



EMC Compliance

The RG2 and RG4 Encoder Systems conform to the relevant harmonised European standards for electromagnetic compatibility as detailed below.

BS EN 50081-2: Electromagnetic compatibility. Generic emission standard - Industrial environment.

BS EN 50082-2: Electromagnetic compatibility. Generic immunity standard - Industrial environment.

BS EN 55011: Specification for limits and methods of measurement of radio disturbance characteristics of industrial, scientific and medical (ISM) radio-frequency equipment.

Patents

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

EP 0274491	EP 0207121	JP 1549396
US 4959542	JP 501381/88	EP 0383901
US 5,088,209	JP 2,963,926	US 4,974,962
JP 248,895/1993	EP 0543513	EP 0843159
EP 0274492	EP 0748436	US 4926566
EP 0826138	US 5,302,820	JP 506,211/1999
US 5,861,953	US 6,051,971	EP 0414081
JP 133,732/1993	US 5,241,173	

Further information

For further information relating to the installation of RG41 readheads, see also the RG41 datasheet (part number L-9517-0186), and the Scale installation guide (part number M-9517-2855). These can be downloaded from our website www.renishaw.com and are also available from your local representative.

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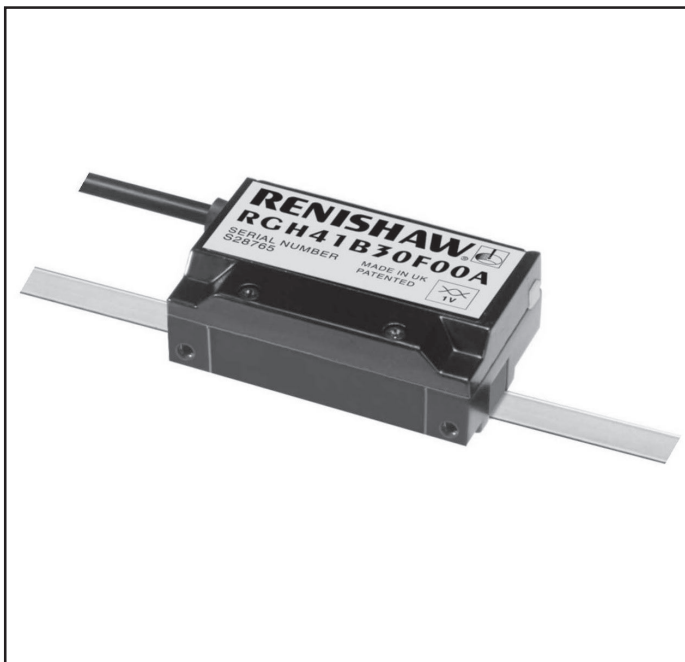
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RENISHAW®

RGH41 Installation Guide

WARNINGS

GB

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.

AVERTISSEMENTS

F

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.

ACHTUNG

D

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 Empfangselektronik 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 die 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 Durchführung von Wartungs- oder Reinigungsarbeiten den Strom ab.

AVVERTENZE

I

Il fabbricante della macchina e/o l'installatore del sistema dotato di decodificatore è responsabile di assicurarsi che, nel caso di applicazioni critiche dei sistemi 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 asservimenti di sicurezza.

Staccare la rete elettrica d'alimentazione prima di eseguire qualsiasi operazione di manutenzione o di pulizia.

ADVERTANCIAS

E

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.

AVISOS

P

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 afectará 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.

ADVARSLER

DK

Maskinfabrikanten og/eller indkodningsoperatoren 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 produktokumentering, samt sikre tilstedeværelsen af forsvarelig sikkerhedsskærme og sikkerhedslåse.

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

WAARSUCHSWINGEN

NL

De machinefabrikant en/of de installateur van het codeersysteem is ervoor verantwoordelijk dat bij de toepassingen van de RG2- en RG4-systemen waar de veiligheid kritisch is, elk deviatie van het leesopsignaal buiten de grenzen van de ontvangende elektronische apparatuur, ongeacht de oorzaak, de machine niet onveilig maakt.

De machineleverancier is ervoor verantwoordelijk dat de gebruikers van de mogelijke gevaren bij het gebruik van hun machine bewust worden gemaakt, inclusief de gevaren die in de productdocumentatie van Renishaw vermeld staan, en tevens dat er voldoende afschermkappen en beveiligingsschakelingen worden aangebracht.

Schakel eerst de stroom uit voordat u schoonmaak- of onderhoudswerkzaamheden uitvoert.

WARNING

SW

Det är maskintillverkarens och/eller givarsysteminstallatörens 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 faror förbundna med användningen av maskinen, inklusive de som anges i Renishaws produktokumentation, och att se till att lämpliga skydd och föregångar finns.

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

VAROITUKSIA

FIN

Koneen valmistajan ja/tai enkooderijärjestelmän asentajan vastuulla on varmistaa, että turvallisuuden suojausta vaativissa RG2- ja RG4-sovelluksissa minkäänmuotoinen lukupääsignaalin poikkeavuus vastaanottavan elektronisen järjestelmän rajoista – riippumatta siitä, kuinka se on aiheutunut – ei tee konetta turvallisuutta vaarantavaksi. Koneen toimittajan vastuulla on varmistaa, että käyttäjä on tietoinen kaikista konsensa käyttöön liittyvistä vaaroista mukaan lukien Renishaw-yhtiön tuoteasiakirjojen mainitsemat vaarat ja varmistaa, että on toimitettu asianmukaiset suojukset ja turvallikutukset.

Katkaise virta ennen minkäänlaisten huolto- tai puhdistustöiden suorittamista.

ΠΡΟΒΛΕΠΟΜΕΝΕΣ

GR

Ο κατασκευαστής του μηχανήματος και/ή ο υπεύθυνος εγκατάστασης του συστήματος κωδικοποίησης οφείλουν να διασφαλίσουν ότι, κατά τις εφαρμογές των συστημάτων RG2 και RG4, οποιαδήποτε μορφή απόκλισης του σήματος κεφαλής ζήτησης από τα όρια του ηλεκτρονικού δέκτη, που δημιουργήθηκε κατά τον οποιαδήποτε αιτία, δεν θα θέσει σε κίνδυνο την ασφάλεια του μηχανήματος.

Ο προμηθευτής του μηχανήματος οφείλει να διασφαλίσει ότι ο χρήστης είναι ενήμερος για τους κινδύνους που συνδέονται με τη χρήση του μηχανήματος του, συμπεριλαμβανομένων και όσων αναφέρονται στα έγγραφα προϊόντων του Renishaw. Επίσης οφείλει να διασφαλίσει ότι υπάρχουν οι κατάλληλες ασφάλειες και δικλείδες ασφαλείας.

Κλείστε το διακόπτη του ρεύματος προτού ξεκινήσετε οποιαδήποτε λειτουργίες συντήρησης ή καθαρισμού.

Storage and handling

Readhead storage temperature: -20°C to +70°C (-4°F to +158°F)

DO NOT store readheads in conditions of high humidity as this may cause condensation to form on the readhead optics.

DO NOT touch PCB components unless suitable antistatic measures have been taken.

DO NOT connect or disconnect the readhead with the power on.

DO NOT touch the readhead optics with bare hands.

DO ensure protection is provided for both scale and readhead when transporting a machine with the equipment already installed.

DO refer to Scale installation guide (part number M-9517-2855) for information on correct storage, handling and cleaning of scale.

Maintenance and cleaning



WARNING: Remove power before performing any maintenance operations.

DO use Renishaw RGW-1 alcohol wetted scale wipes to clean the readhead optics and the scale, available from your Renishaw representative.

Or **DO** use a clean dry lint-free cloth.

Or **DO** use only the following solvents sparingly with a wetted lint-free cloth:

- Propan-2-ol (iso-propyl alcohol) $\text{CH}_3\text{CHOHCH}_3$
- n-Heptane $\text{CH}_3(\text{CH}_2)_5\text{CH}_3$

DO NOT use the following aggressive solvents to clean the scale:

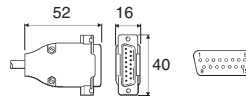
- Acetone CH_3COCH_3
- Chlorinated solvents
- Benzene
- Methylated spirits

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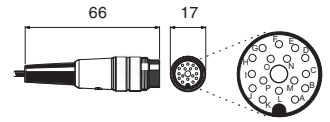
Connection diagram

RGH41 digital output types T, D, G, X

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



In-line connector
(termination code X)



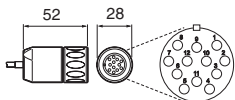
Function	Signal	Colour (F)	15 pin 'D' type (D)	In-line connector (X)
Power	5V	Brown	7	A
		Brown (link)	8	M
	0V	White	2	B
		White (link)	9	N
Incremental signals	A+	Green	14	G
	A-	Yellow	6	D
	B+	Blue	13	R
	B-	Red	5	F
Reference mark	Z+	Violet	12	K
	Z-	Grey	4	O
Limit switches	Q	Pink	10	H
	P	Black	11	I
Alarm	E-	Orange	3	P
External set-up	X	Clear	1	E
Shield	Inner	Green/Yellow	15	L
	Outer		Case	Case

6

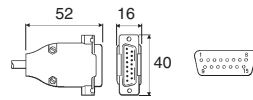
Connection diagram

RGH41 analogue output type A and B - 1Vpp

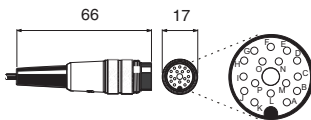
12 pin circular plug
(termination code V)



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



In-line connector
(termination code X)



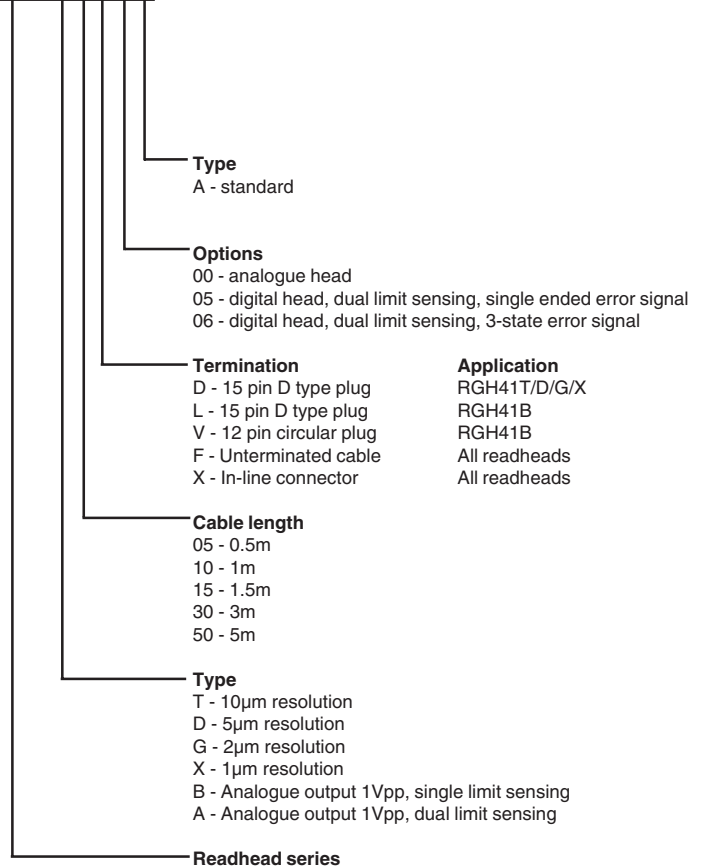
Function	Signal	Colour (F)	15 pin 'D' type (L)	12 pin circular (V)	In-line connector (X)
Power	5V	Brown	4	2	A
		Brown (link)	5	12	M
	0V	White	12	10	B
		White (link)	13	11	N
Incremental signals	V ₁₊	Red	9	5	F
	V ₁₋	Blue	1	6	R
	V ₂₊	Yellow	10	8	D
	V ₂₋	Green	2	1	G
Reference mark	V ₀₊	Violet	3	3	K
	V ₀₋	Grey	11	4	O
*Limit switch	V _s	Pink	8	NC	H
External set-up	V _x	Clear	7	NC	I
Shield	Inner	Green/Yellow	15	11 (link)	L
	Outer		Case	Case	Case

*Please note that dual limit versions (A) utilise the clear wire (pin 7) as the 'V_p' limit output. The 'V_x' external set-up signal on these versions is not available. Dual limit readheads are only available with 'F', 'L', or 'X' terminations.

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Readhead nomenclature

RGH41 B 15 L 00 A



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General operating specifications



CAUTION: Voltage spikes on the power supply line can result in permanent damage to the readhead. Please ensure that the power supply output is regulated to prevent this.

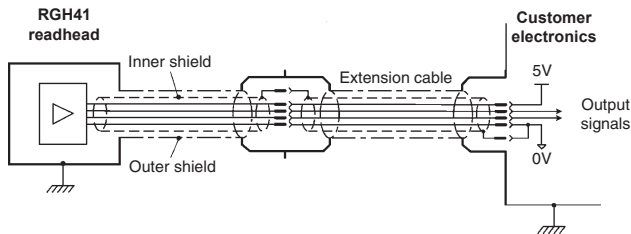
Power supply	5V±5% 120mA (typical), complying with BS EN 61010
Temperature	Storage: -20°C to +70°C Operating: 0°C to +55°C
Humidity	10 - 90% RH non-condensing
Sealing	IP50
Acceleration operating	300m/s ²
Shock non-operating	1000m/s ² , 11ms, 1/2 sine
Vibration operating	100m/s ² , 55 to 2000Hz per IEC 68-2-6
Mass	Readhead: 30g Cable: 32g/m
EMC compliance	BS EN 50081-2, BS EN 50082-2, BS EN 55011
Cable integral	12 core, double shielded, outside dia. 4.7mm. Flex life >10x10 ⁶ cycles at 50mm bend radius.

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

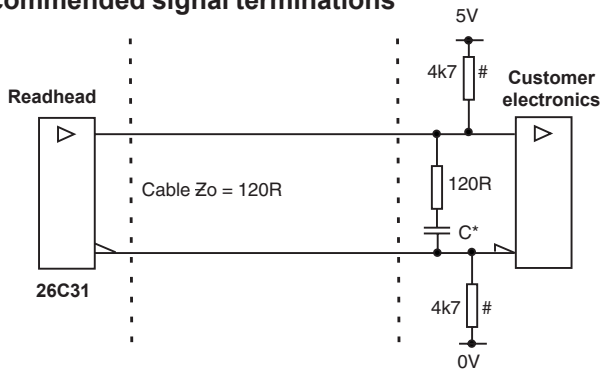
9

Electrical connection

Grounding and shielding



Recommended signal terminations



* Optional power saving capacitor

Only required on alarm channel E for fail safe operation

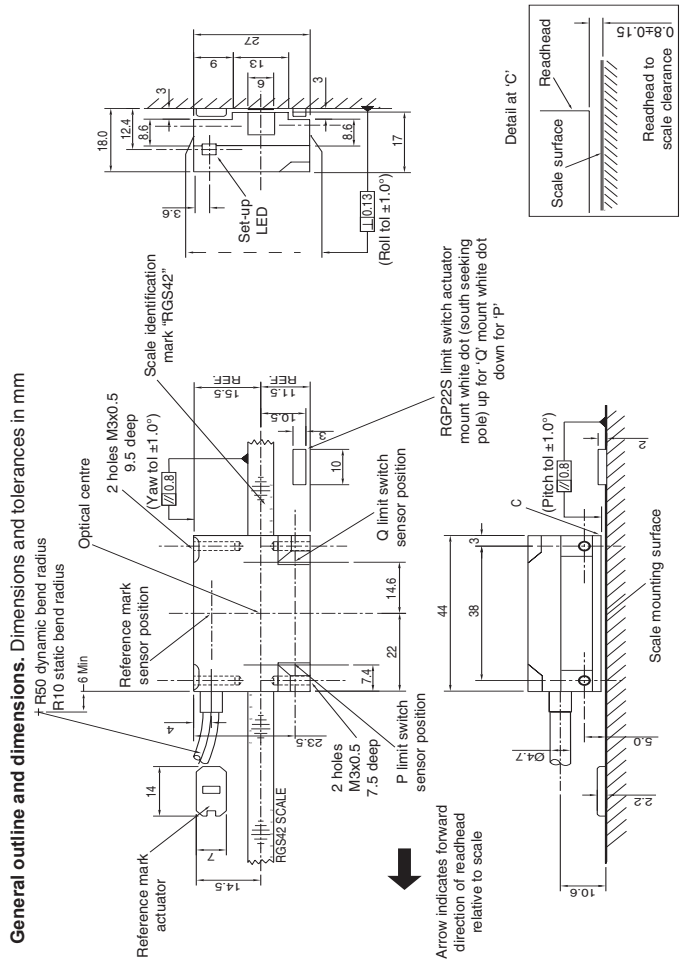
Maximum length of extension cable that can be used for different types of readhead:-

A/B = 100m

T/D/G/X = 50m

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Installation drawing



General outline and dimensions. Dimensions and tolerances in mm

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Installation 1

Mounting brackets

The bracket must have a flat mounting surface, conform to the installation tolerances, allow adjustment to the rideheight, and be sufficiently stiff to prevent deflection of the readhead during operation.

For easier installation, adjust the roll and yaw of the bracket before the RGH22 is attached. This can be done with a clock gauge and a precision square.

Readhead mounting

When mounting the readhead, ensure that the scale, readhead optical window and mounting face are clean and free from obstructions.

NOTE: Refer to "Maintenance and cleaning" section of this manual for cleaning instructions.

To set-up the rideheight of the readhead, a blue shim is provided. The shim should be inserted between the readhead and scale whilst the readhead is being attached to the bracket.

Adjusting set-up

Step No.	Set-up parameter	Diagnostic and adjustments
1	Yaw (α) Rideheight	Set rideheight to 0.8 Adjustment required
2	Yaw (α)	Adjust Yaw (α)
3	Rideheight	Re-adjust rideheight
4		Optimum set-up achieved

V_e or X

Red ← Orange → Green

← 0V 5V →

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Installation 2

Set-up LED

RGH41 readheads are supplied as standard with a patented set-up LED to simplify the installation procedure and ensure optimum signal output.

Adjusting set-up

Once the readhead is connected to the bracket, the rideheight, pitch, yaw and roll of the unit may need to be adjusted to ensure that optimum signal strength is achieved. It should be noted that the readhead must be properly connected to the power supply (see relevant connection diagram on this sheet for the model you are using) to enable the set-up LED or external set-up signal to be used. See the diagram "Adjusting set-up".

Confirming set-up

For reliable operation, the LED should be GREEN (external set-up signal at 5V) when moved slowly along the full axis travel.

NOTE: The set-up LED will not indicate an optimised set-up over the reference mark. For further details, refer also to the section in this guide headed "Installation 3 - reference mark set-up".

The set-up LED will exhibit one of three colours during normal use;

GREEN - optimum set-up.

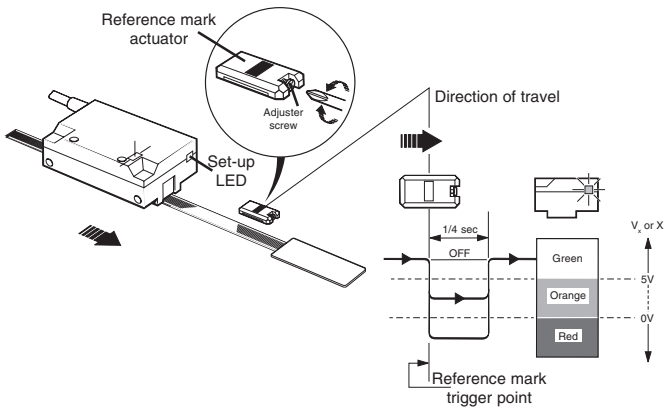
ORANGE - acceptable, but below the recommended level.

RED - signal may be too low for reliable operation, adjust set-up.

An external set-up signal (X or V_x) is also available on most RGH41 heads 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.

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Installation 4 - reference mark set-up (continued)



Limit switch (dual and single)



CAUTION: The limit switch feature must never be used as a fail-safe stop device.

Note: Check whether the dual or single the limit switch sensing option has been specified on the RGH41 that you have purchased.

Analogue RGH41 single limit readheads (B) incorporate a single "Q" limit switch sensor, whereas analogue RGH41 dual limit readheads (A) and digital RGH41 dual limit readheads (T, D, G, X) incorporate dual limit sensors "P" and "Q". The positions of the "P" and "Q" sensors are given in the installation drawing. Please note that the "Q" sensor is activated by the South seeking pole (mount the limit switch magnet with the white dot facing up), while the "P" sensor is activated by the North seeking pole (mount the limit switch magnet with the white dot facing down).

A pulse is output from the readhead whilst the sensor is above the magnetic actuator.

The limit switch provides an end-of travel position point repeatable to <0.1mm (typical)

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Installation 3 - reference mark set-up

Note:

1) For registration condition to be shown, the LED must already be showing GREEN. When the sensor in the readhead passes the magnetic reference mark actuator, a pulse is output.

The actuator trigger signal needs to be optimally phased relative to the incremental signal for the intended direction of travel only to ensure reference mark repeatability. The process of achieving this is 'registration' and is indicated by the interface LED.

Procedure (refer to diagram "Installation 4")

- 1) Run the readhead past the actuator in the desired direction whilst observing the LED for either a RED flash (optimum registration), or an ORANGE flash (acceptable but further adjustment is advisable). If LED blanks out, full adjustment is required.
- 2) Adjust the actuator as necessary by turning the adjuster screw in an anti-clockwise direction. Only a very small adjustment is needed - try 1/4 turn steps.
- 3) Repeat steps 1 and 2 until the LED flashes RED - i.e. registration is achieved.

Note:

- 1) If the readhead mounting is disturbed at any time, the reference mark will have to be re-registered.
- 2) A reference pulse is output in both directions, but because the reference mark can only be phased for one direction of traverse, any indication from the LED when the readhead is moved in the reverse direction is to be ignored.
- 3) LED flash duration is a constant 1/4 second, regardless of traverse speed.

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Issued 0301

Part no. M-9537-0196-01-B