

## MI 5 interface unit



© 1996 Renishaw. All rights reserved.

Renishaw® is a registered trademark of Renishaw plc.

This document may not be copied or reproduced in whole or in part, or transferred to any other media or language, by any means, without the prior written permission of Renishaw.

The publication of material within this document does not imply freedom from the patent rights of Renishaw plc.

Renishaw part no: H-2000-5014-05-G

Issued: 08.2002

## **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.

## **Trademarks**

All brand names and product names used in this document are trade names, service marks, trademarks, or registered trademarks of their respective owners.

**Installation and user's guide**  
**MI 5 interface unit**



**FCC DECLARATION (USA)****FCC Section 15.19**

This device complies with Part 15 of the FCC rules. Operation is subject to the following two conditions:

1. This device may not cause harmful interference.
2. This device must accept any interference received, including interference that may cause undesired operation.

**FCC Section 15.105**

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment.

This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference, in which case you will be required to correct the interference at your own expense.

**FCC Section 15.21**

The user is cautioned that any changes or modifications not expressly approved by Renishaw plc, or authorised representative could void the user's authority to operate the equipment.

**FCC Section 15.27**

The user is also cautioned that any peripheral device installed with this equipment such as a computer, must be connected with a high-quality shielded cable to insure compliance with FCC limits.

**GB  
SAFETY****Information for the user**

For instructions regarding the safe cleaning of Renishaw products, refer to the MAINTENANCE section of the relevant product documentation.

Replace blown fuses with new components of the same type. Refer to the SAFETY section of the relevant product documentation.

Remove power before performing any maintenance operations.

Refer to the machine supplier's operating instructions.

**Information for the machine supplier**

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

Under certain circumstances the probe signal may falsely indicate a probe seated condition. Do not rely on probe signals to stop machine movement.

**D****SICHERHEITSANWEISUNGEN****Informationen für den Benutzer**

Anleitungen über die sichere Reinigung von Renishaw-Produkten sind in Kapitel WARTUNG (MAINTENANCE) in der Produktdokumentation enthalten.

Durchgebrannte Sicherungen müssen mit gleichwertigen ersetzt werden. Beziehen Sie sich bitte auf die SICHERHEITSANWEISUNGEN (SAFETY) in der Produktdokumentation.

Bevor Wartungsarbeiten begonnen werden, muss erst die Stromversorgung getrennt werden.

Beziehen Sie sich auf die Wartungsanleitungen des Lieferanten.

**Informationen für den Maschinenlieferanten**

Es obliegt dem Maschinenlieferanten, den Anwender über alle Gefahren, die sich aus dem Betrieb der Ausrüstung, einschließlich der, die in der Renishaw Produktdokumentation erwähnt sind, zu unterrichten und zu versichern, dass ausreichende Sicherheitsvorrichtungen und Verriegelungen eingebaut sind.

Unter gewissen Umständen könnte das Messtastersignal fälschlicherweise melden, dass der Messtaster nicht ausgelenkt ist. Verlassen Sie sich nicht allein auf Sondersignale, um sich über Maschinenbewegungen zu informieren.

**DK****SIKKERHED****Oplysninger til brugeren**

Se afsnittet VEDLIGEHOLDELSE (MAINTENANCE) i produktdokumentationen for at få instruktioner til sikker rengøring af Renishaw-produkter.

Udskift sikringer, der er sprunget, med nye komponenter af samme type. Se i afsnittet SIKKERHED (SAFETY) i produktdokumentatione

Afbryd strømforsyningen, før der foretages vedligeholdelse.

Se maskinleverandørens brugervejledning.

**Oplysninger til maskinleverandøren**

Det er maskinleverandørens ansvar at sikre, at brugeren er bekendt med eventuelle risici i forbindelse med driften, herunder de risici, som er nævnt i Renishaws produktdokumentation, og at sikre, at der er tilstrækkelig afskærmning og sikkerhedsblokeringer.

Under visse omstændigheder kan sondesignalet ved en fejl angive, at sonden står stille.

Stol ikke på, at sondesignaler stopper maskinens bevægelse.

## E SEGURIDAD

### **Información para el usuario**

Para instrucciones sobre seguridad a la hora de limpiar los productos Renishaw, remitirse a la sección titulada MANTENIMIENTO (MAINTENANCE) en la documentación sobre el producto.

Sustituir los fusibles fundidos con componentes nuevos del mismo tipo. Remitirse a la sección titulada SEGURIDAD (SAFETY) en la documentación sobre el producto.

Quitar la corriente antes de emprender cualquier operación de mantenimiento.

Remitirse a las instrucciones de manejo del proveedor de la máquina.

### **Información para el proveedor de la máquina**

Corresponde al proveedor de la máquina asegurar que el usuario esté consciente de cualquier peligro que implica el manejo de la máquina, incluyendo los que se mencionan en la documentación sobre los productos Renishaw y le corresponde también asegurarse de proporcionar dispositivos de protección y dispositivos de bloqueo de seguridad adecuados.

Bajo determinadas circunstancias la señal de la sonda puede indicar erróneamente que la sonda está asentada. No fiarse de las señales de la sonda para parar el movimiento de la máquina.

## F SECURITE

### **Informations à l'attention de l'utilisateur**

Les conseils de nettoyage en toute sécurité des produits Renishaw figurent dans la section MAINTENANCE de votre documentation.

Remplacer les fusibles grillés par des composants neufs du même type. Consulter la section SECURITE (SAFETY) de votre documentation.

Mettre la machine hors tension avant d'entreprendre toute opération de maintenance.

Consulter le mode d'emploi du fournisseur de la machine.

### **Informations à l'attention du fournisseur de la machine**

Il incombe au fournisseur de la machine d'assurer que l'utilisateur prenne connaissance des dangers d'exploitation, y compris ceux décrits dans la documentation du produit Renishaw, et d'assurer que des protections et verrouillages de sûreté adéquats soient prévus.

Dans certains cas, il est possible que le signal du palpeur indique à tort l'état que le palpeur est au repos. Ne pas se fier aux signaux du palpeur qui ne garantissent pas toujours l'arrêt de la machine.

FIN

**TURVALLISUUTTA****Καyttäjälle tarkoitettuja tietoja**

Renishaw-tuotteiden turvalliset puhdistusohjeet löytyvät tuoteselosteen HUOLTOA (MAINTENANCE) koskevasta osasta.

Vaihda palaneiden sulakkeiden tilalle samantyyppiset uudet sulakkeet. Lue tuoteselosteen TURVALLISUUTTA (SAFETY) koskeva osa.

Kytke pois sähköverkosta ennen huoltotoimenpiteitä.

Katso koneen toimittajalle tarkoitettuja käyttöohjeita.

**Tietoja koneen toimittajalle**

Koneen toimittaja on velvollinen selittämään käyttäjälle mahdolliset käyttöön liittyvät vaarat, mukaan lukien Renishaw'n tuoteselosteessa mainitut vaarat. Toimittajan tulee myös varmistaa, että toimitus sisältää riittävän määrän suoja ja lukkoja.

Tietyissä olosuhteissa anturimerkki saattaa osoittaa virheellisesti, että kyseessä on anturiin liittyvä ongelma. Älä luota anturimerkkeihin koneen liikkeen pysäyttämiseksi.

GR

**ΑΣΦΑΛΕΙΑ****Πληροφορίες για τους χρήστες**

Για οδηγίες που αφορούν τον ασφαλή καθαρισμό των προϊόντων Renishaw, βλέπετε το κεφάλαιο ΣΥΝΤΗΡΗΣΗ (MAINTENANCE) στο διαφωτιστικό υλικό του προϊόντος.

Τυχόν ασφάλειες που καίονται πρέπει να αντικαθιστούνται με νέες ασφάλειες του ίδιου τύπου. Βλέπετε το κεφάλαιο ΑΣΦΑΛΕΙΑ στο διαφωτιστικό υλικό του προϊόντος.

Απουσνδέστε το μηχάνημα από το ηλεκτρικό ρεύμα προτού επιχειρήσετε τυχόν εργασίες συντήρησης.

Βλέπετε τις οδηγίες λειτουργίας του προμηθευτή του μηχανήματος.

Πληροφορίες για τους προμηθευτές των μηχανημάτων  
Αποτελεί ευθύνη του προμηθευτή του μηχανήματος να εξασφαλίσει ότι ο χρήστης είναι ενημερωμένος τυχόν κινδύνων που συνεπάγεται η λειτουργία, συμπεριλαμβανομένων και όσων αναφέρονται στο διαφωτιστικό υλικό του προϊόντος της Renishaw. Είναι επίσης ευθύνη του να εξασφαλίσει ότι υπάρχουν τα απαιτούμενα προστατευτικά καλύμματα καλύμματα και συνδέσεις ασφαλείας.

Υπό ορισμένες συνθήκες μπορεί το σήμα ανιχνευτή να δώσει εσφαλμένη ένδειξη θέσης του ανιχνευτή. Μη βασίζεστε στα σήματα ανιχνευτή για θέση της κίνησης του μηχανήματος εκτός λειτουργίας.

## I SICUREZZA

### Informazioni per l'utente

Per le istruzioni relative alla pulizia dei prodotti Renishaw, fare riferimento alla sezione MANUTENZIONE (MAINTENANCE) della documentazione del prodotto.

I fusibili bruciati dovranno essere sostituiti con quelli dello stesso tipo. Consultare la sezione SICUREZZA (SAFETY) della documentazione del prodotto.

Prima di effettuare qualsiasi intervento di manutenzione, isolare dall'alimentazione di rete.

Consultare le istruzioni d'uso del fabbricante della macchina.

### Informazioni per il fabbricante della macchina

Il fornitore della macchina ha la responsabilità di avvertire l'utente dei pericoli inerenti al funzionamento

della stessa, compresi quelli riportati nelle istruzioni della Renishaw, e di mettere a disposizione i ripari di sicurezza e gli interruttori di esclusione.

E' possibile, in certe situazioni, che la sonda emetta erroneamente un segnale che la sonda è in posizione. Evitare di fare affidamento sugli impulsi trasmessi dalla sonda per arrestare la macchina.

## NL VEILIGHEID

### Informatie voor de Gebruiker

Voor het veilig reinigen van Renishaw produkten wordt verwezen naar het hoofdstuk ONDERHOUD (MAINTENANCE) in de produktendocumentatie.

Doorgeslagen zekeringen met nieuwe componenten van hetzelfde type vervangen. U wordt verwezen naar het hoofdstuk VEILIGHEID (SAFETY) in de produktendocumentatie.

Voordat u enig onderhoud verricht dient u de stroom uit te schakelen.

De bedieningsinstructies van de machineleverancier raadplegen.

### Informatie voor de Machineleverancier

De leverancier van de machine is ervoor verantwoordelijk dat de gebruiker op de hoogte wordt gesteld van de risico's die verbonden zijn aan bediening, waaronder de risico's die vermeld worden in de produktendocumentatie van Renishaw.

De leverancier dient er tevens voor te zorgen dat de gebruiker is voorzien van voldoende beveiligingen en veiligheidsgrendelinrichtingen.

Onder bepaalde omstandigheden kan het sondesignaal een onjuiste sondetoestand aangeven. Vertrouw niet op de sondesignalen voor het stoppen van de machinebeweging.



**P****SEGURANÇA****Informações para o Utilizador**

Para instruções relativas à limpeza segura de produtos Renishaw, consultar a secção **MANUTENÇÃO (MAINTENANCE)** da documentação do produto.

Substituir fusíveis fundidos por novos componentes do mesmo tipo. Consultar a secção **SEGURANÇA (SAFETY)** da documentação do produto.

Desligar a alimentação antes de efectuar qualquer operação de manutenção.

Consultar as instruções de funcionamento do fornecedor da máquina.

**Informações para o Fornecedor da Máquina**

É responsabilidade do fornecedor da máquina assegurar que o utilizador é consciencializado de quaisquer perigos envolvidos na operação, incluindo os mencionados na documentação do produto Renishaw e assegurar que são fornecidos resguardos e interbloqueios de segurança adequados.

Em certas circunstâncias, o sinal da sonda pode indicar falsamente uma condição de sonda assentada. Não confiar em sinais da sonda para parar o movimento da máquina.

**SW****SÄKERHET****Information för användaren**

För instruktioner angående säker rengöring av Renishaws produkter, se avsnittet **UNDERHÅLL (MAINTENANCE)** i produktdokumentationen.

Byt ut smälta säkringar med nya av samma typ. Se avsnittet **SÄKERHET (SAFETY)** i produktdokumentationen.

Koppla bort strömmen innan underhåll utförs.

Se maskintillverkarens bruksanvisning.

**Information för maskinleverantören**

Maskinleverantören ansvarar för att användaren informeras om de risker som drift innebär, inklusive de som nämns i Renishaws produktdokumentation, samt att tillräckligt goda skydd och säkerhetsföreglingar tillhandahålls.

Under vissa omständigheter kan sondens signal falskt ange att en sond är monterad. Lita ej på sondersignaler för att stoppa maskinens rörelse.

# Installation and user's guide

## Contents

MI 5 interface unit	...	...	1-1
MI 5 function	...	...	1-2
MI 5 installation	...	...	1-3
Wiring diagram for SSR outputs	...		1-4
Alternative TTL and OCT outputs	...		1-6
LP2 hard wired inspection system			1-7
Output signal	...	...	1-8
Dimensions	...	...	1-9
Parts list	...	...	1-9

## WARRANTY

Equipment requiring attention under warranty must be returned to your supplier. No claims will be considered where Renishaw equipment has been misused, or repairs or adjustments have been attempted by unauthorised persons.

## CHANGES TO EQUIPMENT

Renishaw reserves the right to change specifications without notice.

## CNC MACHINE

CNC machine tools must always be operated by competent persons in accordance with manufacturers instructions.

## MI 5 MAINTENANCE

No routine maintenance is required.

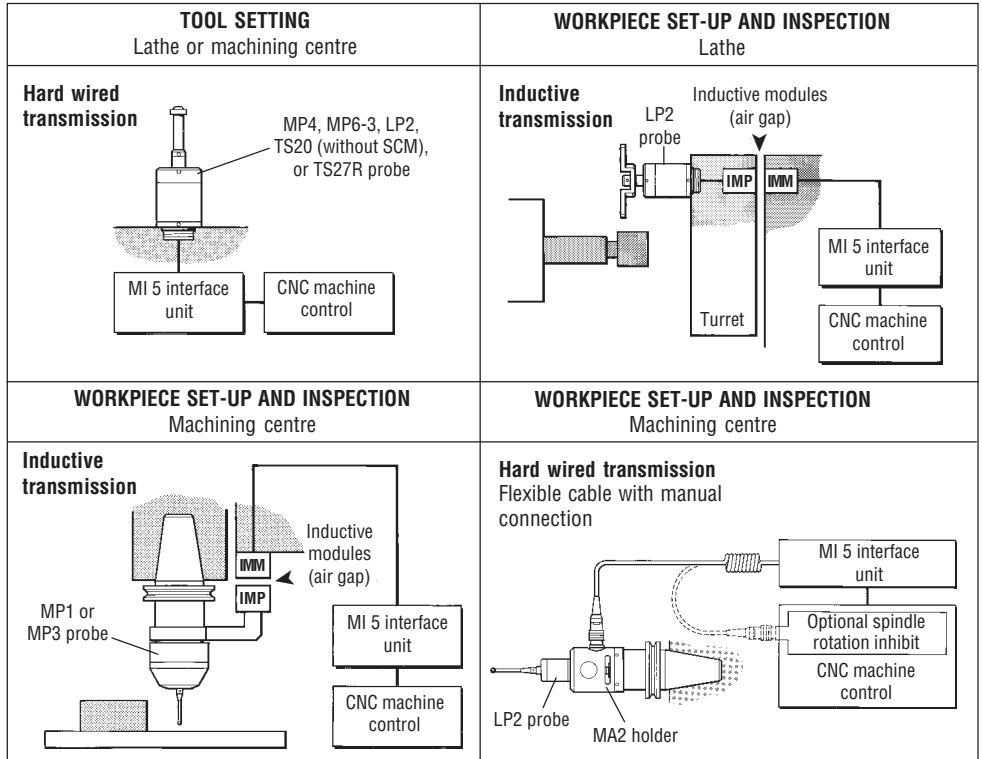
## ENVIRONMENT

### Temperature

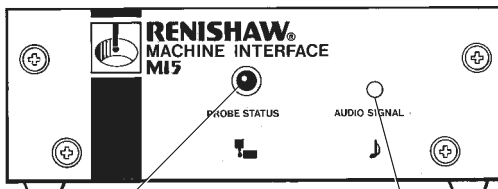
The MI 5 is specified for storage over  $-10^{\circ}$  to  $70^{\circ}$  C ( $14$  to  $158^{\circ}$  F) and operation over  $5^{\circ}$  to  $50^{\circ}$  C ( $41^{\circ}$  to  $122^{\circ}$  F) ambient temperature range.

## MI 5 INTERFACE UNIT

CNC machine tools using a Renishaw probe system for tool setting or workpiece set-up and inspection require an interface unit, to convert probe signals into an acceptable form for the CNC machine control. The MI 5 interface unit is part of probe systems using hard wired or inductive signal transmission.



## MI 5 FUNCTION



**Probe status LED**

Lit when probe is at rest or interface is inhibited.  
Unlit indicates probe stylus is deflected or power is off.

**Audible indicator**

A tone is emitted each time the probe changes state.  
(From stylus at rest to stylus deflected or stylus deflected to stylus at rest).

The MI 5 interface processes signals from Renishaw probes and converts the signals into voltage free solid state relay (SSR) output, for transmission to the CNC machine control, which stores work offsets and responds to probe inputs.

The probe status LED is lit when the probe stylus is seated (at rest), or the interface is inhibited.

When the probe stylus deflects on making contact with a surface, a signal is generated causing the MI 5 output relays to change state, the LED to switch off and the audible indicator emit a 'bleep'.

As the probe moves clear of the contact surface, the audible indicator emits a second 'bleep', and the LED lights, indicating the probe stylus has resealed, and the probe is available for the next contact in the probing routine.

#### **Remote audible indicator or LED**

If the MI 5 is installed where it not be easily seen, outputs are provided for a remote audible indicator or LED, to be positioned near the machine operator (see wiring diagram page 1-4).

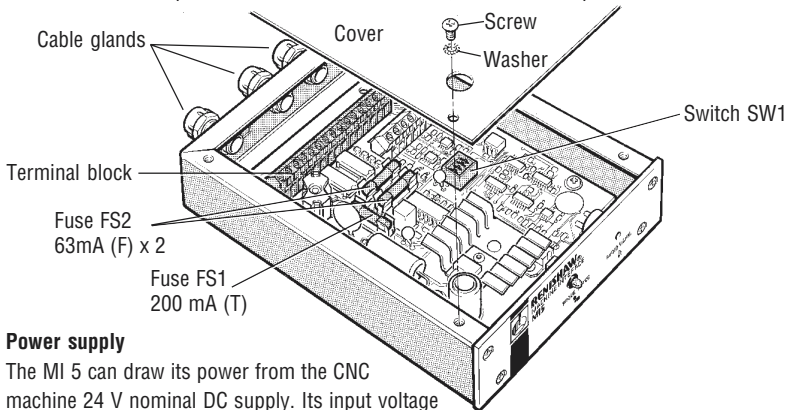
#### **SAFETY**

**Only qualified persons should adjust switches or replace fuses.**

**Remove mains supply from units before removing covers.**

## MI 5 INSTALLATION

Take care to avoid potential sources of interference, such as three phase transformers and motor controllers.



### Power supply

The MI 5 can draw its power from the CNC machine 24 V nominal DC supply. Its input voltage range is 18 V DC to 30 V DC and it presents load of up to 200 mA. Alternatively it can be powered from a Renishaw PSU3 power supply unit.

**Note :** Incorrect polarity of the DC supply will blow fuse FS1.

### Inhibit/enable function - two probes

When the machine has two probes, the CNC control must be able to identify which probe is in use. e.g. Hard wired tool setting probe or inspection probe with inductive transmission. The MI 5 has inputs for two probes. To enable both systems to be used safely, the MI 5 also contains a pair of remote inhibit inputs, which allows the control to select the probe to be used.

### Single hard wired tool setting probe operation

See probe input linking on terminals 18 and 19 (page 1-4).

### Single inductive inspection probe operation

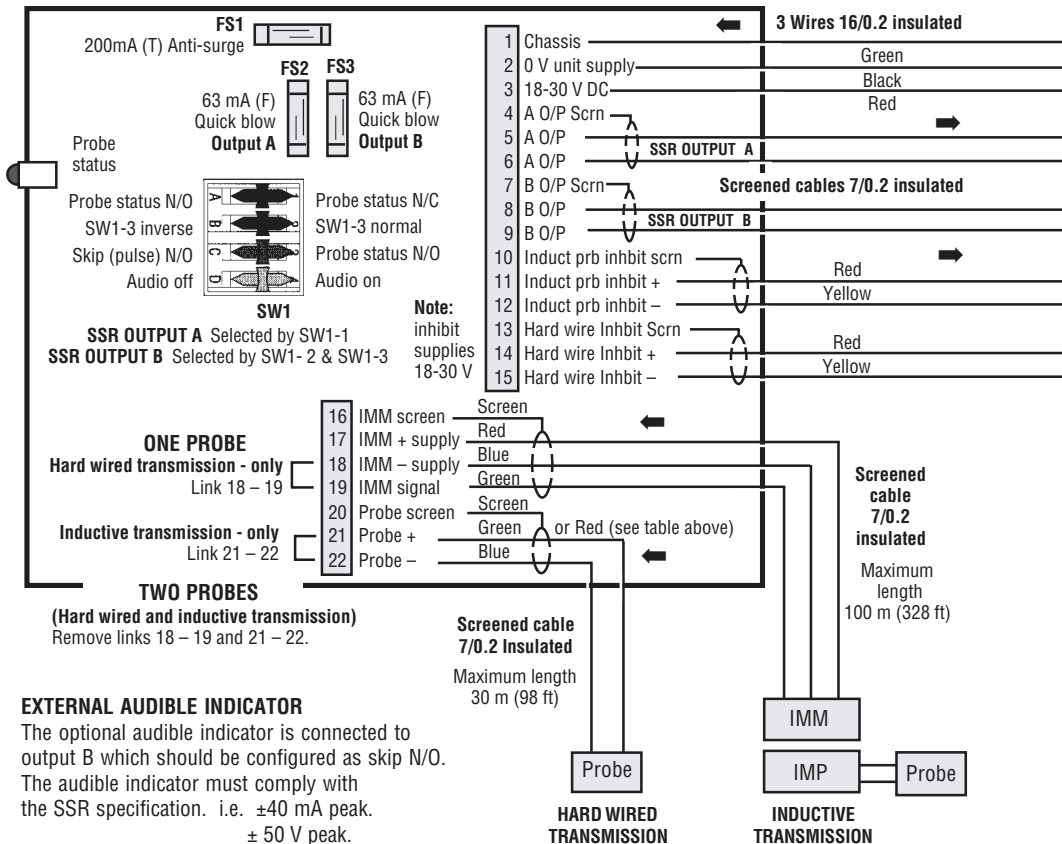
See probe input linking on terminals 21 and 22 (page 1-4).

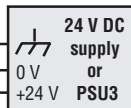
### Simultaneous - two probes

#### Tool setting and inspection probe operation

When one probe is inhibited it is held in a 'probe at rest' state so that the other probe output will not be masked. This can be automatically controlled by an M code (miscellaneous function) from the CNC machine control. To activate the inhibit function, a voltage of 18 to 30 V DC should be applied across the input terminals (ensure correct polarity). The inhibit function consumes a nominal 7 mA when activated.

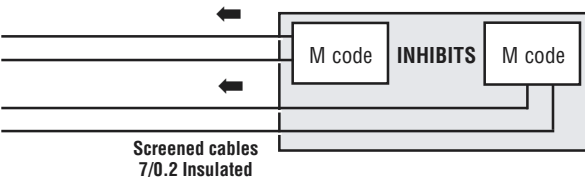
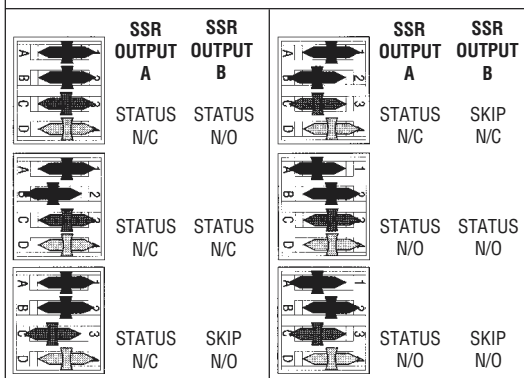
## WIRING DIAGRAM (The wiring configuration of this unit differs from earlier models)



**POWER SUPPLY**

CNC  
MACHINE  
CONTROL

Terminal no.	Core colour	Probe			
		LP2 MP6-3	RP2	MP4 TS27R	TS20
22	Blue	●		●	
21	Green	●			
21	Red			●	

**CNC MACHINE CONTROL****CONNECTIONS FOR TWO PROBES ONLY****SWITCH SW1 SETTINGS****CABLE SPECIFICATION**

*Cable ends are screwed to the terminal block*

**HARD WIRED TRANSMISSION**

Hard wired probe to interface.

Four core insulated cable 7/0,2 mm, braided screen.

Recommended colours :

Red, green, blue and yellow.

See table opposite for connections.

Overall diameter 4,3 mm (0.17 in).

Maximum length 30 m (98 ft).

Please consult Renishaw when cable length

exceeds 30 m (98 ft).

**INDUCTIVE TRANSMISSION**

Inductive module machine (IMM) to interface.

Four core insulated cable 7/0,2 mm, braided screen.

Recommended colours :

Red, green, blue and yellow.

Yellow not connected.

Overall diameter 4,3 mm (0.17 in).

Maximum length 100 m (328 ft).

Please consult Renishaw when cable length

exceeds 100 m (328 ft).

**INTERFACE TO CNC MACHINE CONTROL**

Four core insulated cable 7/0,2mm, braided screen.

Recommended colours :

Red, green, blue and yellow.

Blue and green not connected.

Overall diameter 4,3 mm (0.17 in).

**POWER SUPPLY TO INTERFACE**

Three low voltage wires, each conductor 16/0,2 mm.

PVC insulated, overall diameter 1,6 mm (0.06 in).

Recommended colours :

Green or green and yellow.

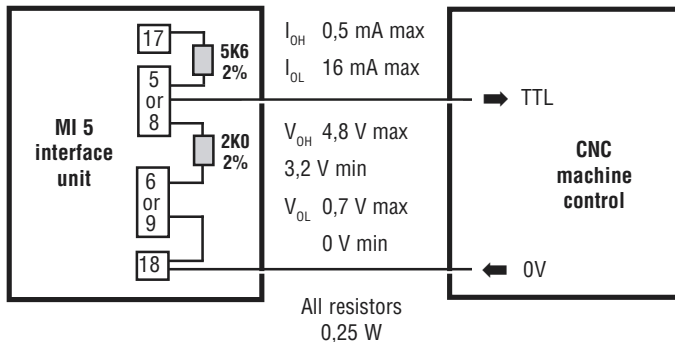
0V Black.

+24V Red.

## ALTERNATIVE TTL and OCT OUTPUTS

### TTL OUTPUT

To provide TTL levels, connect two resistors 5k6 and 2K0, and hard wire link terminals 9 to 18.

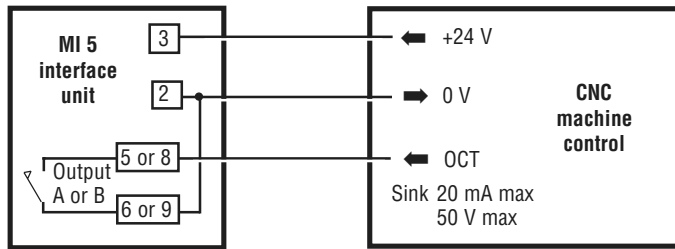


### OCT OUTPUT

To provide OCT levels, hard wire link terminals 2 to 9.

V output low at 16 mA  
= 0,7 Vmax  
0,0 Vmin

If more than 16 mA to be sunk, then there will be a voltage drop across the fuse and SSR.

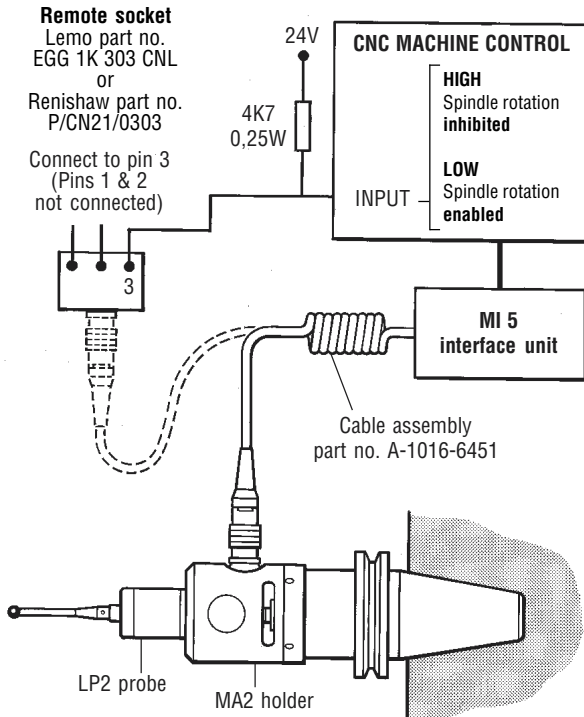




## LP2 HARD WIRED INSPECTION SYSTEM

### SAFETY

The probe should **not** be rotated (spun) by the machine spindle with the cable connected. If this is allowed, then serious injury could occur to persons nearby due to flying cable or entanglement.



TO ENSURE OPERATOR SAFETY  
It is recommended that a fail safe  
**SPINDLE ROTATION INHIBIT**  
is built into the machine  
installation.

The example shows the probe  
cable plugged into the probe  
socket, preventing spindle  
rotation.

When the probe cable (dotted  
lines) is plugged into the remote  
socket, spindle rotation is  
enabled.

**WIRING TABLE**

Wire colour	Plug pin no	MI 5 terminal block
* Screen	3	20
Blue	1	21
Green	2	22

**\* Note**

Screen must be referenced to machine 0V.

## OUTPUT SIGNAL

The output signal from the interface must be compatible with machine control.

The two output devices are identical and have the following specification:

### Solid state relay (SSR)

Normally Closed (N/C).

or

Normally open (N/O).

(Teledyne 640-1 or equivalent).

Maximum current  $\pm 40$  mA peak.

Maximum voltage  $\pm 50$  V peak.

### SSR OUTPUT A

Can be configured for

Probe status N/O or probe status N/C.

(see wiring diagram page 1-4).

### SSR OUTPUT B

Can be configured for either

Skip N/O or skip N/C.

or

Probe status N/O or probe status N/C.

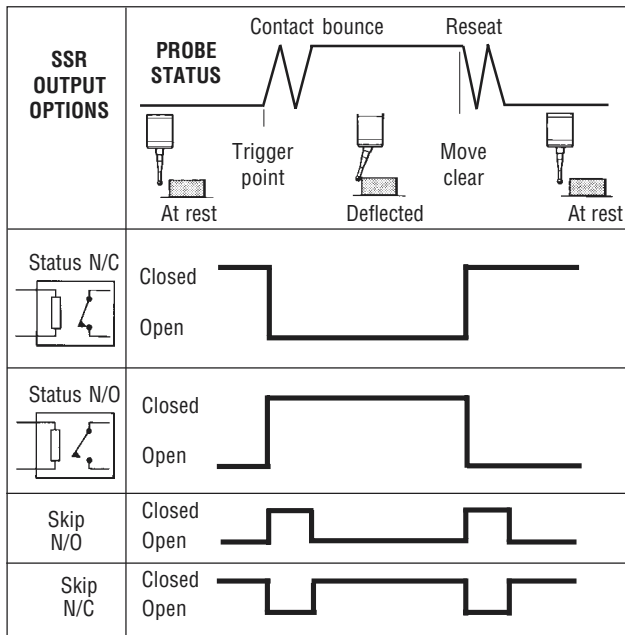
(see wiring diagram page 1-4).

**OCT** and **TTL** style outputs can

be emulated using the SSR's.

OCT and TTL circuits are shown

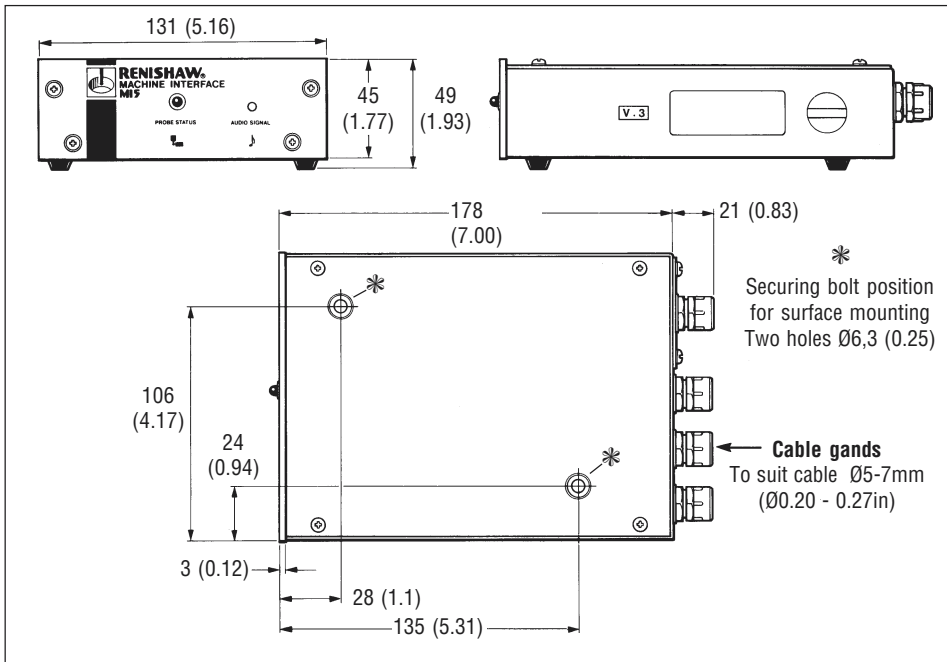
on page 1-6.



**Note:** Change of state debounce time is  $17,5 \text{ mS} \pm 5,5 \text{ mS}$ .  
Skip pulse length is  $32,5 \text{ mS} \pm 12,5 \text{ mS}$ .

Debounce time is the time delay after the MI 5 has responded to probe a trigger, before it can be used again.

## DIMENSIONS mm (in)

**PARTS LIST - Please quote the part no. when ordering equipment.**

Type	Part no.	Description
MI 5	A-2019-0006	MI 5 interface unit complete with spare fuses.
Fuse	P-FS01-0200	200 mA (T) Anti-surge fuse, dia 5 x 20 mm long.
Fuse	P-FS02-0063	63 mA (F) Quick blow fuse, dia 5 x 20 mm long.

**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](http://www.renishaw.com)

**RENISHAW**   
apply innovation

### Renishaw worldwide

#### Australia

**T** +61 3 9521 0922  
**E** australia@renishaw.com

#### Brazil

**T** +55 11 4195 2866  
**E** brazil@renishaw.com

#### Czech Republic

**T** +420 5 4821 6553  
**E** czech@renishaw.com

#### The People's Republic of China

**T** +86 10 8448 5306  
**E** china@renishaw.com

#### France

**T** +33 1 64 61 84 84  
**E** france@renishaw.com

#### Germany

**T** +49 7127 9810  
**E** germany@renishaw.com

#### Hong Kong

**T** +852 2753 0638  
**E** hongkong@renishaw.com

#### India

**T** +91 80 5320 144  
**E** india@renishaw.com

#### Italy

**T** +39 011 966 10 52  
**E** italy@renishaw.com

#### Japan

**T** +81 3 5332 6021  
**E** japan@renishaw.com

#### The Netherlands

**T** +31 76 543 11 00  
**E** benelux@renishaw.com

#### Poland

**T** +48 22 575 8000  
**E** renishaw@poland.com

#### Russia

**T** +7/095/113 42 44  
**E** russia@renishaw.com

#### Singapore

**T** +65 6897 5466  
**E** singapore@renishaw.com

#### Slovenia

**T** +386 1 52 72 100  
**E** mail@rls.si

#### South Korea

**T** +82 2 565 6878  
**E** southkorea@renishaw.com

#### Spain

**T** +34 93 478 21 31  
**E** spain@renishaw.com

#### Switzerland

**T** +41 55 415 50 60  
**E** switzerland@renishaw.com

#### Taiwan

**T** +886 4 251 3665  
**E** taiwan@renishaw.com

#### UK (Head Office)

**T** +44 (0)1453 524524  
**E** uk@renishaw.com

#### USA

**T** +1 847 286 9953  
**E** usa@renishaw.com

#### For all other countries

**T** +44 1453 524524  
**E** international@renishaw.com