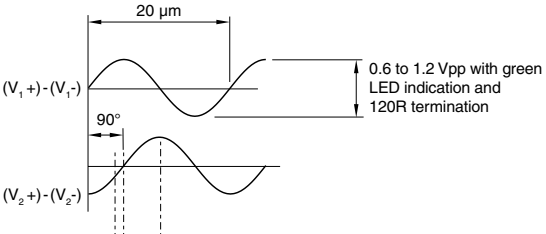
Recommended signal termination



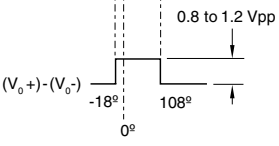
Standard RS422A line receiver circuitry. Contact Renishaw for further details on receiver termination for 3-state output

Analogue output signals type RGH24B (1Vpp)

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

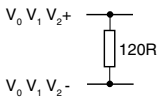


Reference



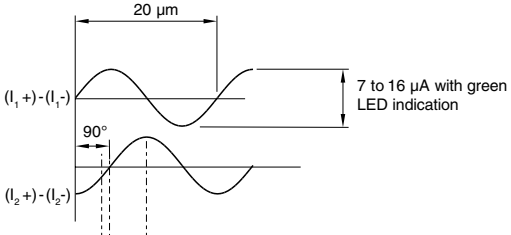
Differential pulse V_0 - 18° to 108°
Duration 126° (electrical)
Repeatability of position (uni-directional) maintained within ±10 °C from installation temperature and for speed <250 mm/s
Actuation device A-9541-0037

Termination

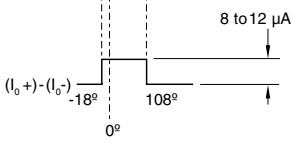


Analogue output signals type RGH24C (12µA)

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



Reference



Differential pulse I_0 - 18° to 108°
Duration 126° (electrical)
Repeatability of position (uni-directional) maintained within ±10 °C from installation temperature and for speed <250 mm/s.
Actuation device A-9541-0037

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