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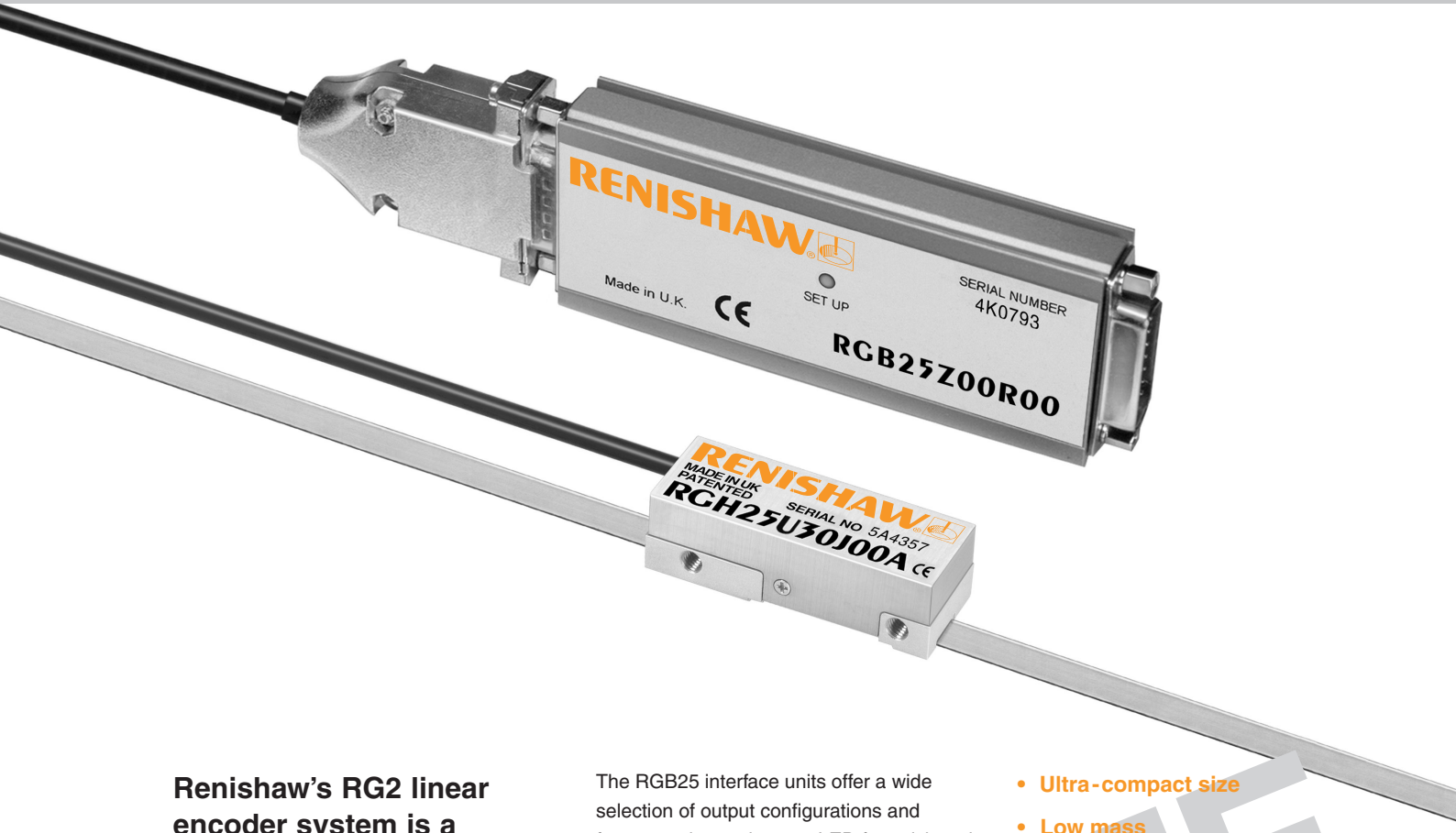
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Find the *Renishaw RGB25X00R00* at our website: ***Click HERE***

Data sheet
L-9517-0168-07-B

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RGH25 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. The interface is 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 and gives proven performance benefits together with high tolerance to scale contamination.

RGH25 is an ideal feedback solution wherever precision controlled movement is required.

The ultra-compact size and low mass of the RGH25 readhead makes the system ideal for size critical applications.

The RGB25 interface units offer a wide selection of output configurations and feature an integral set-up LED for 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

RGB25D - 5 µm resolution

RGB25X - 1 µm resolution

RGB25Z - 0.5 µm resolution

RGB25Y - 0.1 µm resolution

RGB25H - 50 nm resolution

Analogue range

RGB25B - 1 Vpp differential

RGB25C - 12 µA differential

A vacuum compatible version of the RGH25 readhead is available (RGH25U UHV), refer to Data sheet part number L-9517-9164.

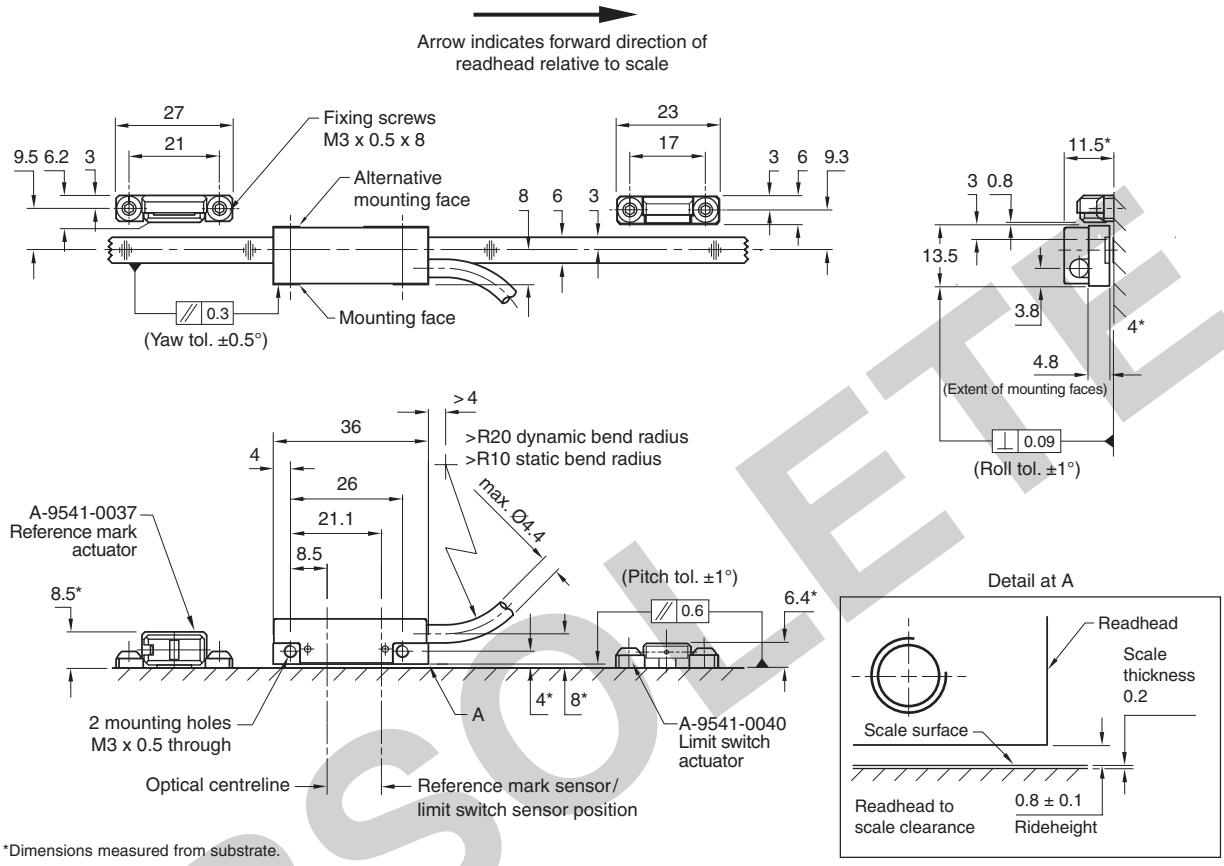
- **Ultra-compact size**
- **Low mass**
- **Interpolation by RGB25 interface unit**
- **Digital and analogue output options**
- **Resolutions from 5 µm to 50 nm**
- **Integral set-up LED**
- **Uses RGS20-S self-adhesive scale**
- **Reference mark or limit switch capability**

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RGH25 installation drawing

Dimensions and tolerances in mm



*Dimensions measured from substrate.

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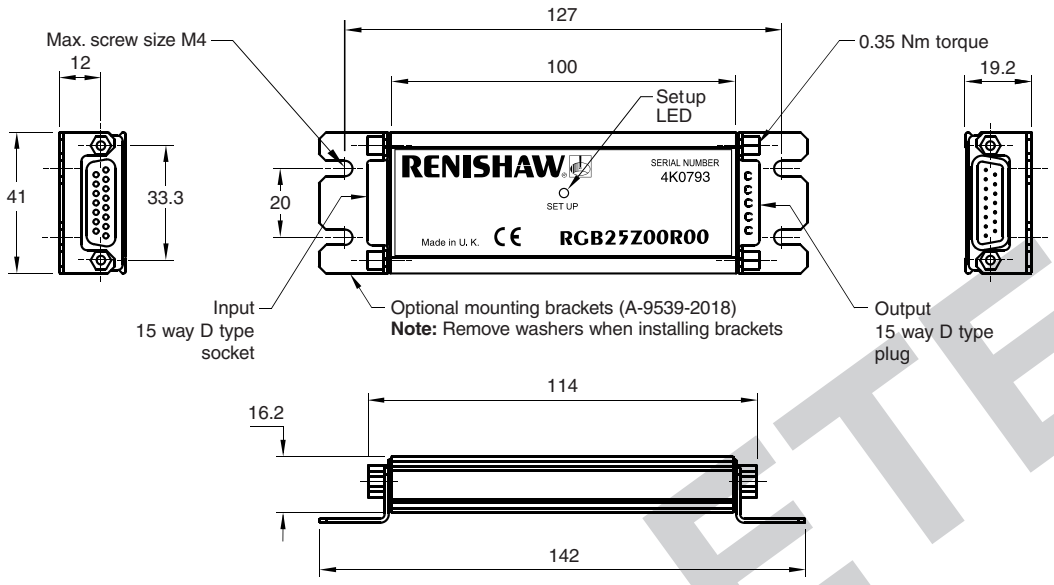
Temperature (system)	Storage -20 °C +70 °C Operating 0 °C to +55 °C
Humidity (system)	Storage 95% maximum relative humidity (non-condensing) Operating 80% maximum relative humidity (non-condensing)
Sealing (system)	IP40
Acceleration (system)	Operating 500 m/s² BS EN 60068-2-7:1993 (IEC 68-2-7:1983)
Shock (system) non-operating	1000 m/s², 6 ms, ½ sine BS EN 60068-2-27:1993 (IEC 68-2-27:1987)
Vibration (system) operating	100 m/s² max @ 55 Hz to 2000 Hz BS EN 60068-2-6:1996 (IEC 68-2-6:1995)
Mass	Readhead RGH25: 9 g Interface RGB25: 95 g Cable 34 g/m
EMC compliance (system)	BS EN 61326-1: 2006
Cable	Double-shielded, maximum outside diameter 4.4 mm Flex life >20 x 10^6 cycles at 20 mm bend radius
Termination to RGB	15 way D type plug

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RGB25 installation drawing

Dimensions and tolerances in mm



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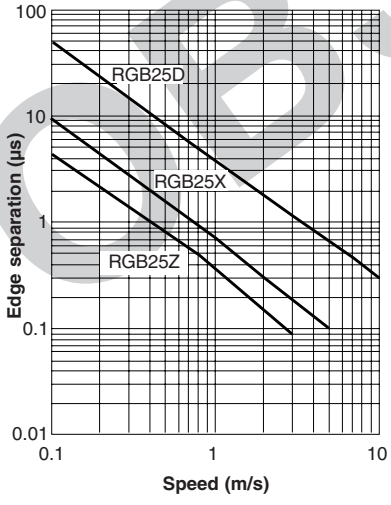
Operating and electrical specifications

Power supply 5 V ± 5% 200 mA
Renishaw encoder systems must be powered from a 5 V dc supply complying with the requirements for SELV of standard EN (IEC) 60950.

Ripple 200 mVpp maximum @ frequency up to 500 kHz maximum

NOTE: Current consumption figures include RGH25 readhead, but refer to unterminated interfaces.
For digital outputs, a further 25 mA per channel pair (eg A+, A-) will be drawn when terminated with 120 Ω.
For analogue (1Vpp) output, a further 20mA will be drawn when terminated with 120 Ω.

Edge separation

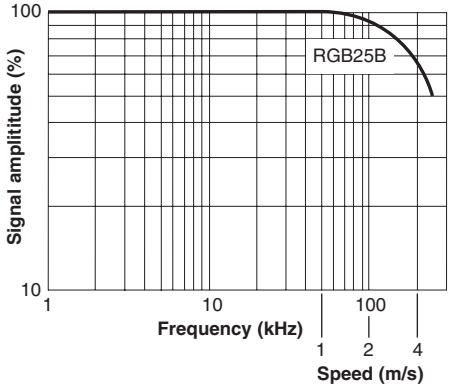


0.1/0.05 µm resolution interfaces

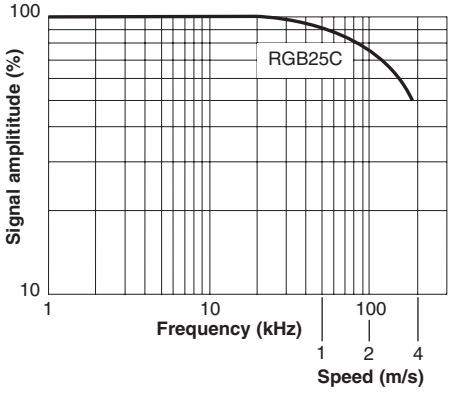
The RGB25Y (0.1µm) and RGB25H (50 nm) interfaces have clocked outputs. These are designed to prevent fine edge separations being missed by receiving electronics utilising slower clock speeds. The table below shows the maximum speed and associated minimum recommended counter clock frequency for these readheads.

Head type	Maximum speed (m/s)		Minimum recommended counter clock frequency (MHz)
D X Z	10 5 3		$\left(\frac{\text{Encoder velocity (m/s)}}{\text{Resolution (µm)}}\right)$ x 4 safety factor
Y/H option	**Y**	**H**	
61	1.3	0.6	20
62	0.7	0.3	10
63	0.35	0.15	5

Speed - analogue type B (1Vpp)

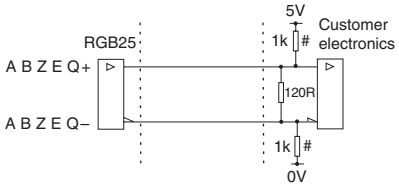


Speed - analogue type C (12µA)



Recommended signal termination

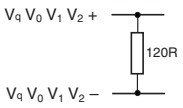
Digital output readheads



Standard RS422A line receiver circuitry.

Analogue termination network

- type RGB25B only



Only required on alarm channel E for fail safe operation and to ensure alarm signal is asserted at low signal amplitude on RGB25Y, H when output is 3-stated.

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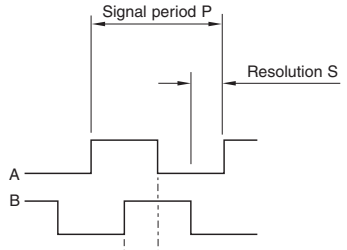
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Output specifications

Digital output signals - type RGB25D, X, Z, Y, H

Form - Square wave differential line driver to EIA RS422A (except external set-up signal X)

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



Model	P (µm)	S (µm)
RGB25D	20	5
RGB25X	4	1
RGB25Z	2	0.5
RGB25Y	0.4	0.1
RGB25H	0.2	0.05

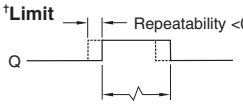
†**Reference**



Synchronised pulse Z, duration as resolution S. Repeatability of position (uni-directional) maintained within ±10 °C from installation temperature and for speed <250 mm/s. For RGB25Y, H only Z pulse re-synchronised at power-up with any one of the quadrature states (00, 01, 11, 10).

Actuation device A-9541-0037.

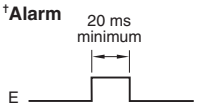
†**Limit**



Asynchronous pulse Q

NOTE: RGH25 readheads and RGB25 digital interfaces are available with reference mark **or** limit switch detection.
Select output option at order.
Actuation device A-9541-0040.

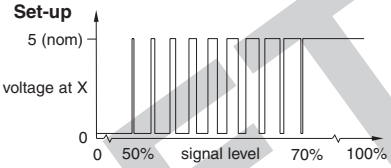
†**Alarm**



Asynchronous pulse E

For RGB25D, X, Z alarm asserted for signal amplitude <15%.
For RGB25Y, H - alarm asserted when:
- Signal amplitude >150%
- Readhead exceeds specified maximum speed
Also, outputs are 3-stated at signal amplitude <15%

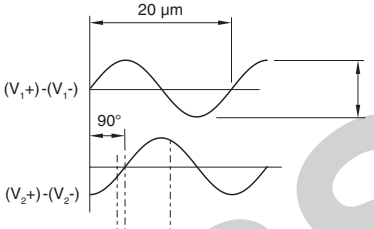
Set-up



Between 50% and 70% signal level, X is a duty cycle, 20 µm duration.
Time spent at 5 V increases with signal level.
At >70% signal level X is nominal 5V.

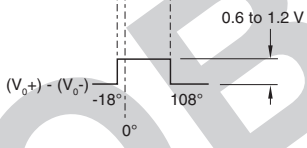
Analogue output signals - type RGB25B (1Vpp)

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



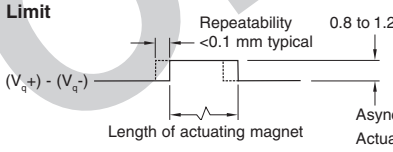
0.6 to 1.2 Vpp with green LED indication and 120R termination.

Reference



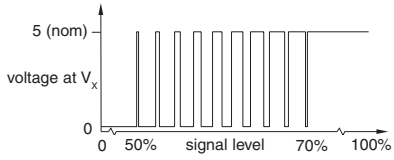
Differential pulse V_0 -18° to 108°. Duration 126° (electrical). Repeatability of position (uni-directional) maintained within ±10 °C from installation temperature and for speed <250 mm/s.
Actuation device A-9541-0037.

Limit



Asynchronous pulse V_q
Actuation device A-9541-0040.

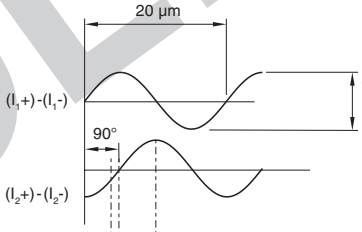
Set-up



Between 50% and 70% signal level, V_x is a duty cycle, 20 µm duration.
Time spent at 5 V increases with signal level.
At >70% signal level V_x is nominal 5V.

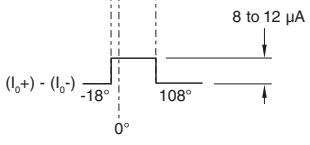
Analogue output signals - type RGB25C (12µA)

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



7 to16 µA with green LED indication

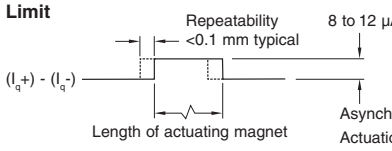
Reference



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.

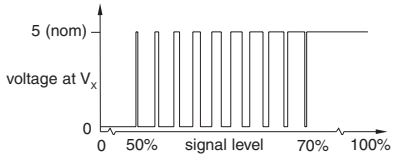
Actuation device A-9541-0037.

Limit



Asynchronous pulse I_q
Actuation device A-9541-0040.

Set-up



Between 50% and 70% signal level, V_x is a duty cycle, 20 µm duration.
Time spent at 5 V increases with signal level.
At >70% signal level V_x is nominal 5V.

†Inverse signals not shown for clarity.

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