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Installation guide
M-9541-0084-04-C

RENISHAW
apply innovation™

RGH24/25U series readhead



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CE

EMC compliance

The RG2 encoder system conforms to the relevant harmonised European standards for electromagnetic compatibility as detailed below.

BS EN 61326

Patents

Features of Renishaw's encoder systems and similar products are the subjects of the following patents and patent applications:

EP 0207121	JP 1549396	US 4959542	EP 0274491
US 4,974,962	EP 0274492	US 4926566	EP 0383901
JP 2,963,926	US 5,088,209	EP 0388453	JP 2837483
US 5,063,685	EP 0514081	JP 3,202,316	US 5,241,173
EP 0543513	JP 248,895/1993	US 5,302,820	EP 0748436
US 5,861,953	EP 826138 B	JP 506,211/1999	US 6,051,971
EP 1147377	JP 2003-512,611	US 6,588,333 B1	

Further information

For further information relating to the installation of RGH24/25 readheads, see also the RGH24 and/or the RGH25 (UHV) Data sheets (Part numbers L-9517-0166, L-9517-0168 and L-9517-9164), and the Scale installation guide (Part number M-9517-2855). These can be downloaded from our website www.renishaw.com/encoder and are also available from your local representative.

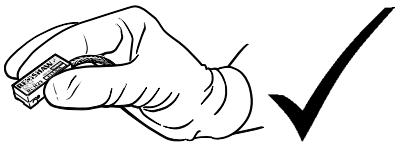
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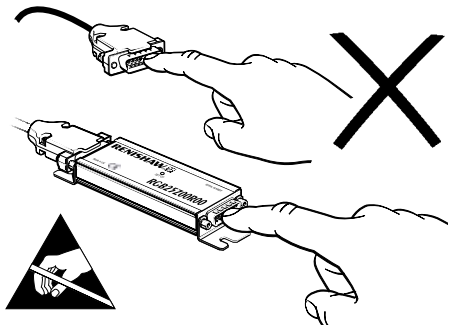
Disclaimer

Considerable effort has been made to ensure that the contents of this document are free from inaccuracies and omissions. However, Renishaw makes no warranties with respect to the contents of this document and specifically disclaims any implied warranties. Renishaw reserves the right to make changes to this document and to the product described herein without obligation to notify any person of such changes.

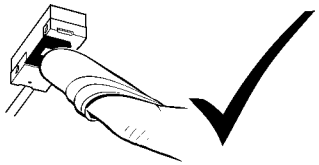
Storage and handling

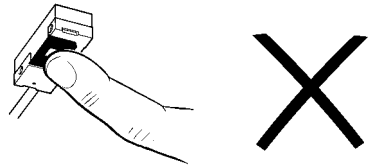


UHV version only



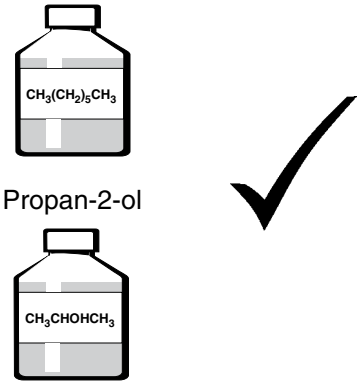
Storage and handling (continued)



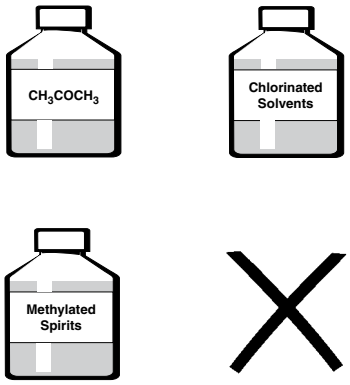


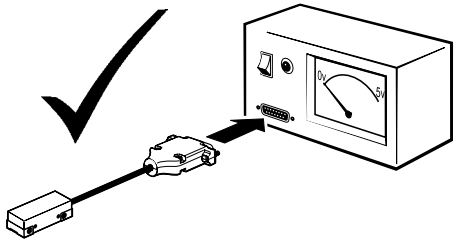
N-heptane

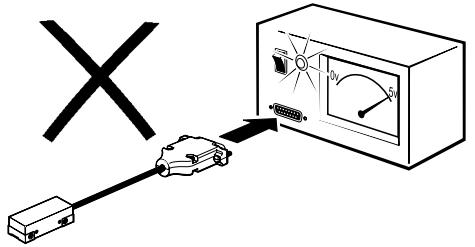
Propan-2-ol

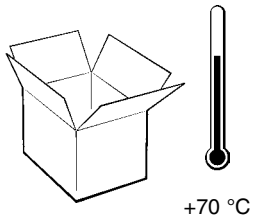


Acetone

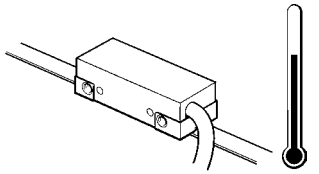




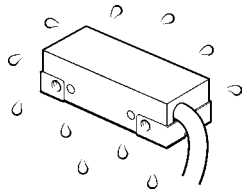




+70 °C
-20 °C
System



+55 °C
0 °C
System

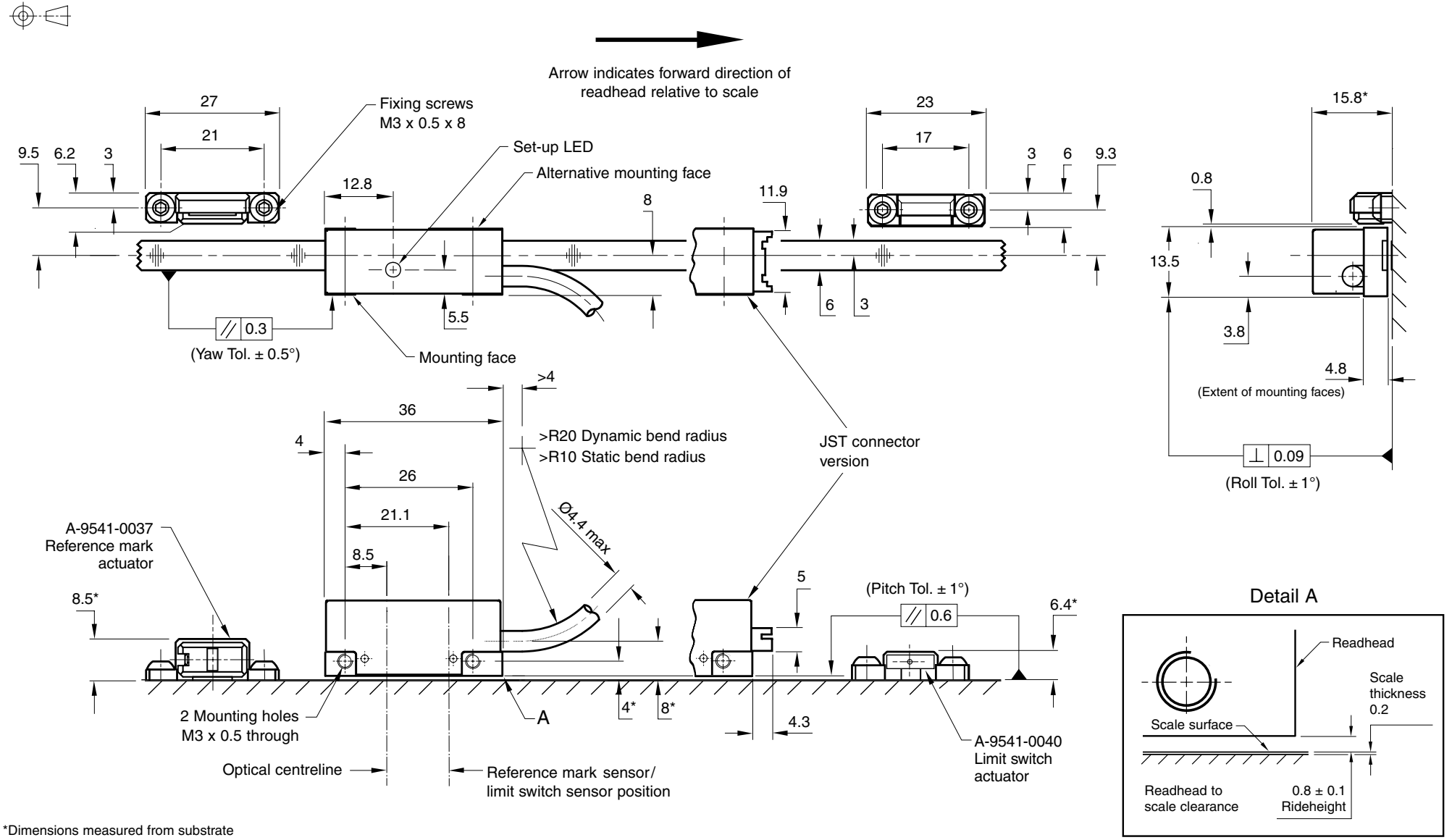


Storage <95% RH
Operating <80% RH

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RGH24/25 Installation drawing

Dimensions and tolerances in mm.



Detail A

*Dimensions measured from substrate

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Readhead mounting/installation

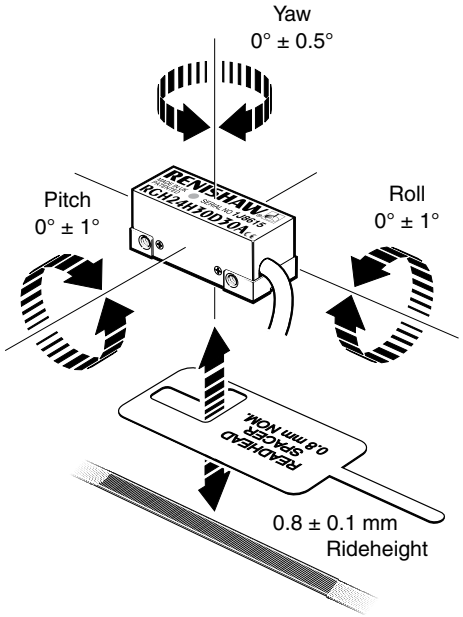
Mounting brackets

The bracket must have a flat mounting surface, enable conformance to the installation tolerances, allow adjustment to the rideheight of the readhead, and be sufficiently stiff to prevent deflection of the readhead during operation. For easier installation, adjust the roll and yaw of the bracket with respect to the axis of readhead travel before the RGH24 or RGH25 is attached. This can be done with a clock gauge and a precision square.

Readhead set-up

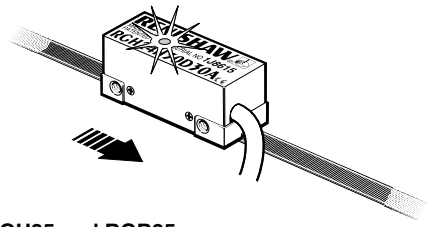
To set nominal rideheight, position readhead spacer with 'L' shaped aperture under the optical centre of the readhead to allow normal LED function during set-up procedure. Ensure that the scale, readhead optical window and mounting face are clean and free from obstructions.

NOTE: Ensure readhead fixing screws are tightened to 0.5 Nm - 0.7 Nm.

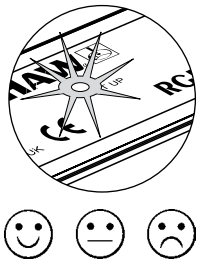


RGH24





RGH25 and RGB25



For reliable operation, the set-up LED should be GREEN when readhead is moved along the full axis travel.

An external set-up signal (X or V_x) is also available on RGB25 interfaces for use where the LED is not visible. In this case, 5V indicates optimum set-up, while a 0V signal indicates that the set-up should be adjusted. The JST version of the RGH24 has an LED repeater signal that can be used in cases where the LED is not visible.

IMPORTANT: The RGH24 range does not incorporate a separate Alarm 'E' signal. Low signal is indicated by a 3-state output of the line driver channels. For further details, refer to the Data sheet Part No. L-9517-0166.

Limit switch

A limit switch signal is output when the readhead sensor passes over the magnetic actuator. For full output specification refer to RGH24 Data sheet (Part number L-9517-0166) and RGH25 Data sheet (Part number L-9517-0168).

Reference mark set-up

To ensure unidirectional repeatability, the reference mark requires phasing with the scale in the direction of normal datuming operation.

A reference pulse is output in both directions, but repeatabilty is guaranteed only in the phased direction.

Ensure readhead is set up correctly with a green LED indication over the full length of travel and that the reference mark actuator is fitted correctly.

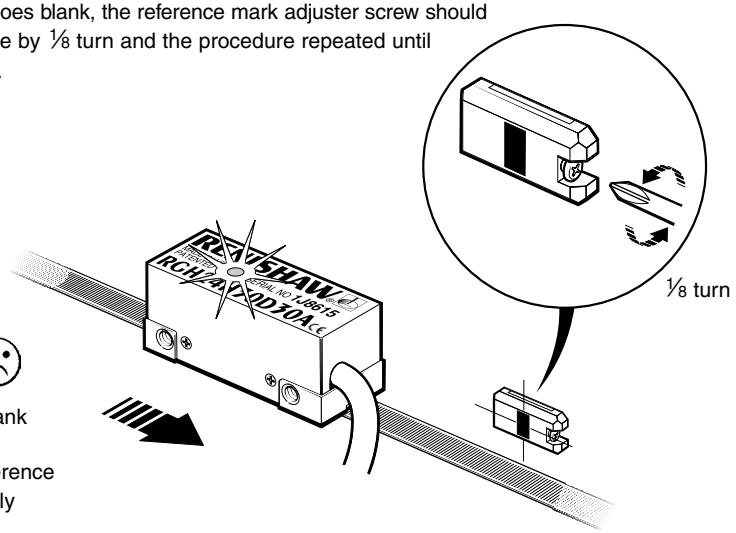
NOTE: It is recommended that a datum procedure is performed as part of any power-up sequence to ensure the correct datum position is recorded.

NOTE: Reference mark output is synchronised with the incremental channels, giving unit of resolution pulse width. For further details see RGH24 and RGH25 Data sheets (L-9517-0166 and L-9517-0168)

Phasing procedure

The readhead must be moved over the reference mark in the direction to be used for the datuming operation. The reference mark is phased correctly when the set-up LED flashes red for 0.25 seconds. If it flashes orange or goes blank, the reference mark adjuster screw should be turned anti-clockwise by ⅛ turn and the procedure repeated until a red flash is obtained.

RGH24



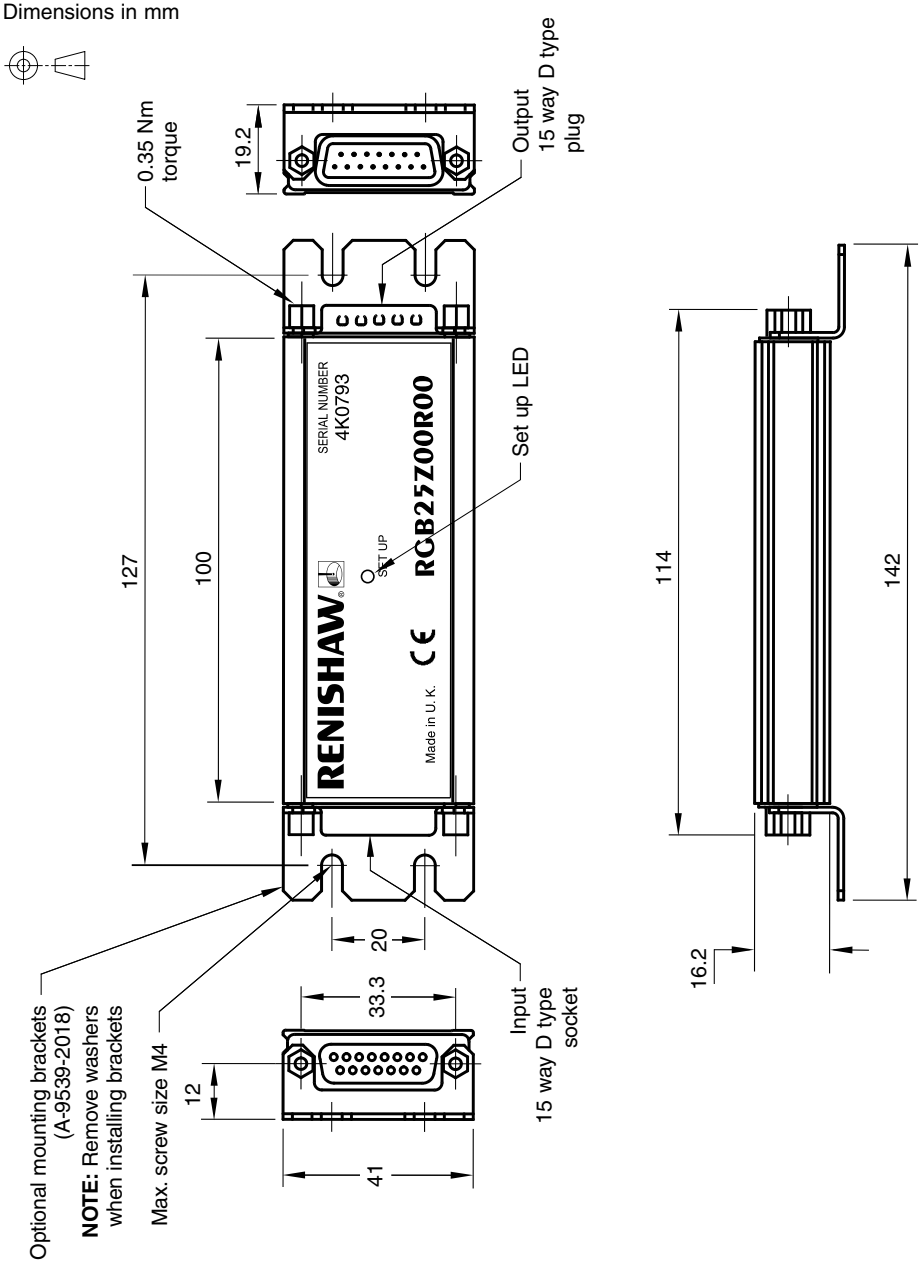


LED flash during reference mark traverse only

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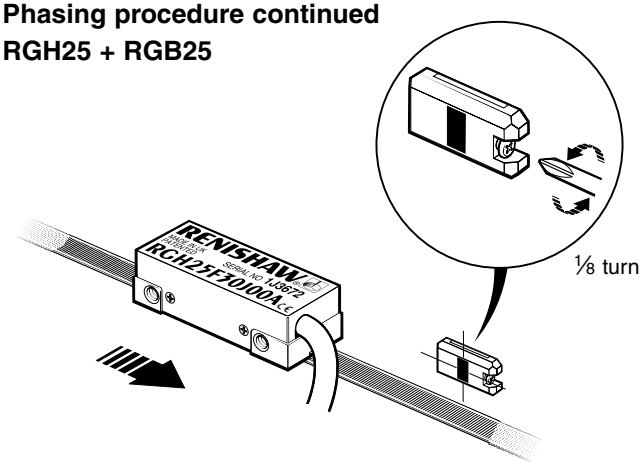
RGB25 Installation drawing

Dimensions in mm



Phasing procedure continued

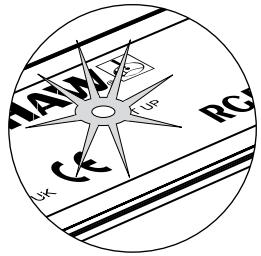
RGH25 + RGB25





Red Orange Blank

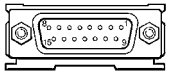
LED flash during reference mark traverse only



Connections

RGB25 input (all models)

Function	Signal	RGH25 core wire colour	RGB25 interface 15 pin D type socket input
Power	5 V	Red	8
	0 V	White	9
	V_{mid}	Brown	3
Incremental signals	A phase	Green	6
	B phase	Yellow	5
	C phase	Blue	4
Reference mark	HALL	Pink	1
Not connected	-	-	2, 7, 11, 12, 13
Sin monitor	-	Do not connect	14
Cos monitor	-	Do not connect	10
Shield	Inner shield (not UHV)		15
	Outer shield		Case



RGB25 input

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RGH24 D, X, Z, W, Y, H, I, O RS422A digital

Function	Signal		Colour	9 pin D type (A)	JST (Z)	15 pin D type (D)
Power	5 V		Brown	5	9	7,8
	0 V		White	1	10	2,9
Incremental signals	A	+	Green	2	8	14
		-	Yellow	6	7	6
	B	+	Blue	4	2	13
		-	Red	8	1	5
Reference mark/Limit switch	Z+/Q-		Pink	3	5	12
	Z-/Q+		Grey	7	6	4
Shield	Inner		Inner shield	9	N/A	15
	Outer		Outer shield	Case	N/A	Case
Remote LED driver	Green		N/A	N/A	4	N/A
	Red		N/A	N/A	3	N/A

3-state Alarm

For RGH24D, X, Z, incremental channels forced open circuit for >20 ms when signal too low for reliable operation.
For RGH24W, Y, H, I, O incremental channels forced open circuit for >10 ms when signal too low or speed too high for reliable operation.

RGH24 B 1Vpp, RGH24C 12µA analogue

Function	Signal	Colour	9 pin D type (A) (B and C outputs)	15 pin D type (L) (B outputs only)	9 pin circular (C) (C outputs only)
Power	5 V	Brown	5	4, 5	6
	0 V	White	1	12, 13	5
Incremental signals	V_1+/I_1+	Green	2	9	8
	V_1-/I_1-	Yellow	6	1	7
	V_2+/I_2+	Blue	4	10	4
	V_2-/I_2-	Red	8	2	3
Reference mark	V_0+/I_0+	Pink	3	3	2
	V_0-/I_0-	Grey	7	11	1
Shield	Inner	–	9	15	9
	Outer	–	Case	Case	Case

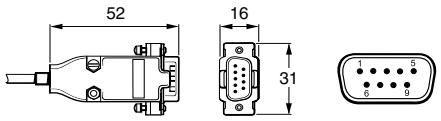
RGB25 output (all models)

Function	Signal	Digital outputs	Analogue outputs
Power	5 V	7	4
	5 V	8	5
	0 V	2	12
	0 V	9	13
Alarm	E+	11	N/A
	E-	3	N/A
External set-up	X/V_x	1	7
Shield	Inner	NOT CONNECTED	
	Outer	Case	Case
Reserved	–	15	15

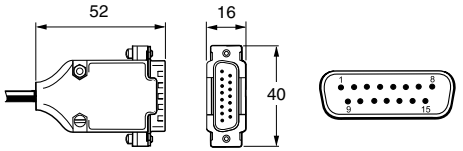
	Digital signal	'B' signal	'C' signal	Digital outputs	Analogue outputs
Incremental signals	A+	V_1+	I_1+	14	9
	A-	V_1-	I_1-	6	1
	B+	V_2+	I_2+	13	10
	B-	V_2-	I_2-	5	2
Reference mark / Limit switch	Z+/Q+	V_0+/V_q+	I_0+/I_q+	12	3
	Z-/Q-	V_0-/V_q-	I_0-/I_q-	4	11

Alarm

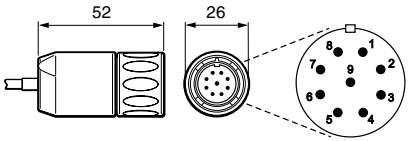
For RGB25D, X, Z alarm asserted for signal amplitude <15%.
For RGB25Y, H alarm asserted when: - Signal amplitude >150% - Readhead exceeds specified maximum speed.
Also, outputs are 3-stated at signal amplitude <15%



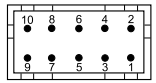
9 pin D type plug (Termination code A)

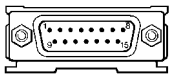


15 pin D type plug (Termination code D, L)



9 pin circular plug (Termination code C)


10 pin JST plug
(Termination code Z)


RGB25 output

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General specifications

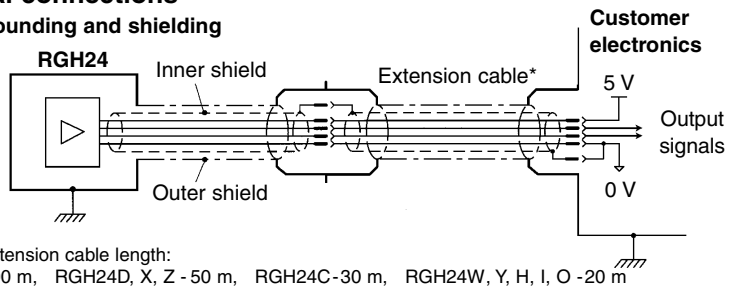
Power supply		
RGH24	5 V ± 5%	120 mA
RGH25+RGB25 (system)	5 V ± 5%	200 mA
RGH25UHV (readhead only)	5 V ± 5%	50 mA
		NOTE: For digital outputs, current consumption figures refer to unterminated readheads/interfaces. A further 25 mA per channel pair (eg A+, A-) will be drawn when terminated with 120 Ω. Renishaw encoder systems must be powered from a 5 V dc supply complying with the requirements for SELV of standard EN (IEC) 60950.
	Ripple	200 mVpp maximum@ frequency up to 500 kHz maximum
Bake-out temperature		120 °C (RGH25UHV only)
Sealing (readhead)		IP40
Acceleration (readhead)	operating	500 m/s^2 BS EN 60068-2-7:1993 (IEC 68-2-7:1983)
Shock (readhead)	non-operating	1000 m/s^2, 6 ms, ½ sine BS EN 60068-2-27:1993 (IEC 68-2-27:1987)
Vibration (readhead)	operating	100 m/s^2, 55 Hz to 2000 Hz BS EN 60068-2-6:1996 (IEC 68-2-6:1995)
Mass		RGH24: 11 g RGH25: 9 g RGB25 interface: 95 g Cable: standard 34 g/m UHV 23 g/m
Cable	Standard	Double shielded, maximum outside diameter 4.4 mm. Flex life >20 x 10^6 cycles at 20 mm bend radius.
	UHV	Single tinned copper braided shield over PTFE insulated cores.
		NOTE: standard 15 pin 'D' type connector fitted is not vacuum compatible.

The RGH24/25 series readheads have been designed to the relevant EMC standards, but must be correctly integrated to achieve EMC compliance. In particular, attention to shielding arrangements is critical. Renishaw recommends the use of a double screened cable to connect RGH24 JST as used in the cable variants of the RGH24/25.

NOTE: Class 1M LED product. LED radiation. Do not view directly with optical instruments.

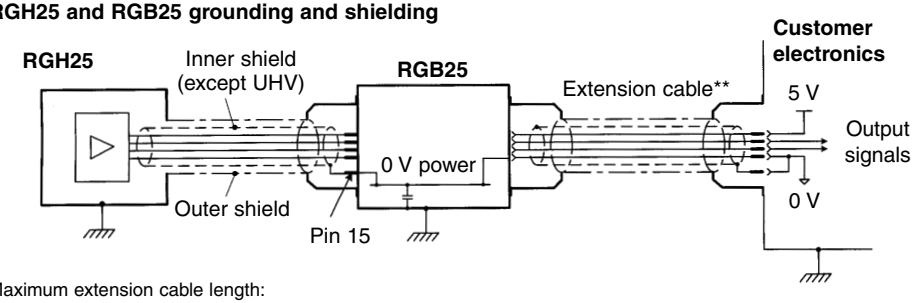
Electrical connections

RGH24 grounding and shielding



*Maximum extension cable length:
RGH24B-100 m, RGH24D, X, Z-50 m, RGH24C-30 m, RGH24W, Y, H, I, O-20 m

RGH25 and RGB25 grounding and shielding

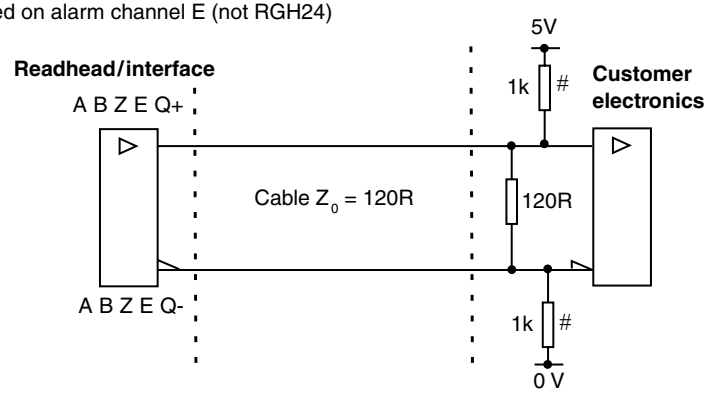


**Maximum extension cable length:
RGB25B-100 m, RGB25D, X, Z-50 m, RGB25C-30 m, RGB25Y, H-20 m

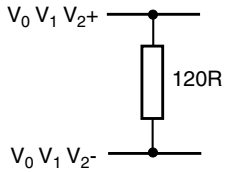
Recommended signal termination

Digital outputs - RGH24D, X, Z, W, Y, H, I, O - RGB25D, X, Z, Y, H

#Only required on alarm channel E (not RGH24)

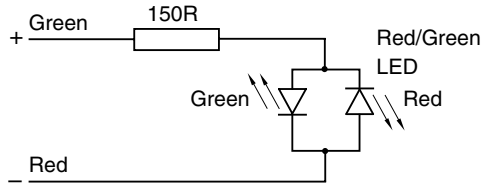


Analogue outputs - RGH24B, RGB25B



Remote LED driver outputs

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



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Readhead part numbers

RGH24 X 30 A 00 A

Datum
A - Standard reference sensor
B - Limit switch sensor (RGH24D, H, I, O, W, X, Y and Z only)

Options
00 - Standard (RGH24B, C, D, X and Z only)
01 - JST connector (RGH24D, X and Z only)
30 - 12 MHz customer clock (RGH24H, I, O and Y only)
31 - 8 MHz customer clock (RGH24H, I, O and Y only)
32 - 6 MHz customer clock (RGH24W only)
33 - 4 MHz customer clock (RGH24H, I, O, W and Y only)
35 - 12 MHz customer clock (RGH24H, I, O and Y JST connector version only)
36 - 8 MHz customer clock (RGH24H, I, O and Y JST connector version only)
37 - 6 MHz customer clock (RGH24W JST connector version only)
38 - 4 MHz customer clock (RGH24H, I, O, W and Y JST connector version only)

Termination
A - 9 pin D type plug
C - 9 pin circular plug (RGH24C only)
D - 15 pin D type plug (RGH24D, H, I, O, W, X, Y and Z only)
F - unterminated cable
L - 15 pin D type plug (RGH24B only)
Z - JST connector (RGH24D, H, I, O, W, X, Y, and Z only)

Cable length
00 - no cable (JST connector only)
15 - 1.5 m (all except JST connector)
30 - 3 m (all except JST connector)
50 - 5 m (all except JST connector)

Output
Analogue B - 1 Vpp
C - 12 µA
Digital D - 5 µm
X - 1 µm
Z - 0.5 µm
W - 0.2 µm
Y - 0.1 µm
H - 50 nm
I - 20 nm
O - 10 nm

Readhead series

NOTE: Not all combinations are valid. Check valid options online at www.renishaw.com/epc

Readhead part numbers

RGH25U 15 J 00 A

Datum
A - Standard reference sensor
B - Limit switch sensor
C - Vacuum reference sensor
D - Vacuum Limit switch sensor

Options
00 - Standard head
01 - Vacuum head and cable

Termination
J - 15 pin D type plug for RGB25 interface (non-vacuum only)
M - 15 pin D type plug for RGB25 interface (vacuum only)

Cable length
15 - 1.5 m
30 - 3 m
50 - 5 m

Readhead series

Interface part numbers for use with RGH25U

RGB25 H 00 R 61

Options
00 - Standard.(RGB25B, C, D, X, and Z only)
61 - 20 MHz customer clock (RGB25H and Y only)
62 - 10 MHz customer clock (RGB25H and Y only)
63 - 5 MHz customer clock (RGB25H and Y only)

Type of datum sensor
R - Standard reference sensor
L - Limit switch sensor

Alarm
00 - E+/E- alarm for signal amplitude <15% (RGB25D, X and Z only)
- E+/E- alarm for signal amplitude >150%; overspeed alarm;
3 state alarm for signal amplitude <15% (RGB25H and Y only)
- No alarm (RGB25B and C only)
01 - 3 state alarm for signal amplitude <15% (RGB25D, X and Z only)

Output
Analogue B - 1 Vpp
C - 12 µA
Digital D - 5 µm
X - 1 µm
Z - 0.5 µm
Y - 0.1 µm
H - 50 nm

Interface series

NOTE: Not all combinations are valid. Check valid options online at www.renishaw.com/epc

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Renishaw plc
New Mills, Wotton-under-Edge,
Gloucestershire GL12 8JR
United Kingdom

T +44 (0)1453 524524
F +44 (0)1453 524901
E uk@renishaw.com
www.renishaw.com

RENISHAW
apply innovation™

For worldwide contact details, please visit our main website at www.renishaw.com/contact

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M-9541-0084-04

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