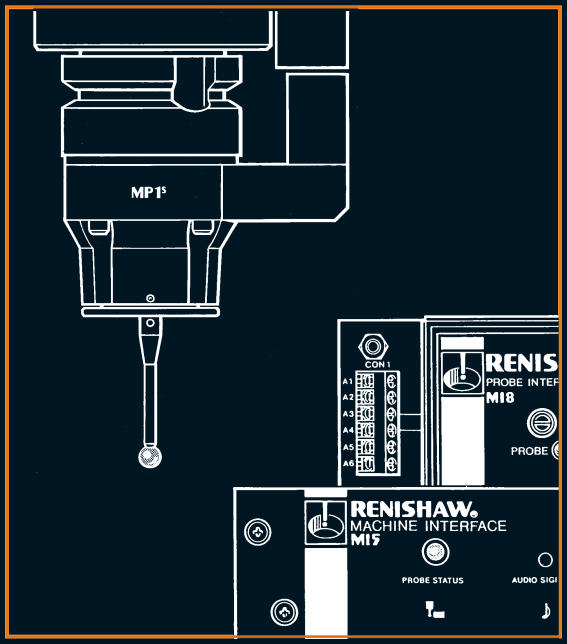



RENISHAW®

# MP1 probe with inductive or hard wired transmission system

Renishaw part no: H-2000-5001-01-D
Issued: August 2001

# Installation and User's Guide
# MP1 inspection probe
# with inductive or
# hard wired transmission system

CE

**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 harmfull 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**

Beware of unexpected movement. The user should remain outside of the full working envelope of Probe Head/Extension/Probe combinations.

In all applications involving the use of Machine Tools or CMMs, eye protection is recommended.

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**

Auf unerwartete Bewegungen achten. Der Anwender sill sich immer außerhalb des Meßtasterkopf-Arm-Meßtaster-Bereichs aufhalten.

Bei der Bedienung von Werkzeugmaschinen oder Koordinatenmeßanlagen ist Augenschutz empfohlen.

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 falscherweise melden, daß der Meßtaster nicht ausgelenkt ist. Verlassen Sie sich nicht allein auf Sondensignale, um sich über Maschinenbewegungen zu informieren.

## DK

### SIKKERHED

**Oplysninger til brugeren**

Pas på uventede bevægelser. Brugeren bør holde sig uden for hele sondehovedets/forlængerens/sondens arbejdsområde.

I alle tilfælde, hvor der anvendes værktøjs- og koordinatmålemaskiner, anbefales det at bære øjenbeskyttelse.

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**
Tener cuidado con los movimientos inesperados. El usuario debe quedarse fuera del grupo operativo completo compuesto por la cabeza de sonda/ extensión/sonda o cualquier combinación de las mismas.

Se recomienda usar protección para los ojos en todas las aplicaciones que implican el uso de máquinas herramientas y máquinas de medición de coordenadas.

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 erroneamente 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**
Attention aux mouvements brusques. L'utilisateur doit toujours rester en dehors de la zone de sécurité des installations multiples Tête de Palpeur/Rallonge/ Palpeur.

Le port de lunettes de protection est recommandé pour toute application sur machine-outil et MMC.

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

**Käyttäjälle tarkoitettuja tietoja**

Varo äkillistä liikettä. Käyttäjän tulee pysytellä täysin anturin pään/jatkeen/anturin yhdistelmiä suojaavan toimivan kotelon ulkopuolella.

Kaikkia työstökoneita ja koordinoituja mittauskoneita (CMM) käytettäessä suositamme silmäsuojuksia.

Kytke pois sähköverkosta ennen huoltotoimenpiteitä.

Katso koneen toimittajalle tarkoitettuja käyttöhjeita.

**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 suojia 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

Προσοχή - κίνδονος απροσδόκητων κινήσεων. Οι χρήστες πρέπει να παραμένουν εκτός του χώρου που επηρεάζεται από όλους τους συνδυασμούς λειτουργίας της κεφαλής του ανιχνευτή, της προέκτασης και του ανιχνευτή.

Σε όλες τις εφαρμογές που συνεπάγονται τη χρήση εργαλείων μηχανημάτων και εξαρτημάτων CMM, συνιστάται η χρήση συσκευής προστασίας των ματιών.

Αποσυνδέστε 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 εξασθαλίσει ότι ο χρήστης είναι ενήμερος τυχόν κινδύνων που συνεπάγεται η λειτουργία, συμπεριλαμβανομένων και όσων αναφέρονται στο διαφωτστικό υλικό του προϊόντος της Renishaw. Είναι επίσης ευθύνη του να εξασφαλίσει ότι υπάρχουν τα απαιτούμενα προστατευτικά καλύμματα καλύμματα και συνδέσεις ασφάλειας.

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**

Fare attenzione ai movimenti inaspettati.
Si raccomanda all'utente di tenersi al di fuori dell'involucro operativo della testina della sonda, prolunghe e altre varianti della sonda.

Si raccomanda di indossare occhiali di protezione in applicazioni che comportano macchine utensili e macchine per misurare a coordinate.

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**

Oppassen voor onverwachte beweging. De gebruiker dient buiten het werkende signaalveld van de Sondekop/Extensie/Sonde combinaties te blijven.

Het dragen van oogbescherming wordt tijdens gebruik van Machinewerktuigen en CMM's aanbevolen.

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 ervoorverantwoordelijk 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**
Tomar cuidado com movimento inesperado.
O utilizador deve permanecer fora do perímetro da área de trabalho das combinações Cabeça da Sonda/Extensão/Sonda.

Em todas as aplicações que envolvam a utilização de Máquinas-Ferramenta e CMMs, recomenda-se usar protecção para os olhos.

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 as segurar 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**

## SÅKERHET

**Information för användaren**
Se upp för plötsliga rörelser. Användaren bör befinna sig utanför arbetsområdet för sondhuvudet/förlängningen/sond-kombinationerna.

Ögonskydd rekommenderas för alla tillämpningar som involverar bruket av maskinverktyg och CMM.

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 säkerhetsförreglingar tillhandahålls.

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

# Installation and Users Guide - English

**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.

**CARE OF THE PROBE**
Treat the probe as a precision instrument.

**IP RATING** IPX8.

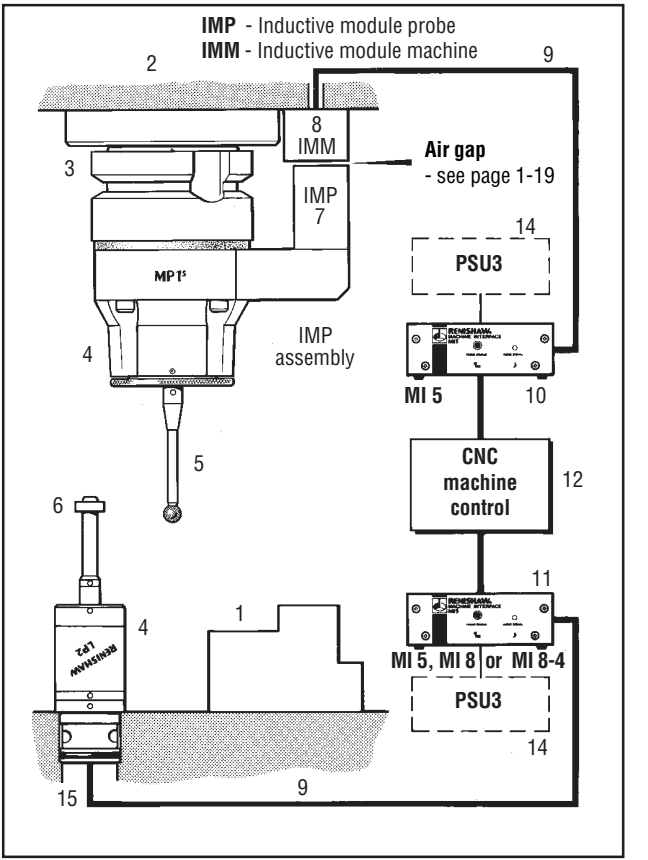
**ENVIRONMENT**
**Temperature**
The MP1 probe is specified for storage over –10° to 70°C (14 to 158°F) and operation over 0° to 60°C (32° to 140°F) ambient temperature range.

**PATENT NOTICE**
Features of Renishaw products are the subject of one or more of the following patents and patent applications:

| | | | |
|---|---|---|---|
| DE | 3234241 | US | 4542467 |
| GB | 2108715 | US | 4636960 |
| JP | 1,847,335 | | |

# Contents

**TYPICAL PROBE SYSTEM - Inductive transmission**




**MACHINING CENTRE**
**JOB SET-UP and INSPECTION**
**Inductive signal transmission**

1. Workpiece.
2. Machine spindle.
3. Shank.
4. MP1-S probe
5. Stylus.
7. Inductive module probe (IMP).
8. Inductive module machine (IMM).
9. Cable.
10. MI 5 interface unit.
12. CNC machine control.
14. PSU3 power supply unit. optional.

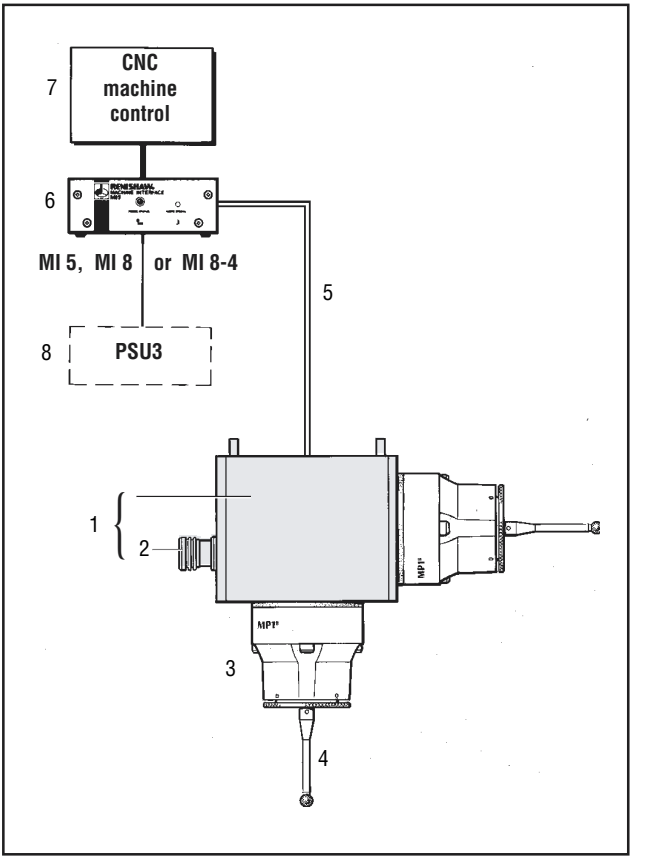
**TOOL SETTING**
**Hard wired signal transmission**

4. LP2 probe.
6. Square tip stylus.
9. Cable.
11. MI 5, MI 8 or MI 8-4 interface.
12. CNC machine control.
14. PSU3 power supply unit. optional.
15. Socket for LP2.

**MACHINING CENTRE**
**JOB SET-UP and INSPECTION**
**Hard wired signal transmission**

1. 3 way mounting block.
2. Cover (shorting socket).
3. MP1-R probe.
4. Stylus.
5. Wires.
6. Interface unit.
   MI 5, MI 8 or MI 8-4.
7. CNC machine control.
8. PSU3 power supply unit.
   optional.

**TYPICAL PROBE SYSTEM - Hard wired transmission**



There are two versions of the MP1 Probe.

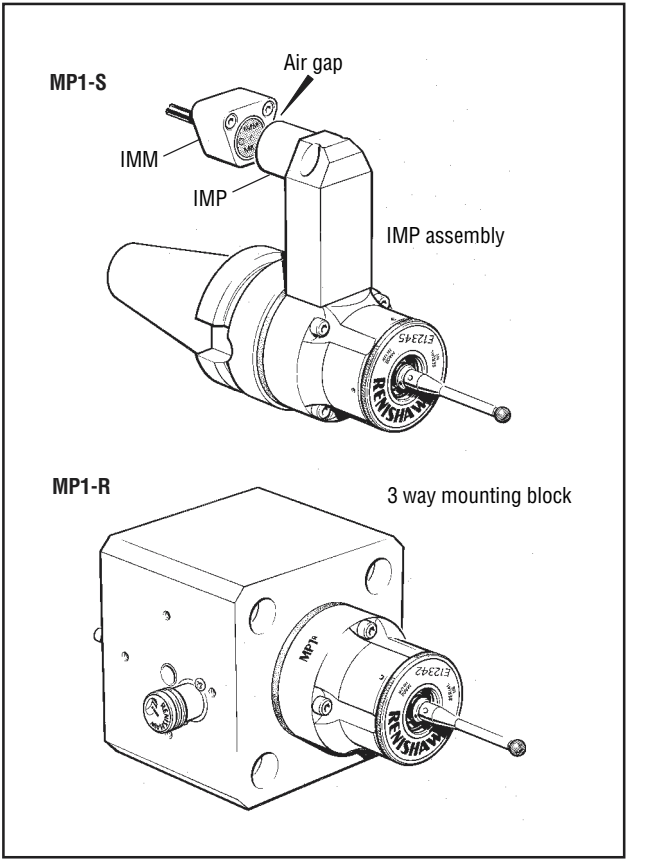
1. The **MP1-S** with side electrical connection for inductive signal transmission systems. Inductive transmission allows automatic tool change of the probe as any other tool in the the system.

   The IMP assembly is attached to the probe using the screws supplied with the assembly.

   Tighten the screws in accordance with the screw torque values given on page 1-18.

2. The **MP1-R** with rear electrical connection for hard wired signal transmission systems, typically vertical turning lathes.

**MP1 PROBE TYPES**



## MP1 SPECIFICATION

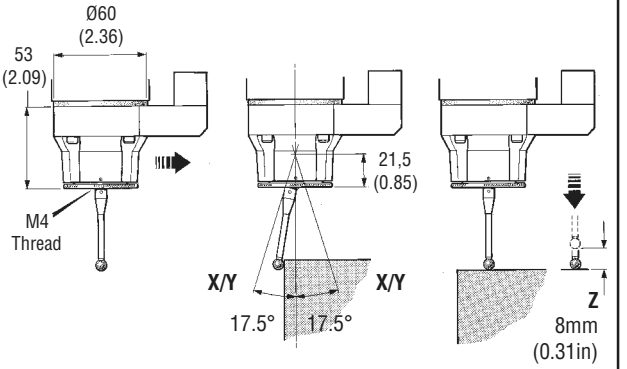
**REPEATABILITY**
A rigid probe mounting is essential for good repeatability.

**Max 2 sigma (2σ) value**
Repeatability of 1,0µm (40µ in) is valid for test velocity of 480mm/min (1.57ft/min) at the stylus tip using a stylus 50mm (1.97in) long.

**STYLUS TRIGGER FORCE**
Set at factory using stylus 50mm (1.97in) long.
X and Y trigger forces vary around the stylus seating.

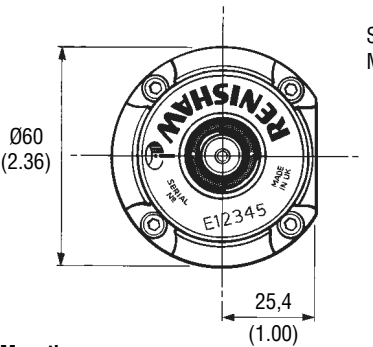
| | |
|---|---|
| X -Y direction | 0,57 - 1,15N<br>57 - 115gf<br>(2.01-4.05ozf) |
| Z direction | 3,8N<br>380gf<br>(13.40ozf) |

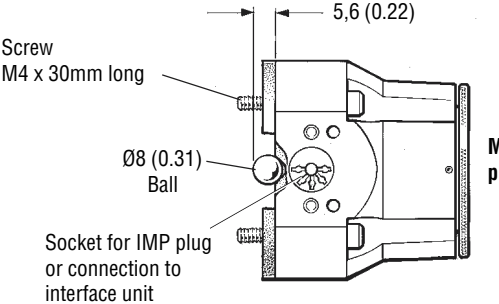
**dimensions mm (in)**



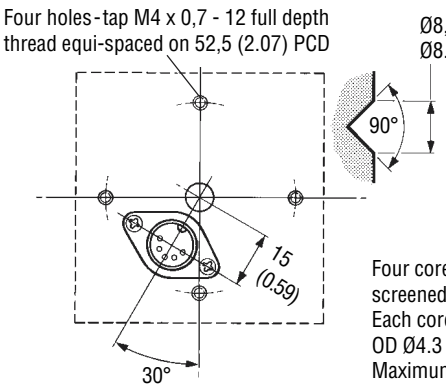

| Stylus overtravel limits | | | |
|---|---|---|---|
| **Stylus length** | **X** | **Y** | **Z** |
| **50mm (1.96in)** | 33mm (1.29in) | 33mm (1.29in) | 8mm (0.31in) |
| **100mm (3.93in)** | 39mm (1.53in) | 39mm (1.53in) | 8mm (0.31in) |

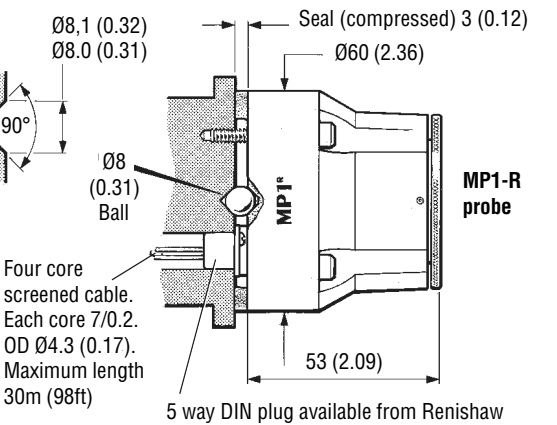
## MP1 GENERAL ARRANGEMENT - dimensions mm (in)




**Mounting**



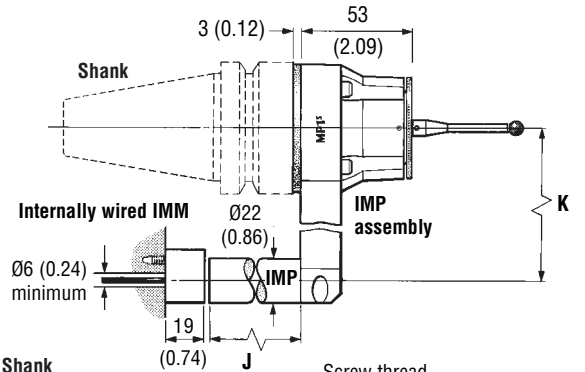



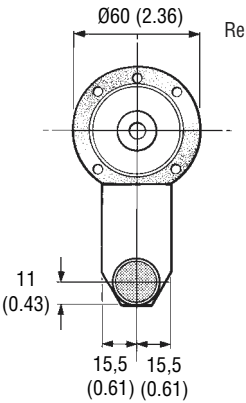
## MP1-S with IMP ARM - dimensions mm (in)

Renishaw provide a comprehensive range of IMP's and IMM's. The range is listed in Data Sheet ITS Part No. H-2000-2140.

Dimension **K** is available in increments of 5mm, from 40 to 120mm (1.57 to 4.72in).

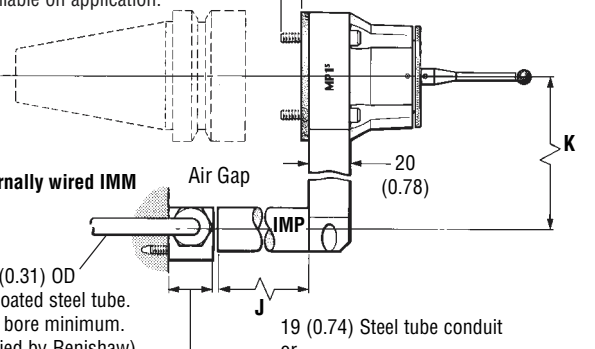
Dimension **J** is available in increments of 5mm, from 20 to 80mm (0.78 to 3.15in).




**Shank**

Renishaw supply probe ready shanks. Details available on application.



## STYLUS SPRING PRESSURE ADJUSTMENT - gauging force

Spring pressure within the probe causes the stylus to sit in one unique position, and return to this position following each stylus deflection.

Spring pressure is set by Renishaw. The user should only adjust spring pressure in special circumstances e.g. excessive machine vibration or insufficient pressure to support the stylus weight. The probe is removed from its mounting to gain access to the spring pressure adjusting screw.

Turn the adjusting screw anti-clockwise to reduce pressure for greater sensitivity or clockwise to increase pressure.

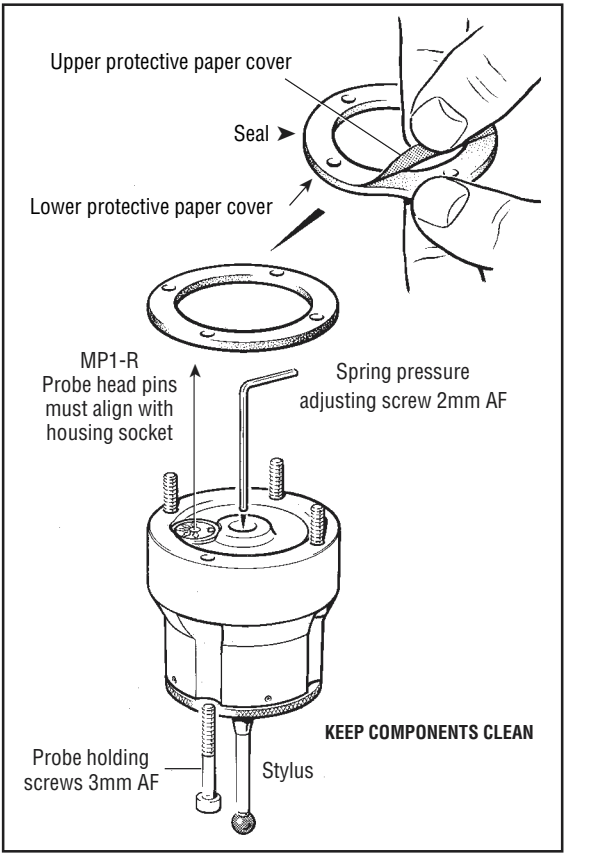
**MP1 base seal**

When the probe head is seperated from its mounting, the seal will become ineffective.

The probe base must be cleaned and a new seal fitted prior to re-assembly.

The seal is supplied with protective paper on the lower and upper surfaces. When the paper is removed the adhesive surface is exposed ready for attachment to the probe and mounting surface.

STYLUS SPRING PRESSURE ADJUSTMENT AND USE OF STYLI OTHER THAN CALIBRATION STYLUS TYPE, MAY CAUSE REPEATABILITY TO DIFFER FROM THE TEST CERTIFICATE RESULTS.



## STYLUS ON-CENTRE ADJUSTMENT

Stylus alignment with the spindle centre line need only be approximate, except in the following circumstances.

1. Alignment must be as exact as possible, when probe vector software is used.
2. The probe must be parrallel to the spindle axis to prevent stylus stem contact when gauging deep holes.
3. When the machine control software cannot compensate for an offset stylus.

**How to check stylus position**

Stylus tip and stem position are established using a low force (less than 0,2N / 0,045 lbf.) dial test indicator or setting gauge.

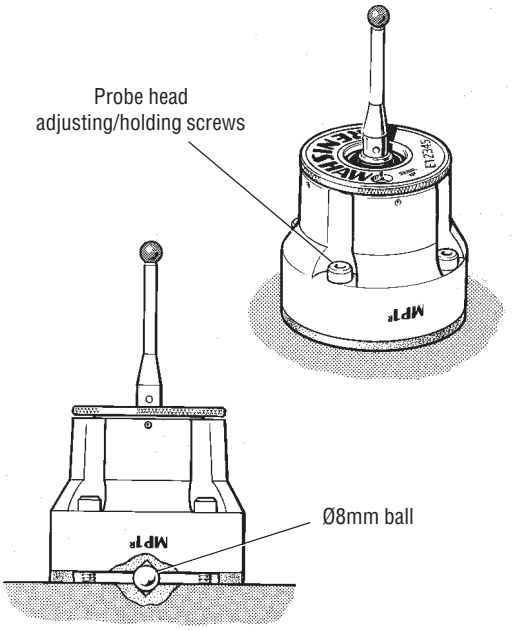
Alternatively rotate the stylus ball against a flat surface. Alignment is good when the stylus ball maintains a consistent distance from the flat surface.

**Stylus aligment**

To adjust stylus alignment, slacken the probe head holding screws to allow the probe head to pivot on the Ø8mm ball.

Adjust and tighten these four screws to lock the probe head in its new position. Then check the new position for alignment.

When the stylus is correctly aligned, check tightness of holding screws, and replace the front cover.




**KEEP COMPONENTS CLEAN**

1. IF AT ANY TIME THE UNIT IS ACCIDENTLY DROPPED, IT SHOULD BE CHECKED FOR ON-CENTRE POSITION.
2. DO NOT HIT OR TAP THE PROBE TO ACHIEVE ON-CENTRE ADJUSTMENT.

## PROBE MOVES

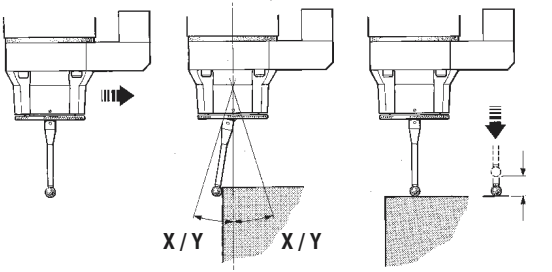
**Probe trigger**

A probe trigger signal is generated when the probe stylus is driven against a surface. The machine control records the contact position and instructs machine motion to stop.

High probing speeds are desirable, however a probing velocity must be chosen which allows the machine to stop within the limits of stylus overtravel and machine measuring capability. Follow feed rate guide lines given by supplier.

To ensure a trigger signal is given, drive the probe against the workpiece to a target beyond the expected surface, but within the limits of stylus overtravel.

After the probe stylus touches the surface, reverse clear of the surface.



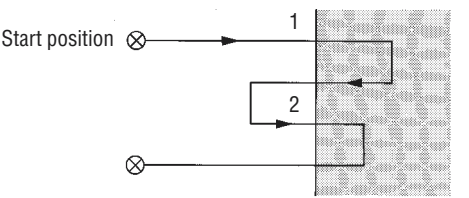

X/Y overtravel limits *see page 1-5*

**Single and double touch**

With some types of controllers, it is an advantage to use a two touch method as poor repeatability can result at higher feed rates,

If the probe operating sequence is based on a single touch, then the probe may be returned to its start point, following a guaging move.

With a double touch sequence the first move finds the surface quickly. Then the probe is reversed to a position clear of the surface, before making the second touch at a slower feed rate, thereby recording the surface position at a higher resolution.



## PROBE MOVES

### System delays

System delays are repeatable to less than 2μs, and are constant in each direction measurement is taken.
Delays are automatically compensated for, provided a calibration move is made in the same direction and velocity as each measurement move.

### Calibrating a system

Calibrate the probe system, at a constant measurement speed in the measurement direction, to automatically compensate for errors - in the following circumstances.

1. Before the system is used.
2. When a new stylus is used.
3. If the stylus is bent.
4. To allow for machine thermal growth.
5. Poor shank relocation repeatability, in the machine spindle.

Probe cycles and features are machine software dependant

Software for probing routines is available from Renishaw

## SOFTWARE REQUIREMENTS

### SOFTWARE for TURNING and MACHINING CENTRES

**Good software will allow the following functions :**

- Simple to use calibration routines
- Update a tool offset.
- Generate an alarm if a broken tool is found or set a flag for corrective action.
- Update work co-ordinate systems for positioning.
- Report measured sizes and update tool offsets for automatic tool offset compensations.
- Print data in the form of an inspection report to an external PC / printer.
- Set tolerances on features.

### Verify your software

**1** Does your software have suitable calibration routines which compensate for stylus on centre errors. If not you must set the probe stylus on centre mechanically.
**Note - machining centre applications :**
When using probe styli which are not on spindle centre, spindle orientation repeatability is important to avoid probe measurement errors.

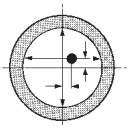
**2** Does your software compensate for probe triggering characteristics in all measuring directions.

**3** Does the software automatically adjust the program co-ordinate system to the relevant set-up feature on the component, for job set-up purposes.

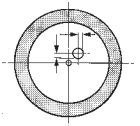
## SOFTWARE for MACHINING CENTRES
### Simple to use canned cycles for basic features

**CALIBRATION**

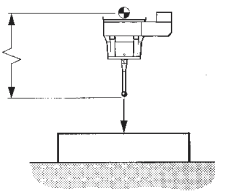
Probe XY offset calibration



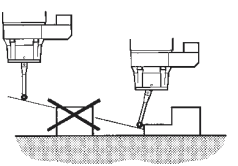
Stylus ball radius calibration



Probe length calibration



**PROBE COLLISION PROTECTION**

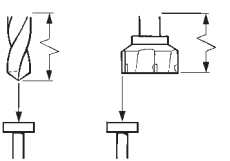


**TOOL SETTING PROBE**

Length setting (rotating and non rotating)

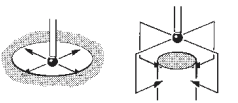
Diameter setting (rotating)

Broken tool detection

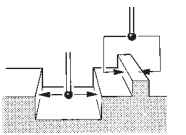


**INSPECTION**

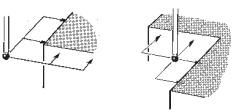
Bore and boss measure



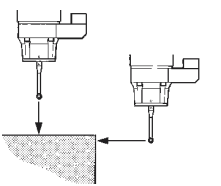
Web and pocket measure



Internal and external corner find



XYZ single surface position



Inspection print-out

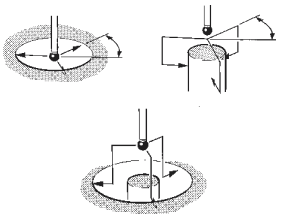
**COMPONENT No. 1**

| OFFSET NO. | NOMINAL DIMENSION | TOLERANCE | DEVIATION FROM NOMINAL | COMMENTS |
|---|---|---|---|---|
| 99 | 1.5000 | .1000 | .0105 | |
| 97 | 200.0000 | .1000 | .2054 | OUT OF TOL |

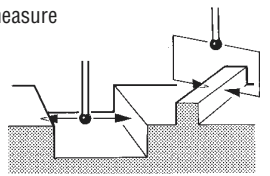
**SOFTWARE for MACHINING CENTRES**
**Simple to use canned cycles for additional features**

## INSPECTION

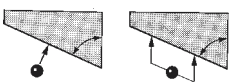
Bore and boss (three point)



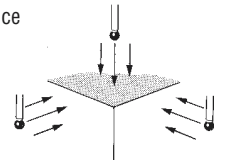
Angled web and pocket measure



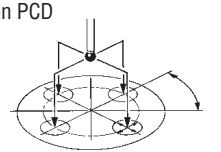
Angled surface measure



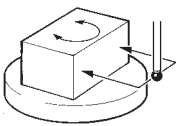
Stock allowance



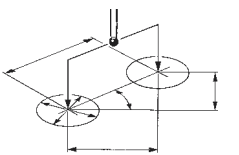
Bore and boss on PCD



4th axis measure



Feature to feature measure



## MAINTENANCE

**THE PROBE IS A PRECISION TOOL HANDLE WITH CARE**

**ENSURE THE PROBE IS FIRMLY SECURED IN ITS MOUNTING**

**SAFETY - SWITCH POWER OFF WHEN WORKING INSIDE ELECTRICAL COMPONENTS**

Although Renishaw probes require little maintenance, the performance of the probe will be adversely affected if dirt, chips or liquids are allowed to enter the sealed working parts.

Therefore keep all components clean and free from grease and oil. Periodically check cables for signs of damage, corrosion or loose connections.

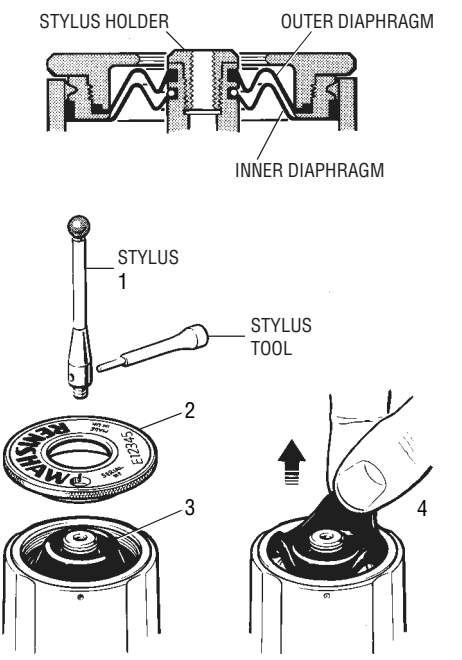
**OUTER DIAPHRAGM INSPECTION.**

The probe mechanism is protected by two diaphragms, these provide adequate protection under normal working conditions. The user should periodically check the outer diaphragm, for signs of damage and coolant leakage. If this is evident replace the outer diaphragm.

The outer diaphragm is resistant to coolant and oils. However if the outer diaphragm is damaged, the inner diaphragm could become weakened with prolonged immersion in certain coolants and oils.

The user must not remove the inner diaphragm, if damaged, return the probe to your supplier for repair.

**WARNING:** NEVER ATTEMPT TO REMOVE DIAPHRAGM WITH METAL OBJECTS



**DIAPHRAGM INSPECTION**

1. Remove the stylus.
2. Unscrew the front cover.
3. Inspect outer diaphragm for damage.
4. To remove outer diaphragm, grip near the middle and pull upwards.

**INNER DIAPHRAGM INSPECTION**

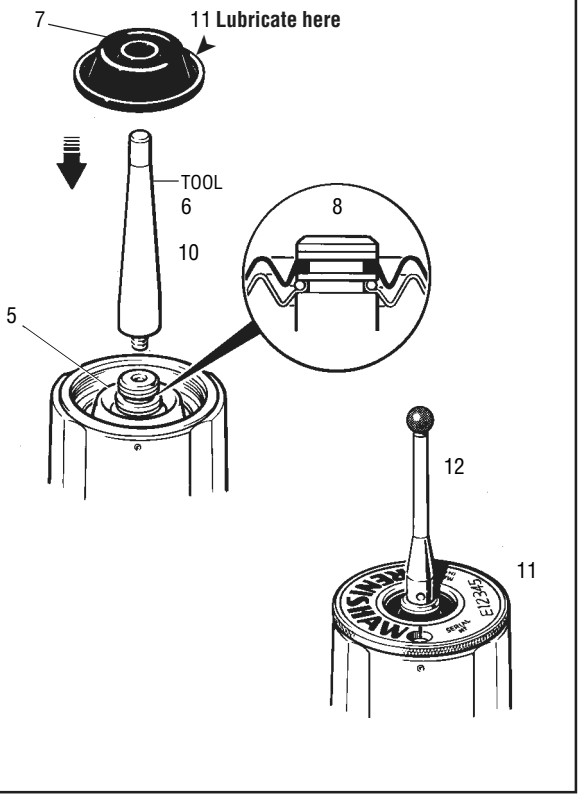
5. Inspect inner diaphragm for damage.

**If damaged return the probe to your supplier for repair.**

DO NOT REMOVE INNER DIAPHRAGM

**OUTER DIAPHRAGM REPLACEMENT**

6. Screw tool fully into stylus holder.
7. Fit new diaphragm.
8. The diaphragm must locate centrally in the stylus holder groove.
9. Press diaphragm to expel trapped air.
10. Remove tool.
11. Lightly lubricate diaphragm rim surface. Then refit front cover.
12. Refit stylus.



**COMPLETE FAILURE**

| | |
|---|---|
| Transmission modules not correctly aligned. | Align correctly. |
| Transmission modules damaged. | Return to supplier for repair. To check IMM, place metal disc against IMM. The audible indicator should bleep when disc is removed. If it does not bleep, replace IMM. |
| Swarf blocking inductive transmission air gap. | Clean out. |
| Loose mounting. | Check all bolted or screwed connections for tightness. |
| Interface LED does not light up. | Check fuses. |
| Poor electrical connection. | Check connectors. |
| Cable screen broken. | Replace cable. |
| Incorrect voltage. | Check supply. |
| Probe failure. | No continuity through probe circuit. |
| Probe spring pressure too low. | Tighten stylus spring pressure. |
| Probe mounting damaged. | Repair or replace. |

**IF THESE CHECKS DO NOT ELIMINATE THE FAULT, CONSULT YOUR PROBE SUPPLIER.**

## FAULT FINDING

### POOR REPEATABILITY

| | |
|---|---|
| Transmission modules not correctly aligned. | Align correctly. |
| Loose mounting. | Check all bolts and screwed connections for tightness. |
| Loose stylus. | Tighten. |
| Poor electrical connections. | Check connectors. |
| Excessive machine vibration. | Tighten spring pressure. |

### SPURIOUS READING

| | |
|---|---|
| Cable screen broken. | Replace. |
| Poorly regulated supply voltage. | Regulate correctly. |
| Excessive machine vibration. | Eliminate vibration or adjust stylus spring pressure. |

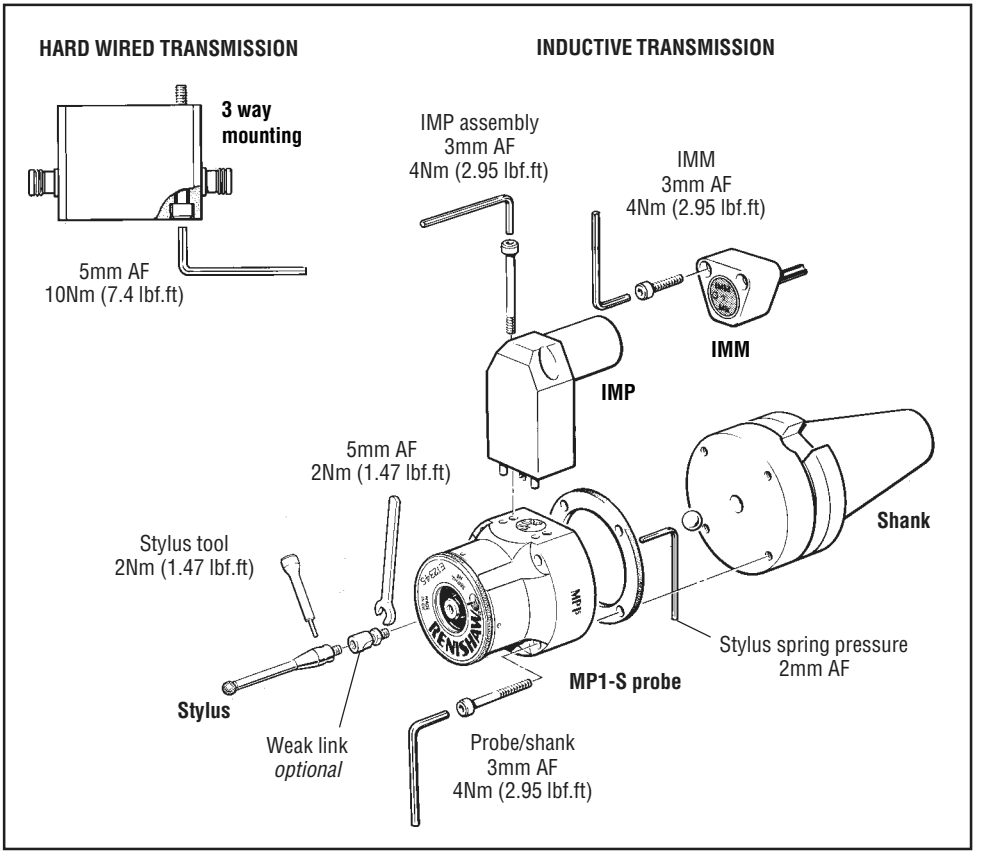
### POOR RE-ARMING

The probe is armed when the stylus mounting is seated, the electrical circuit is complete and the interface LED is lit.

| | |
|---|---|
| Spring pressure too low. | Adjust spring pressure. |
| Inner diaphragm pierced or damaged. | Return to supplier for repair. |

**IF THE PROBE OR INTERFACE CONTINUES TO MALFUCTION, RETURN TO YOUR SUPPLIER FOR REPAIR.**

## SCREW TORQUE VALUES - Nm (lbf.ft)



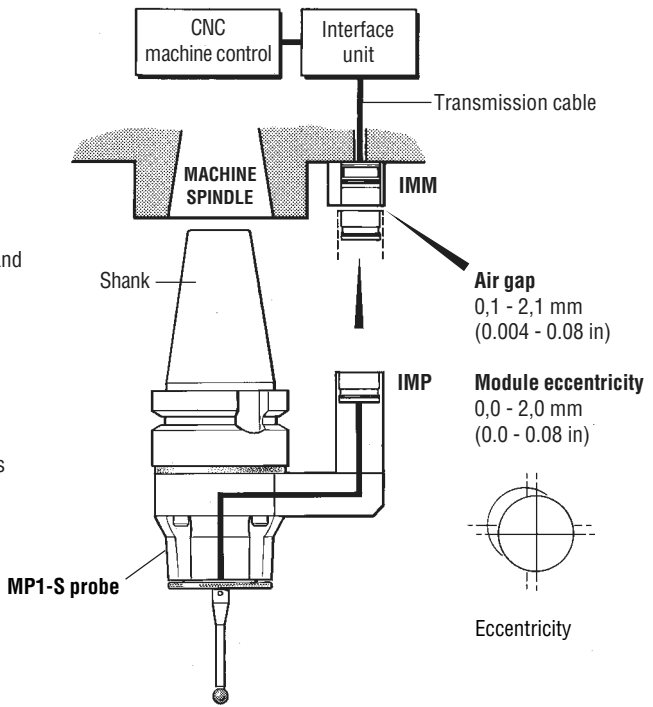
**APPENDIX 1**
**INDUCTIVE SIGNAL TRANSMISSION MODULES - MACHINING CENTRE**

Inductive transmission systems are fully described in Data Sheet ITS H-2000-2140
IMP installation is fully described in IMP Installation Guide H-2000-4037
IMM installation is fully described in IMM Installation Guide H-2000-4039

**SIGNAL TRANSMISSION MODULES**
**Inductive module probe (IMP)**
**Inductive module machine (IMM)**

Inductive signal transmission modules pass power and signals across an air gap between the IMP and IMM, allowing the probe unit to be easily transferred between the machine spindle and machine tool store, as any other tool in the system.

Modules are always installed in pairs and must locate within specified separation (air gap) and eccentricity limits.



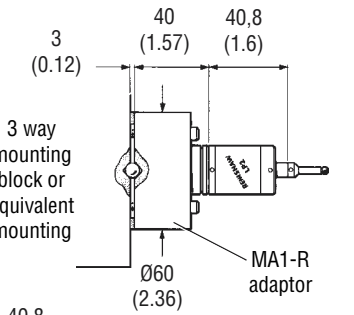
## APPENDIX 2
## ADAPTORS and EXTENSIONS

Adaptors and extensions are fully described in Data Sheet AEH H-2000-2120
IMP's are fully described in Data Sheet ITS H-2000-2140

### ADAPTORS

Features with restricted access can be probed using an LP2 probe.
The MA1 and MA1-R adaptors allow the MP1 probe to be substituted with an LP2 probe.
The MA1 connects directly to the IMP assembly.
The MA1-R connects directly to a 3 way mounting block or equivalent mounting.

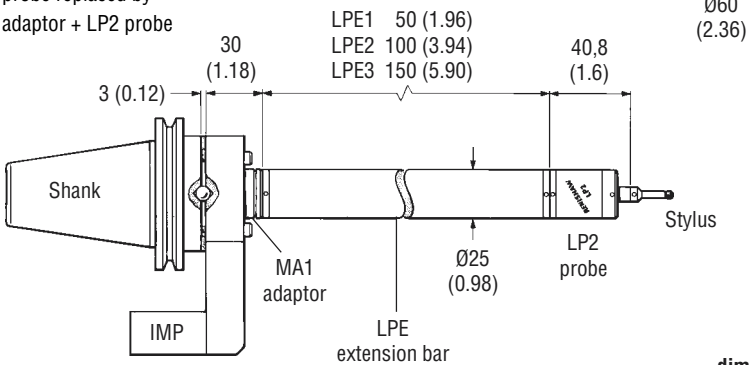
MP1 probe replaced by
MA1-R adaptor + LP2 probe




### EXTENSIONS

Extensions allow deeper access into workpiece features.
**LPE** extensions with M16 thread, are suitable for machining centre applications using the LP2 probe.

MP1 probe replaced by
MA1 adaptor + LP2 probe



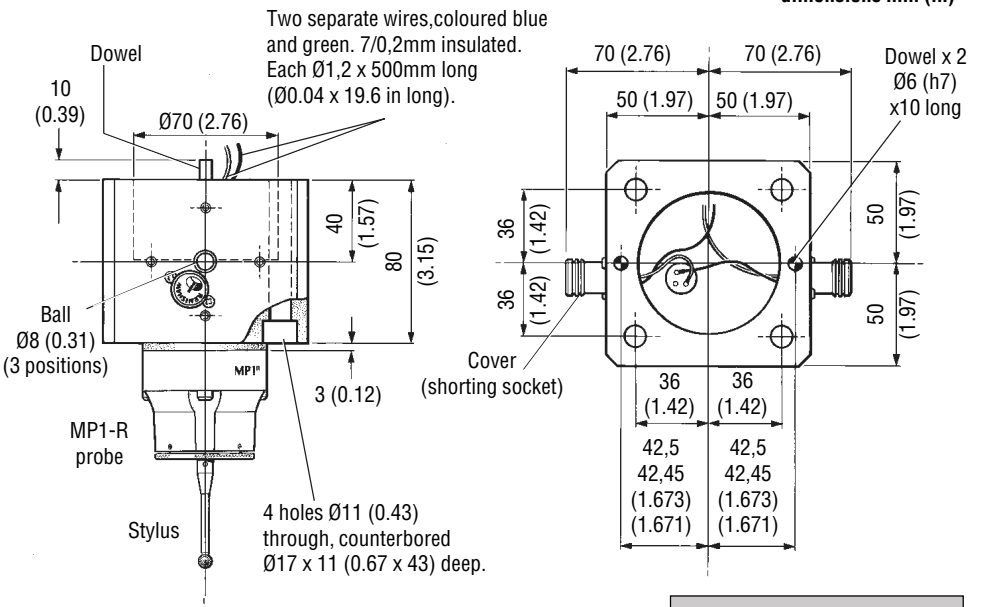

**dimensions mm (in)**

**APPENDIX 3**

**3 WAY MOUNTING BLOCK for MP1 PROBES (or LP2 probe with adaptor)**

The mounting will accept 1 to 3 probes. A probe or cover must be fitted in each mounting position to complete the electrical circuit.

**dimensions mm (in)**




Each mounting block is supplied complete with :

2 Covers (shorting socket).
3 Ø8mm balls.
2 Dowels.

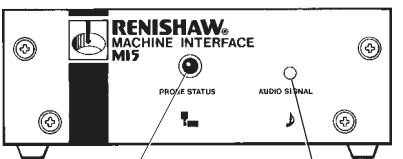
Mounting blocks are typically used on probing systems for vertical turning lathes or other installations requiring hard wired signal transmission.

## APPENDIX 4
## MI 5 INTERFACE UNIT

The MI 5 is fully described in
User's Guide H-2000-5014

The MI 5 interface is used with inductive and/or hard wired signal transmission systems. System status is presented visually in a continuously updated form, on the front panel diagnostic LED display, and by outputs available from the MI 5 to the CNC control.

**Front View**




**Probe status LED**
(Light emmiting diode)

Lit when probe is at rest or interface is inhibited.

LED off indicates probe stylus is deflected or power is off.

**Audible indicator**
A tone is emitted each time stylus is defected or returns to rest.

**INTERFACE UNIT**

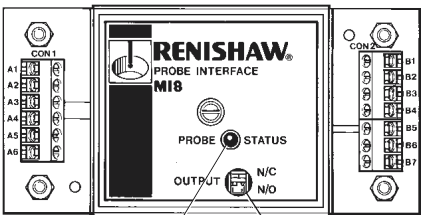
**Interface units convert probe signals into an acceptabel form for the CNC machine control.**

## APPENDIX 5
## MI 8 INTERFACE UNIT

The MI 8 is fully described in
User's Guide H-2000-5015

The MI 8 interface is used with hard wired signal transmission systems. System status is presented visually in a continuously updated form on the front panel diagnostic LED display, and by outputs available from the MI 8 to the CNC control.

**Front View**




**Probe status LED**
(Light emmiting diode)

Lit when probe is at rest or interface is inhibited.

LED off indicates probe stylus is deflected or power is off.

**Switch SW1**

Output N/C
(normally closed)

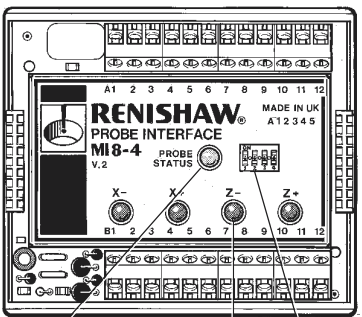
Output N/O
(normally open)

## APPENDIX 6
## MI 8-4 INTERFACE UNIT

The MI 8-4 is fully described in
User's Guide H-2000-5008

The MI 8-4 is used with hard wired signal transmission systems. it connects to the machine control input, or it connects into the 4 wire Fanuc 'Automatic Length Measurement' input (XAE, ZAE).

**Front view**




**Bi-colour probe status LED**
(Light emmiting diode)

Green when probe is at rest or interface is inhibited.

Red when probe stylus is deflected.

LED off indicates power is off.

**Switch SW1**

Output high
or
output low

**Diagnostic LED's**
Indicate direction of machine movement

## APPENDIX 7
## PSU3 POWER SUPPLY UNIT

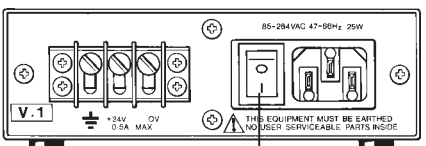
The PSU3 is fully described in
User's Guide H-2000-5057

The PSU3 provides a +24V supply for Renishaw interface units when a power supply is not available from the CNC machine control.

**Front view**


**Power LED**
(Light emitting diode)
When the green LED is lit, the power supply is on.

**Rear view**



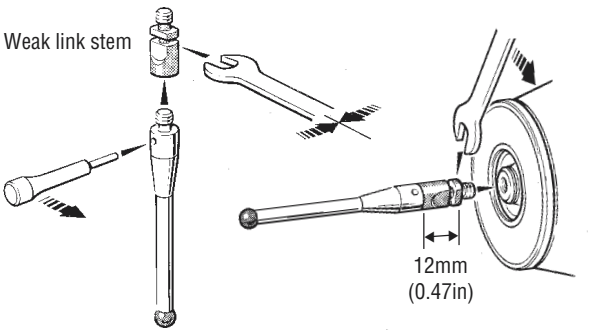

**Mains switch**
On/off

## APPENDIX 8
## WEAK LINK FOR STYLI WITH STEEL SHAFT - optional

**In the event of excessive stylus overtravel the weak link stem is designed to break, thereby protecting the probe from damage.**

### FITTING STYLUS WITH WEAK LINK ONTO A TYPICAL PROBE

Screw torque value - 2 Nm (1.7 lbf.ft)
**Take care to avoid stressing the weak link during assembly**

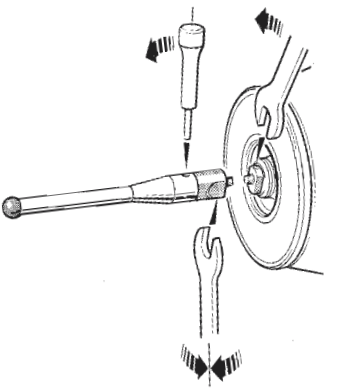



Attach the weak link to the stylus, by rotating the tommy bar and holding the spanner steady.

Fit the stylus with weak link to the probe.

**Note:**
THE WEAK LINK IS NOT USED WITH CERAMIC SHAFT STYLI

### TO REMOVE A BROKEN STEM



To remove broken portion of stem from the stylus, use the spanner and tommy bar.

The broken portion of stem attached to the probe is removed with the spanner.

**PARTS LIST - Please quote the Part No. when ordering equipment**

| Type | Part No. | Description |
|---|---|---|
| | | **MP1 PROBE** |
| MP1-S | A-2051-4576 | MP1-S probe (side electrical connection) with holding screws & TK1 tool kit. |
| MP1-R | A-2051-4577 | MP1-R probe (rear electrical connection) with holding screws & TK1 tool kit. |
| | | **ACCESSORIES** |
| Styli | — | For complete listing - see Renishaw styli guide H-1000-3200. |
| Stylus | A-5000-3709 | Ceramic stylus 50mm long with Ø6mm ball. |
| Stylus | A-5000-3712 | Ceramic stylus 100mm long with Ø6mm ball. |
| W link kit | A-2085-0068 | Weak link kit comprising : Two stylus weak link stems and spanner. |
| Weak link | M-2085-0069 | Stylus weak link stem. |
| Spanner | P-BT03-0001 | Spanner for stylus weak link stem. |
| Screw | P-SC01-0430 | Cap head screw M4 x 0,7 - 30mm long, probe holding screws - 4 required. |
| TK1 kit | A-2053-7531 | TK1 - Probe head tool kit comprising : Stylus tool, 1,5mm, 2,0mm, 2,5mm 3,0mm and 4,0mm hexagon keys. |
| DK1 kit | A-2051-7105 | DK1 - MP1 outer diaphragm replacement kit. |
| Seal | M-2051-4522 | Base seal for MP1-S. |
| Seal | M-2054-6583 | Base seal for MP1-R. |
| Ø8 ball | P-BA03-0800 | Ø8mm Ball (pivot for stylus on-centre adjustment). |
| Plug | P-CN07-2002 | 5 way DIN plug for MP1-R mounting block (connects to interface cable). |
| Shank | — | Renishaw supply probe ready shanks - details available on application. |
| | | **MOUNTING BLOCK** |
| Mtg block | A-2051-4777 | 3 way mounting block complete with 2 covers (shorting socket). |
| Cover | A-1016-6363 | Cover (shorting socket) for 3 way mounting block. |
| | | **EXTENSIONS and ADAPTOR** |
| MA1 | A-2051-7080 | MA1 adaptor - allows LP2 probe to be used in place of MP1-S probe. |
| MA1-R | A-2051-7146 | MA1-R adaptor - allows LP2 probe to be used in place of MP1-R probe. |
| LPE1 | A-2063-7001 | LPE1 extension bar Ø25 x 50mm long. |
| LPE2 | A-2063-7002 | LPE2 extension bar Ø25 x 100mm long. |
| LPE3 | A-2063-7003 | LPE3 extension bar Ø25 x 150mm long. |
| | | **SOFTWARE** |
| Software | — | Probe software for machine tools - see Data Sheet H-2000-2289. |

**Australia** – Renishaw Oceania Pty Ltd
**Tel** +61 3 9553 8267
**Fax** +61 3 9592 6738
**email** australia@renishaw.com

**Brazil** – Renishaw Latino Americana Ltda
**Tel** +55 11 4195 2866
**Fax** +55 11 4195 1641
**email** brazil@renishaw.com

**The People's Republic of China** – Renishaw Representative Office
**Tel** +86 10 6410 7993
**Fax** +86 10 6410 7992
**email** china@renishaw.com

**France** – Renishaw S.A.
**Tel** +33 1 64 61 84 84
**Fax** +33 1 64 61 65 26
**email** france@renishaw.com

**Germany** – Renishaw GmbH
**Tel** +49 7127 9810
**Fax** +49 7127 88237
**email** germany@renishaw.com

**Hong Kong** – Renishaw (Hong Kong) Ltd
**Tel** +852 2753 0638
**Fax** +852 2756 8786
**email** hongkong@renishaw.com

**India** – Renishaw Metrology Systems Private Ltd
**Tel** +91 80 5320 144
**Fax** +91 80 5320 140
**email** india@renishaw.com

**Indonesia** – Renishaw Representative Office
**Tel** +62 21 428 70153
**Fax** +62 21 424 3934
**email** indonesia@renishaw.com

**Italy** – Renishaw S.p.A.
**Tel** +39 011 966 10 52
**Fax** +39 011 966 40 83
**email** italy@renishaw.com

**Japan** – Renishaw K.K.
**Tel** +81 3 5332 6021
**Fax** +81 3 5332 6025
**email** japan@renishaw.com

**The Netherlands** – Renishaw International BV
**Tel** +31 76 543 11 00
**Fax** +31 76 543 11 09
**email** benelux@renishaw.com

**Singapore** – Renishaw Representative Office
**Tel** +65 897 5466
**Fax** +65 897 5467
**email** singapore@renishaw.com

**Slovenia** – RLS merilna tehnika d.o.o.
**Tel** +386 1 52 72 100
**Fax** +386 1 52 72 129
**email** mail@rls.si

**South Korea** – Renishaw Liaison Office
**Tel** +82 2 565 6878
**Fax** +82 2 565 6879
**email** southkorea@renishaw.com

**Spain** – Renishaw Iberica S.A.
**Tel** +34 93 478 21 31
**Fax** +34 93 478 16 08
**email** spain@renishaw.com

**Switzerland** – Renishaw A.G.
**Tel** +41 55 415 50 60
**Fax** +41 55 415 50 69
**email** switzerland@renishaw.com

**Taiwan** – Renishaw Representative Office
**Tel** +886 4 251 3665
**Fax** +886 4 251 3621
**email** taiwan@renishaw.com

**UK (Head Office)** – Renishaw plc
**Tel** +44 1453 524524
**Fax** +44 1453 524901
**email** uk@renishaw.com

**USA** – Renishaw Inc
**Tel** +1 847 286 9953
**Fax** +1 847 286 9974
**email** usa@renishaw.com

**For all other countries**
**Tel** +44 1453 524524
**Fax** +44 1453 524901
**email** international@renishaw.com

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