

## RGH20 series readhead





## EMC Compliance

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

BS EN 61326

## Patents

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

EP 0207121	EP 0514081	JP 1549396	JP 506,211/1999	US 5,241,173
EP 1147377	EP 0543513	JP 501381/88	US 4959542	US 5,302,820
EP 0274491	EP 0843159	JP 2,963,926	US 4,974,962	US 5,861,953
EP 0274492	EP 0748436	JP 2837483	US 4926566	US 6,051,971
EP 0383901	EP 826138 B	JP 3,202,316	US 5,088,209	WO 01/29516
EP 0388453	EP 1094302	JP 248,895/1993	US 5,063,685	

## Further information

For further information, relating to the installation of RGH20, see also the RGH20 Data sheet (part number L-9517-9125). This can be downloaded from our website [www.renishaw.com](http://www.renishaw.com) and also available from your local representative.

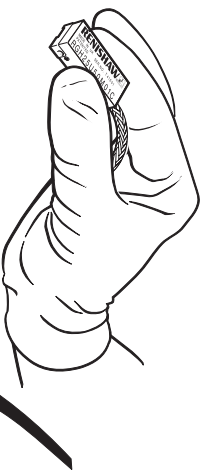
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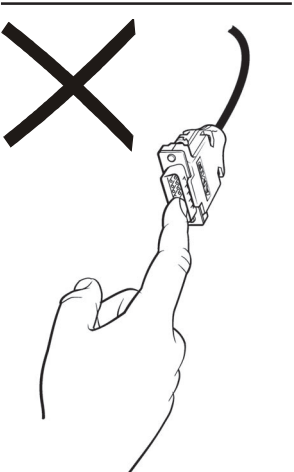
## Disclaimer

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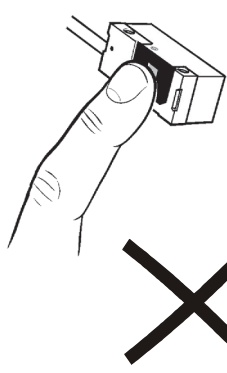
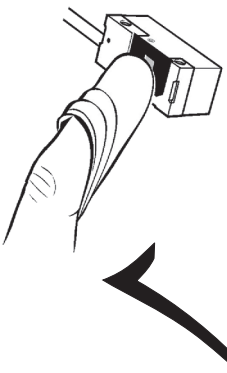
## Storage and handling

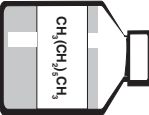
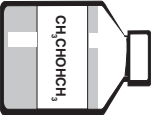

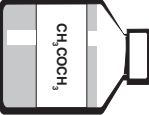
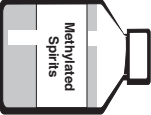

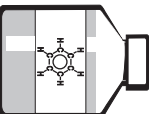
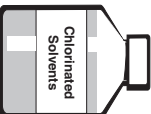


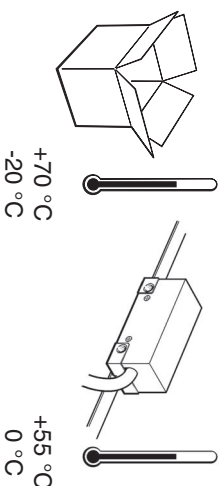
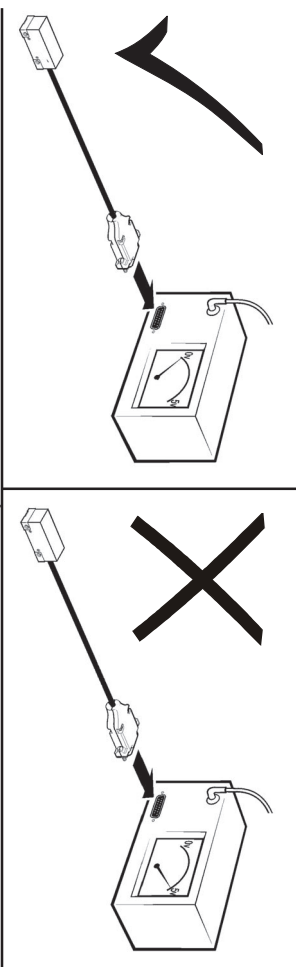
UHV version only



## Storage and handling continued



<p>N-heptane</p>  <p>Propan-2-ol</p> 		<p>Acetone</p>  <p>Methylated Spirits</p> 		<p>Benzene</p>  <p>Chlorinated Solvents</p> 
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## GB - WARNINGS

It is the responsibility of the machine manufacturer and/or encoder installer to ensure that, in safety critical applications of the RG2 and RG4 systems, any form of readhead signal deviation from the limits of the receiving electronics, howsoever caused, shall not cause the machine to become unsafe.

It is the machine supplier's responsibility to ensure that the user is made aware of any hazards involved in operation of their machine, including those mentioned in Renishaw product documentation, and to ensure that adequate guards and safety interlocks are provided.

Remove power before performing any maintenance or cleaning operations.

## F - AVERTISSEMENTS

La responsabilité de veiller à ce que, dans le cadre d'applications des codeurs RG2 et RG4 où les considérations de sécurité doivent être impérativement prises en compte, toute forme de déviation du signal de tête de lecture par rapport aux limites des dispositifs électroniques récepteurs, quelle qu'en soit la cause, ne risque pas de compromettre la sécurité de la machine, incombe au fabricant de la machine et/ou à l'installateur du codeur.

La responsabilité de veiller à ce que l'utilisateur du système soit informé de tous risques associés à l'utilisation des machines, y compris les risques figurant dans la documentation afférente aux produits Renishaw et de vérifier que les dispositifs de protection et de verrouillage de sécurité appropriés ont bien été prévus, incombe au fournisseur de la machine.

Veiller à bien isoler les systèmes de la source d'alimentation avant de procéder à un travail d'entretien quelconque.

## D - ACHTUNG

Es liegt in der Verantwortung des Herstellers der Maschine und/oder dem Nachrüster des Wegmess-Systems RG2 und RG4, dass bei einer sicherheitskritischen Anwendung der Systeme die Emplangselektronik keine Signalabweichung von den Spezifikationen verursacht, die zu einem unsicheren Betrieb der Maschine führen könnten.

Es liegt weiterhin in der Verantwortung des Maschinen-Herstellers sicherzustellen, dass der Benutzer auf alle, einschließlich der in der Renishaw Produktdokumentation aufgeführten Gefahrenwirkungen beim Betrieb der Maschine hingewiesen wird. Ferner ist dafür zu sorgen, dass entsprechende Sicherheitsvorrichtungen vorhanden sind.

Schalten Sie vor der Durchführung von Wartungs- oder Reinigungsarbeiten den Strom ab.

## I - AVVERTENZE

Il fabbricante della macchina e/o l'installatore del sistema dotato di encoder è responsabile di assicurarsi che, nel caso di applicazioni critiche del sistema RG2 e RG4, qualsiasi forma di deviazione, dovuta a qualsiasi causa, del segnale della testina di lettura dai limiti richiesti dal sistema elettronico a cui è diretto non renda la macchina insicura. Il fornitore della macchina è responsabile di assicurarsi che l'utente sia messo al corrente di qualsiasi pericolo connesso con il funzionamento della macchina, inclusi quelli menzionati nella documentazione Renishaw del prodotto, e di assicurarsi che siano fornite adeguate cuffie di protezione ed asseveramenti di sicurezza.

Prima di effettuare qualsiasi intervento di manutenzione o pulizia, isolare la rete di alimentazione.

## E - ADVERTANCIAS

Es responsabilidad del fabricante de la máquina y/o el instalador del sistema codificador asegurarse de que, en las aplicaciones de los sistemas RG2 y RG4 en las que resulta crítica la seguridad, ninguna forma de desviación de la señal de la cabeza de lectura de los límites de la electrónica receptora, sea cual sea la causa, hará que la máquina se vuelva peligrosa. Es responsabilidad del proveedor de la máquina asegurarse de que el usuario tenga conocimientos de cualquier peligro que implica la operación de su máquina, incluyendo los que se mencionan en la documentación sobre los productos Renishaw, y asegurarse de haber suministrado las defensas y dispositivos de interbloqueo adecuados.

Se debe cortar la corriente antes de realizar cualquier trabajo de mantenimiento o limpieza.

## P - AVISOS

É a responsabilidade do fabricante da máquina e/ou instalador do sistema de codificação de certificar-se de que, em aplicações críticas de segurança dos sistemas RG2 e RG4, qualquer forma de desvio do sinal de cabeça de leitura dos limites da electrónica receptora, independente do motivo, não afetará a segurança da máquina. É a responsabilidade do fornecedor da máquina de garantir que o utilizador esteja ciente dos perigos envolvidos na operação da máquina, a incluir os mencionados na documentação do produto da Renishaw e de certificar-se de que existem protectores e travas de segurança adequados.

Desligar a máquina antes de efectuar operações de manutenção ou limpeza.

## DK - ADVARSLER

Maskinfabrikanten og/eller indkodningsoperatøren står ansvarlig for at sikre at sikkerheden opretholdes for RG2 og RG4's kritiske applikationssystemer, samt at alle former for afvigelse i læsesignalerne fra modtagerelektronikkens begrænsninger ikke gør maskinen usikker, uanset hvordan dette er opstået.

Maskinleverandøren er ansvarlig for at brugeren gøres bekendt med de risici der er involveret i betjening af maskinen, inklusive dem der er angivet i Renishaw's produktdokumentering, samt sikre tilstedeværelsen af forsvarlige sikkerhedsudrustninger og sikkerhedsåbne.

Inden der udføres nogen for for vedligeholdelse eller rengøring, skal strømtojsyningen frakobles.

## NL - WAARSCHUWINGEN

De machinefabrikant en/of de installateur van het codeer/systeem is ervoor verantwoordelijk dat bij de toepassing van de RG2- en RG4-systemen wear de veiligheid kritisch is, elk deviatie van het leesesignaal buiten de grenzen van de omtvangende elektronische apparatuur, ongeacht de oorzaak, de machine niet onveilig maakt.

De leverancier van de machine is ervoor verantwoordelijk dat de gebruiker op de hoogte wordt gesteld van de risico's die verbonden zijn aan het gebruik, waaronder de risico's die vermeld worden in de productdocumentatie van Renishaw. De leverancier dient er tevens voor te zorgen dat de gebruiker is voorzien van voldoende beveiligingen en veiligheidsingedeelrichtingen.

Voordat u enig technisch onderhoud of schoonmaak werkzaamheden verricht dient u de stroom uit te schakelen.

## SW - VARNING

Der är maskin tillverkarens och/eller givarsysteminställarens ansvar att se till att säkerheten inte äventyras i säkerhetskritiska tillämpningar av RG2 och RG4 om signalen från läshuvudet skulle avvika från vad den mottagande elektroniken klarar, hur denna avvikelse än har uppstått.

Det är maskinleverantörens ansvar att se till att användaren är medveten om eventuella faktorer förbundna med användningen av maskinen, inklusive de som anges i Renishaws produktdokumentation, och att se till att lämpliga skydd och föregående tips.

Maskinen måste göras strömlös innan några skötsel- eller rengöringsarbeten görs.

## FIN - VAROITUKSIA

Koneen valmistajan ja/tai enkoderijärjestelmän asentajan vastuulla on varmistaa, että turvallisuuden suojausta vaativissa RG2- ja RG4-sovelluksissa minkälämuotoisen lukkupaäsignaalin polkkeavun vastaanotavan elektronisen läjätelstämän rajoista – riippumatta siitä, kuinka se on aiheutunut – ei tee konketta turvallisuutta vaarantavaksi.

Koneen toimittajan vastuulla on varmistaa, että käyttäjä on tietoinen kaikista koneensa käyttöön liittyvistä vaaroista mukaan lukien Renishaw-yhtiön tuoteasiakirjojen mainisemat vaarat ja varmistaa, että on toimittu aslammukaiset suojukset ja turvallisuusket.

Katkaise virta ennen minkäläisten huolto- tai puhdistustoiinten suoritamista.

## GR - ΠΡΟΕΙΔΟΤΗΞΕΙΣ

Ο κατασκευστής του μηχανήματος και/ή ο υπεύθυνος εγκατάστασης του συστήματος κωδικοποίησης οφείλουν να διασφαλίσουν ότι, κατά τις επιπολέεις εφαρμογές των συστημάτων RG2 και RG4, οποιοδήποτε joppή απόκλιση του σήματος κεφαλής γύρω της από τα όρια του ηλεκτρονικού όεκτη, που δημιουργήθηκε κροτήν οποιοδήποτε αντίος όεν θα όέσει σε κίνδυνο την ασφάλεια του μηχανήματος.

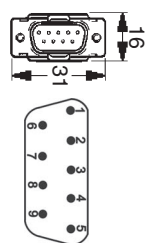
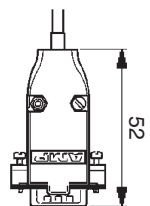
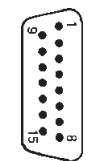
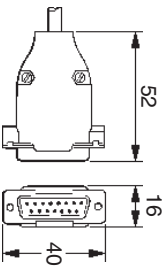
Ο τροποθετής του μηχανήματος οφείλει να διασφαλίσει ότι ο χρήτης είναι ενήμερος για τους κινδύνους που συνδέονται με τη χρήση του μηχανήματος του, συμπεριλαμβανομένων και όων συγκεκριμένων στα έγγραφα προϊόντων του Renishaw. Επίσης οφείλει να διασφαλίσει ότι υπάδχουν οι κατάλληλες ασφάλειες και δικέλειός ασφαλέιός.

Κέλιε το διακόκτην του πέυματος προτού ξεκινήσετε οποιοδήποτε άσκουπιές συντήρησης ή καθαρισμού.

## JP - 警告

RG2及/RG4システムの安全限界性能以内で、受信電気回路が受け取れる信号の限界から逸脱した信号が、リードヘッドから如何なる形式で、出力されたとしても、装置を安全な状態に保つ事は、装置製造メーカーの責任です。また、レニショウの製品関連書類に記載されている事項を含め、装置の操作中に起こり得る如何なる危険性を作業者に知らせる事、及び、十分な安全性、及び、安全確保機能を設ける事は、装置供給業者の責任です。メンテナンス及び、クーリーニング作業の際は、必ず電源を切つてから行なつて下さい。

## Connection diagram



15 pin 'D' type plug (termination code D)

9 pin 'D' type plug (termination code A)  
Flying lead (termination code F)

## Digital types D, X, Z, W, Y, RS422A

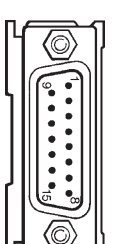
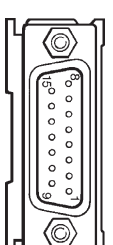
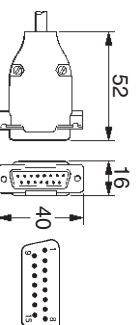
Function	Signal	Colour (F)	9 pin 'D' type (A)	15 pin 'D' type (D)
	Power	5 V	Brown	5
0 V		White	1	2, 9
Incremental signals	A	Green	2	14
	-	Yellow	6	6
	+	Blue	4	13
	B	Red	8	5
Reference mark / limit switch	Z+/Q-	Pink	3	12
	Z-/Q+	Grey	7	4
Shield	Inner	Inner shield	9	15
	Outer	Outer shield	Case	Case

## Analogue type B, 1 Vpp

Function	Signal	Colour (F)	9 pin 'D' type (A)	15 pin 'D' type (L)
Power	5 V	Brown	5	4, 5
	0 V	White	1	12, 13
Incremental signals	V <sub>1+</sub>	Green	2	9
	V <sub>1-</sub>	Yellow	6	1
	V <sub>2+</sub>	Blue	4	10
	V <sub>2-</sub>	Red	8	2
Reference mark / limit switch	V <sub>0+</sub> /V <sub>q-</sub>	Pink	3	3
	V <sub>0-</sub> /V <sub>q+</sub>	Grey	7	11
Shield	Inner	Inner shield	9	15
	Outer	Outer shield	Case	Case

## RGF

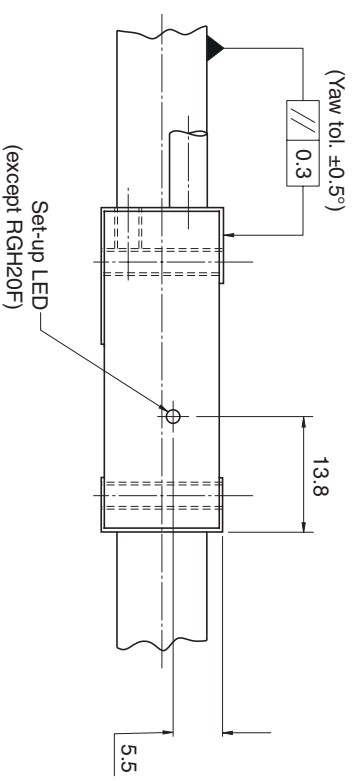
For RGH20F only



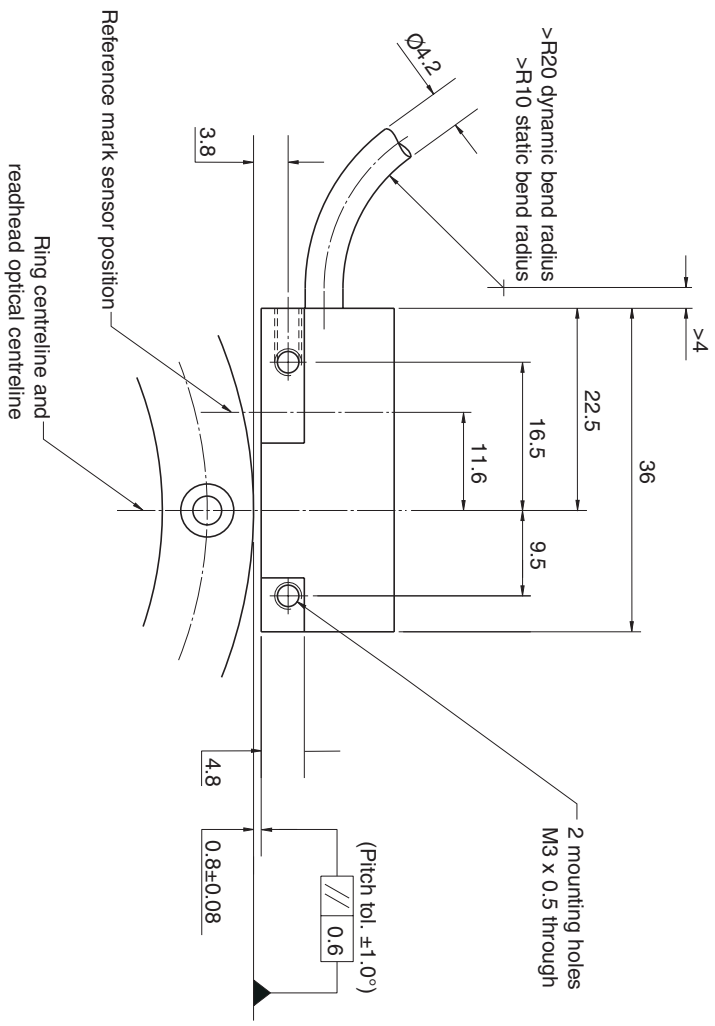
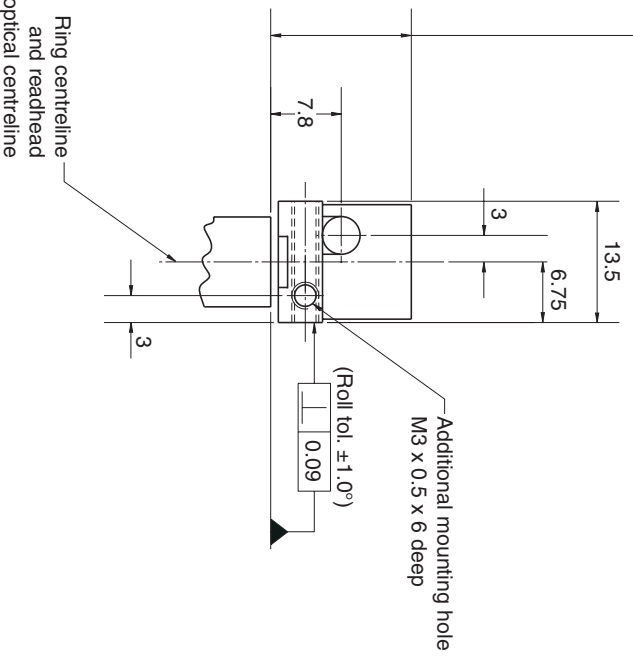
15 pin 'D' type plug  
(termination code D)

Function	Wire colours from readhead	Input		Output	
		Signal	Pin	Signal	Pin
Power	Red	5 V	8	5 V	7, 8
	White	0 V	9	0 V	2, 9
Incremental signals	Green	A	6	A+, V <sub>1+</sub>	14
	Yellow	B	5	A-, V <sub>1-</sub>	6
	Blue	C	4	B+, V <sub>2+</sub>	13
Reference mark / limit switch	-	-	-	B-, V <sub>2-</sub>	5
	Pink	Hall	1	Z+, Q+/V <sub>0+</sub> , V <sub>q+</sub>	12
Alarm	-	-	-	Z-, Q-/V <sub>0-</sub> , V <sub>q-</sub>	4
	-	-	-	E+	11
ired servo	Brown	Servo	3	E-	3
External set-up	Interface outputs only	Servo	3	-	-
		V <sub>x</sub>	13	XV <sub>x</sub>	1
Sin monitor	Sin monitor outputs only	V <sub>and</sub>	7	-	-
		Sin monitor	14	-	-
Cos monitor	Cos monitor	Sin monitor	14	-	-
		Cos monitor	10	-	-
Shield	-	Inner	15	-	-
		Outer	Case	Outer	Case
Do not connect	-	-	2, 11, 12	-	10, 15

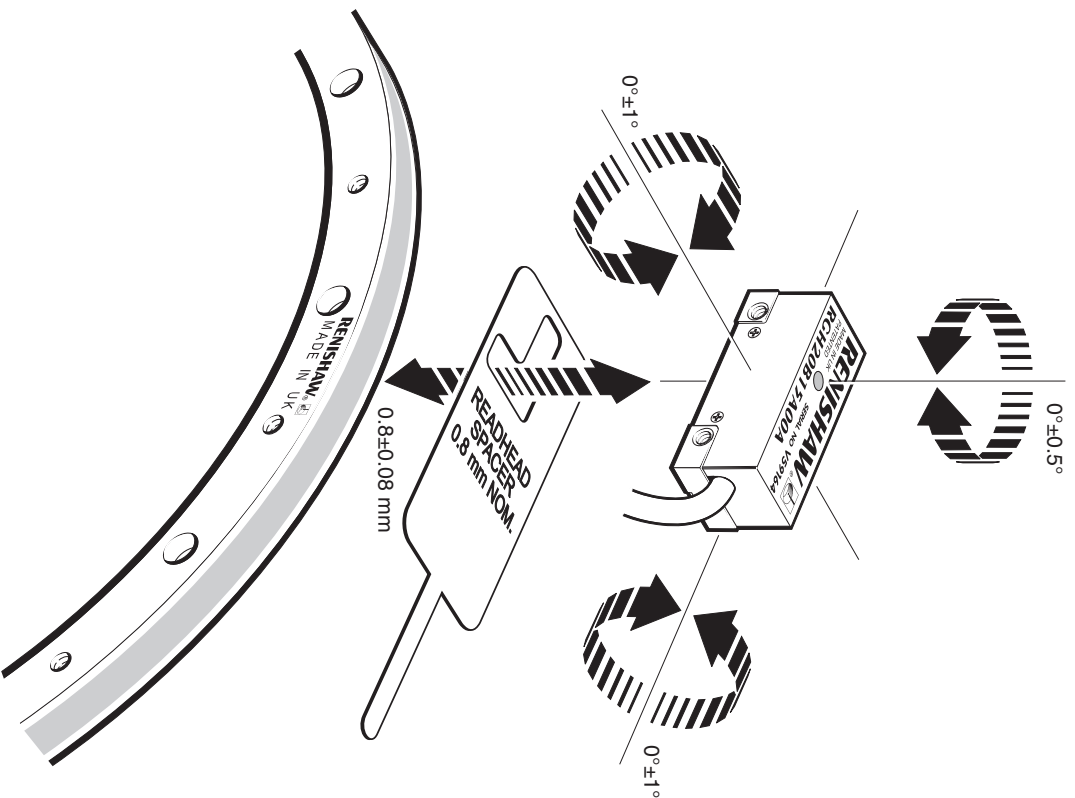
# RGH20 installation drawing Dimensions and tolerances in mm



15.6 (for RGH20 variants D, X, Z, W, Y, B)  
11.3 (for RGH20 variant F)



**NOTE:** For reference mark and limit switch installation please refer to RESR Installation guide (M-9559-0675).



Use readhead spacer to set nominal rideheight. Position aperture under optical centre to allow normal LED function during set-up procedure.

## Reference mark set-up

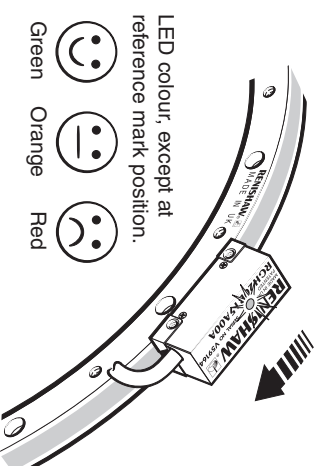
To ensure unidirectional repeatability, the reference mark requires phasing with the scale in the direction of normal datuming operation.

### Unidirectional repeatability

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

### Phasing direction

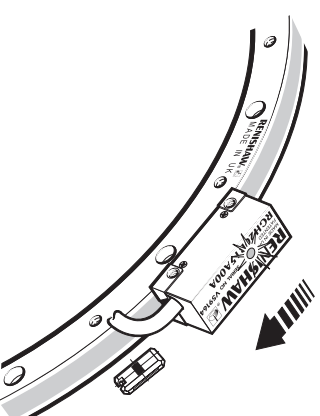
1. Ensure the readhead is set up correctly with a green LED indication over the full length of travel and that the reference mark actuator is fitted correctly.



LED colour, except at reference mark position.



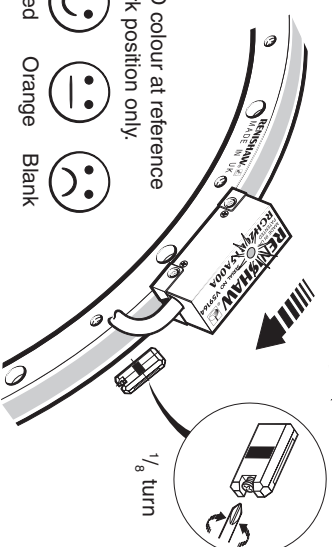
2. Move the readhead past the reference mark in the direction to be used for the datuming operation.



LED colour at reference mark position only.



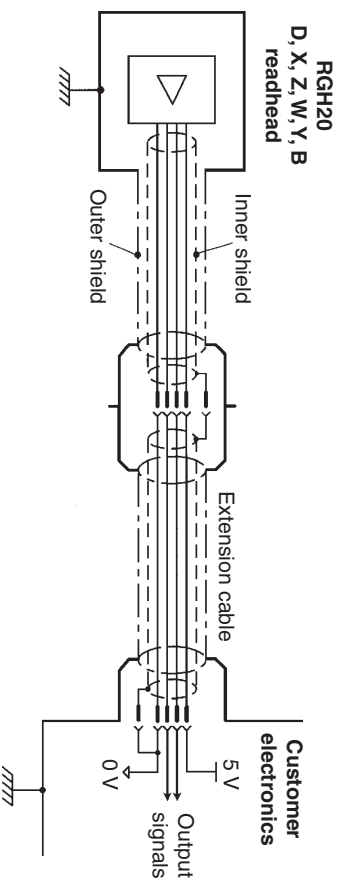
3. The reference mark is phased correctly when the set-up LED flashes red for 0.25 seconds. If it flashes orange or blank, the reference mark adjuster screw should be turned anticlockwise by  $\frac{1}{8}$  turn and the procedure repeated until a red flash is obtained.



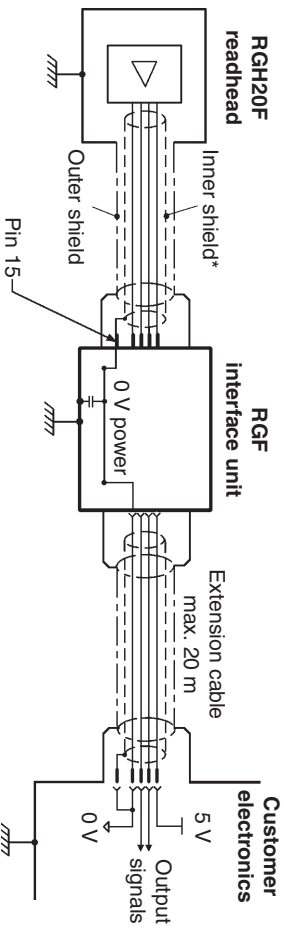
**NOTE:** For the RGH20F only, set-up LED is situated on RGF interface.

## Electrical connections

### RGH20 grounding and shielding



### RGH20F/RGF grounding and shielding



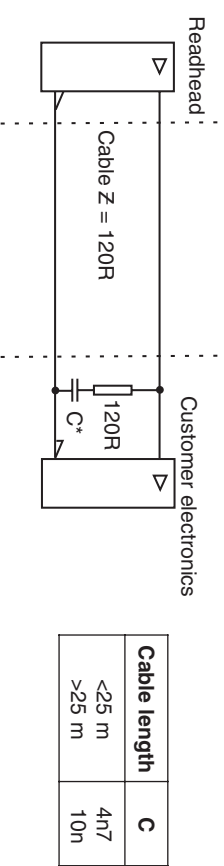
\* Inner shield on standard RGH20F only. No inner shield on RGH20 UHV.

## Electrical connections continued

### Recommended signal termination

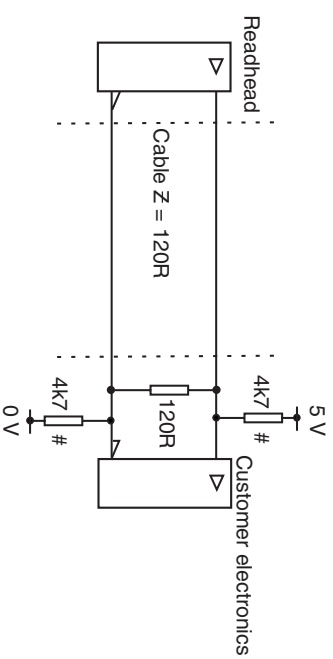
#### Digital readheads - type RGH20D, X, Z, W, Y

\* Optional power saving capacitor, for recommended values see below.



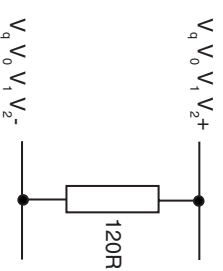
#### RGF interfaces

# Only required on alarm channel E for fail safe operation.



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

#### Analogue termination network - type RGH20B only



## General specifications

**Power supply** 5 V ± 5 %

- 170 mA (RGF1000 + RGH20F)
- 210 mA (RGF2000 + RGH20F)
- 90 mA RGH20D, X, Z
- 110 mA RGH20W, B
- 140 mA RGH20Y

**NOTE:** 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

**Sealing (readhead)**

IP40

**Acceleration (readhead) operating**

500 m/s<sup>2</sup> (IEC 60068-2-7)

**Shock (readhead) non-operating**

1000 m/s<sup>2</sup>, 6 ms, ½ sine (IEC 60068-2-27)

**Vibration (readhead) operating**

100 m/s<sup>2</sup>, 55 to 2000 Hz (IEC 60068-2-6)

**Mass**

Readhead

RGH20D, X, Z, W, Y, B: 11 g

RGH20F: 9 g

RGF1000: 100 g

RGF2000: 125 g

Standard: 34 g/m

UHV: 23 g/m

**Cable**

Standard:

Double-shielded, outside diameter 4.2 mm.

Flex life >20 x 10<sup>6</sup> cycles at 20 mm bend radius.

Single tinned copper braided shield over PTFE insulated cores.

UHV:

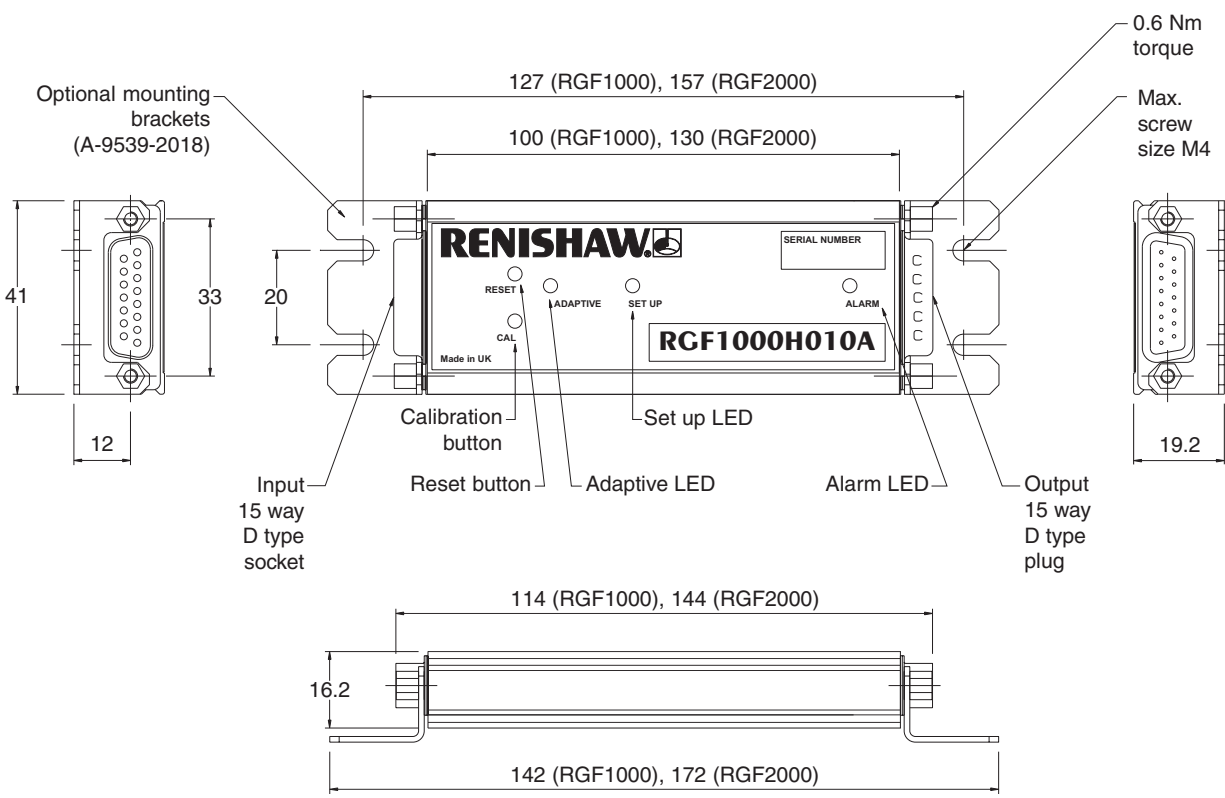
NOTE: standard 15 pin D-type connector fitted is not vacuum compatible.

**IMPORTANT:** Power to Renishaw encoder systems must be supplied from a 5 V DC SELV supply complying with the essential requirements of BS EN 61010 or similar specification.

The RGH20F 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 essential.

## RGF installation drawing

Dimensions in mm



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