

MP16 probe system with selectable channel radio transmission



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Installation and user's guide

MP16 touch-trigger probe system

**(MP3 probe with selectable
channel radio transmission)**

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CHANGES TO EQUIPMENT: Renishaw reserves the right to change its equipment without obligation to change equipment previously sold.

WARRANTY: Equipment requiring attention under warranty must be returned to your supplier. No claims will be considered where equipment has been incorrectly installed or misused, or where repairs or adjustments have been attempted by unauthorised persons. Prior consent must be obtained in instances where Renishaw equipment is to be substituted or omitted. Failure to comply with this requirement will invalidate the warranty

PATENTS: Features of the Renishaw MP16 touch-trigger probe system (MP3 probe with channel selectable radio transmission) are subject to the following patents and patent applications:

EP 0506318	JP 1,847,335	US 4542467
EP 0652413	JP 1,942,442	US 4599524
EP 0872787	JP 2,514/1999	US 4636960
EP 108521	JP 3,126,797	US 5,272,817
		US 5,279,042



This product has been tested to the following European Standards:

I-ETS 300 220 (October 1993)
ETS 300 683 (June 1997)

It complies with the relevant essential health and safety protection requirements of the following EC Directives:

89/336/EEC, 91/263/EEC, 92/31/EEC (EMC), 93/68/EEC (CE Marking)

All relevant safety information, including that incorporated in this Installation and User's Guide must be observed.

FCC

Information to User (FCC Section 15.19)

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

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

Information to User (FCC Section 15.105)

This equipment has been tested and found to comply with the limits for both a Class A and Class B 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 used in accordance with this Installation and User's Guide, 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.

Information to User (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.

Special accessories (FCC Section 15.27)

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

FCC (continued)

The FCC has assigned the following product information codes:

FCC ID: KQG RMP2-224

Comprising:

RMP2 radio module probe (transmitter)
MP3 touch-trigger probe

FCC ID: KQG MI16-224

Comprising:

MI16 machine interface (receiver)
RMM2 radio module machine (antenna)
RMM2 radio module machine (antenna)
OM16 optical module (optional)
PSU3 power supply unit (optional)

Radio authority approval

The 433 MHz variant of this product conforms to **I-ETS 300 220 (October 1993)**, **BAPT 222ZV 125 Dec. 1994** and **Directive 89/336/EEC**.

The product complies with the **R&TT Directive 1999/5/EC of 09. March 1999**.

The product is approved by, and has been assigned the registration number quoted, within the following countries:

Denmark:	Registration number – CEPT/LPD/DK/9853
Finland:	Registration number – FI98080066
France:	Registration number – 98 0102 PPL 0
Germany:	Registration number - G133598J
Holland:	Registration number – G133598J, CEPT 433
Sweden:	Registration number – Ue980077
Switzerland:	Registration number – BAKOM 98.0448.K.P

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List of associated publications

<u>Title</u>	<u>Publication number</u>
Taper shanks for machine tool probe data sheet	H-2000-2011
DK3 – Probe outer diaphragm replacement kit instruction sheet	H-2000-4052
PSU3 power supply unit installation and user's guide	H-2000-5057
Probe systems installation manual for machine tools	H-2000-6040

GB

Consolidated list of warnings and cautions

WARNINGS

INSTALLATION OF THE MP16 TOUCH-TRIGGER PROBE SYSTEM MUST ONLY BE UNDERTAKEN BY FULLY QUALIFIED PERSONNEL WHO ARE FULLY CONVERSANT WITH ALL SAFETY PROCEDURES AND LEGISLATION IN FORCE IN THE COUNTRY OF USE.

THE MI16 MACHINE INTERFACE MUST BE SUPPLIED FROM A 24V DC SELV POWER SUPPLY THAT CONFORMS FULLY WITH THE ESSENTIAL REQUIREMENTS OF BS EN 61010 OR SIMILAR SPECIFICATION.

ENSURE THAT ALL POWER SOURCES ARE SWITCHED OFF PRIOR TO REMOVING ANY PANEL OR GUARD FROM THE MACHINE TOOL. IF ISOLATING POWER AT THE MAINS SWITCH, ENSURE A SIGN TO THIS EFFECT IS PLACED ON THE SWITCH TO PREVENT THE POWER BEING INADVERTENTLY SWITCHED BACK ON.

ISOLATE THE 24 V POWER SUPPLY PRIOR TO CONNECTING THE MI16 MACHINE INTERFACE UNIT.

THE FOLLOWING PROCEDURE REQUIRES THAT THE MACHINE TOOL SPINDLE IS MOVED THROUGH THE FULL WORKING ENVELOPE OF THE MACHINE TOOL. TO AVOID INJURY, ENSURE THAT YOU REMAIN OUTSIDE THIS WORKING ENVELOPE WHENEVER THE MACHINE TOOL IS ACTIVE.

BEWARE OF UNEXPECTED MOVEMENT OF THE MACHINE TOOL.

REFER TO THE MACHINE TOOL MANUFACTURER'S OPERATING INSTRUCTIONS.

NEVER SPIN THE PROBE WITHIN THE MACHINE TOOL SPINDLE AT SPEEDS EXCEEDING 1000 RPM.

Consolidated list of warnings and cautions (continued)

CAUTIONS

IT IS IMPORTANT, PRIOR TO INSTALLING THE MP16 TOUCH-TRIGGER PROBE SYSTEM ON A MACHINE TOOL, TO ENSURE THAT THE ENVIRONMENT WILL BE FREE OF INTERFERENCE ON THE RADIO FREQUENCY AT WHICH YOU WISH TO TRANSMIT SIGNALS. DEVICES WHICH COULD INTERFERE WITH SIGNAL TRANSMISSION INCLUDE, BUT ARE NOT LIMITED TO, ARC WELDERS, RADIO PAGERS, REMOTE CONTROL ALARM KEYS AND MOBILE TELEPHONES.

TO AVOID CROSS INTERFERENCE, A MINIMUM DISTANCE OF 100 METRES (328ft) MUST BE ALLOWED BETWEEN EACH TOUCH-TRIGGER PROBE SYSTEM IF OPERATING ON THE SAME RADIO FREQUENCY AND CHANNEL.

THE MP16 TOUCH-TRIGGER PROBE SYSTEM IS DESIGNED TO OPERATE IN AMBIENT TEMPERATURES OF BETWEEN 0°C AND 60°C (32°F TO 104°F). OPERATION OF THE MP16 TOUCH-TRIGGER PROBE SYSTEM OUTSIDE THIS TEMPERATURE RANGE WILL RESULT IN A REDUCTION IN THE SYSTEM'S TRANSMISSION RANGE.

THE PROBE MOUNTING KIT SUPPLIED WITH THE MP16 TOUCH-TRIGGER PROBE SYSTEM INCLUDES ANTI-VIBRATION WASHERS WHICH MUST BE FITTED TO THE SOCKET HEAD CAPSCREWS USED TO SECURE THE SHANK ADAPTOR TO THE RMP2. FAILURE TO FIT THESE WASHERS COULD RESULT IN LOOSENING OF THE SOCKET HEAD CAPSCREWS DURING PROBE OPERATION.

CARE MUST BE TAKEN NOT TO DAMAGE THE BATTERY COVER SEAL WHEN REMOVING THE BATTERY COVER.

HANDLE BATTERIES IN ACCORDANCE WITH THE MANUFACTURER'S INSTRUCTIONS. USE ONLY THE RECOMMENDED BATTERY TYPE. DO NOT ALLOW THE BATTERY TERMINALS TO CONTACT OTHER METALLIC SURFACES.

WHEN ROUTING THE RMM2 CABLE TO THE MI16 MACHINE INTERFACE, IT IS ESSENTIAL THAT THE CABLE IS KEPT WELL AWAY FROM MOVING PARTS WHICH MAY SNAG, ENTANGLE, TRAP OR SEVER IT WHEN THE MACHINE TOOL IS IN MOTION.

Consolidated list of warnings and cautions (continued)

CAUTIONS (continued)

A FUNDAMENTAL CHARACTERISTIC OF RADIO TRANSMISSION SYSTEMS IS THAT REFLECTED SIGNALS CAN CANCEL OUT EACH OTHER, THUS RESULTING IN AREAS OF THE MACHINE TOOL WHERE NO SIGNAL IS PRESENT AT THE ANTENNA. SUCH AREAS ARE REFERED TO AS 'BLIND SPOTS' AND CAN BE EASILY ELIMINATED BY FITTING A PAIR OF RADIO ANTENNAE, RATHER THAN USING A SINGLE ANTENNA IN ISOLATION. RENISHAW RADIO TRANSMISSION SYSTEMS ARE SUPPLIED WITH TWO RADIO ANTENNAE AS STANDARD.

FAILURE TO ADEQUATELY PROTECT THE RMM2 CABLES CAN RESULT IN SYSTEM FAILURE DUE TO CABLE DAMAGE OR THE INGRESS OF COOLANT.

THE OM16 OPTICAL MODULE SHOULD NOT BE POSITIONED WHERE MACHINING SWARF COULD DIRECTLY IMPACT AGAINST ITS WINDOW. LONG-TERM EROSION OF THE GLASS WILL EVENTUALLY RESULT IN A LOSS OF OPTICAL SIGNAL STRENGTH.

PRIOR TO MOUNTING THE RMP2/RMP2-S RADIO MODULE PROBE TO THE MACHINE TOOL, IT IS IMPORTANT TO ENSURE THAT THE RMP2/RMP2-S IS MOUNTED SECURELY TO ITS SHANK.

PRIOR TO PROBE SYSTEM OPERATION, IT IS VITALLY IMPORTANT THAT YOU FULLY UNDERSTAND THE SOFTWARE WITH WHICH YOU WISH 'DRIVE' THE PROBE. INCORRECT PROGRAMMING CAN RESULT IN DAMAGE TO BOTH THE MACHINE, WORKPIECE AND TO THE PROBE ITSELF.

BEFORE SWITCHING ON THE PROBE, ENSURE THAT THE SHANK IS MOUNTED SECURELY WITHIN THE MACHINE TOOL SPINDLE.

FITTING OF BNC CONNECTORS TO THE RMM2 CABLES MUST ONLY BE PERFORMED BY SUITABLY QUALIFIED PERSONNEL WHO ARE FULLY CONVERSANT WITH THIS TYPE OF PROCEDURE.

WHEN FIRST RUNNING A PROBING CYCLE, IT IS RECOMMENDED THAT THE PROGRAM IS RUN WITH ALL RAPID AND FEEDRATE MOTION AT A REDUCED RATE TO AVOID DAMAGE OCCURING TO EITHER THE MACHINE TOOL OR TO THE PROBE.

THE SPRING PRESSURE WITHIN THE MP3 TOUCH-TRIGGER PROBE IS PRECISELY SET. IT MUST ONLY BE ADJUSTED IN EXTREME CIRCUMSTANCES WHERE EXCESSIVE MACHINE VIBRATION, OR THE USE OF EXTREMELY LONG OR HEAVY STYLI, IS CAUSING THE PROBE TO FALSE TRIGGER.

Consolidated list of warnings and cautions (continued)

CAUTIONS (continued)

ADJUSTMENT OF STYLUS SPRING PRESSURE, AS WELL AS THE USE OF STYLI OTHER THAN THAT USED TO DATUM THE PROBE, MAY RESULT IN DIFFERENCES IN PROBE REPEATABILITY OVER THOSE QUOTED ON THE CALIBRATION CERTIFICATE SUPPLIED WITH THE PROBE.

OVERTIGHTENING THE STYLUS SPRING FORCE ADJUSTMENT SCREW CAN RESULT IN INTERNAL DAMAGE TO THE MP3 TOUCH-TRIGGER PROBE.

D

Sammelliste mit Warnhinweisen (Warnung und Achtung)

WARNUNGEN

DIE INSTALLATION DES TAKTIL SCHALTENDEN MESSTASTERSSYSTEMS MP16 DARF NUR VON GESCHULTEM PERSONAL AUSGEFÜHRT WERDEN, DAS VOLLSTÄNDIG MIT ALLEN SICHERHEITSVORSCHRIFTEN UND GESETZEN VERTRAUT IST, DIE IM VERWENDUNGSLAND GELTEN.

DIE VERSORGUNG DES MASCHINENINTERFACE MI16 MUSS ÜBER EINE 24V DC SPANNUNGSVERSORGUNG MIT SCHUTZKLEINSPANNUNG ERFOLGEN, DIE DIE WESENTLICHEN ANFORDERUNGEN VON BS EN 61010 ODER EINER ÄHNLICHEN NORM ERFÜLLT.

ES IST SICHERZUSTELLEN, DASS VOR DEM ABNEHMEN VON PLATTEN ODER SCHUTZABDECKUNGEN DER WERKZEUGMASCHINE ALLE SPANNUNGSVERSORGUNGEN AUSGESCHALTET WURDEN. WIRD DIE SPANNUNGSVERSORGUNG AM NETZSCHALTER GETRENNT, IST SICHERZUSTELLEN, DASS EIN DEMENTSPRECHENDES SCHILD AM SCHALTER ANGEBRACHT WIRD, UM VERSEHENTLICHES EINSCHALTEN DER STROMVERSORGUNG ZU VERMEIDEN.

DIE 24 V SPANNUNGSVERSORGUNG IST VOR DEM ANSCHLUSS DES MASCHINENINTERFACE MI16 ZU TRENNEN.

FÜR DAS FOLGENDE VERFAHREN MUSS DIE WERKZEUGMASCHINENSPINDEL DURCH DEN GESAMTEN ARBEITSBEREICH DER WERKZEUGMASCHINE BEWEGT WERDEN. UM VERLETZUNGEN ZU VERMEIDEN, IST SICHERZUSTELLEN, DASS PERSONEN AUSSERHALB DES ARBEITSBEREICHES BLEIBEN, WENN DIE WERKZEUGMASCHINE AKTIV IST.

ACHTUNG VOR UNERWARTETER BEWEGUNG DER WERKZEUGMASCHINE.

SIEHE BEDIENUNGSANLEITUNG DES HERSTELLERS DER WERKZEUGMASCHINE.

DEN MESSTASTER NIEMALS BEI DREHZAHLEN ÜBER 1000 min⁻¹ IN DER WERKZEUGMASCHINENSPINDEL DREHEN LASSEN.

Sammelliste mit Warnhinweisen (Warnung und Achtung)
(Fortsetzung)

ACHTUNG!

VOR DER INSTALLATION DES TAKTIL SCHALTENDEN MESSTASTERSYSTEMS AUF EINER WERKZEUGMASCHINE IST ES WICHTIG SICHERZUSTELLEN, DASS DAS UMFELD AUF DER FUNKFREQUENZ, BEI DER SIE SIGNALE SENDEN WOLLEN, FREI VON STÖRSIGNALEN IST. SYSTEME, DIE DIE SIGNALÜBERTRAGUNG STÖREN KÖNNEN, SIND U. A. LICHTBOGENSCHWEISSGERÄTE, FUNKRUFEMPFFÄNGER (PIEPER), SCHLÜSSEL FÜR FERNBEDIENBARE FAHRZEUGALARMANLAGEN UND MOBILTELEFONE.

ZUR VERMEIDUNG VON KREUZKOPPLUNG MUSS EIN MINDESTABSTAND VON 100 METERN ZWISCHEN JEDEM TAKTIL SCHALTENDEN MESSTASTERSYSTEM GELASSEN WERDEN, WENN DIESE AUF DER GLEICHEN FUNKFREQUENZ UND DEM GLEICHEN FUNKKANAL BETRIEBEN WERDEN.

DAS TAKTIL SCHALTENDE MESSTASTERSYSTEM MP16 IST FÜR DEN BETRIEB BEI UMGEBUNGSTEMPERATUREN ZWISCHEN 0°C UND 60°C AUSGELEGT. DER BETRIEB DES TAKTIL SCHALTENDEN MESSTASTERSYSTEMS MP16 AUSSERHALB DIESES TEMPERATURBEREICHS FÜHRT ZU EINER VERRINGERUNG DES SENDEBEREICHS DES SYSTEMS.

DER MESSTASTEREINBAUSATZ (IM LIEFERUMFANG ENTHALTEN) DES TAKTIL SCHALTENDEN MESSTASTERSYSTEMS MP16 ENTHÄLT SCHWINGUNGSDÄMPFENDE UNTERLEGSCHREIBEN, DIE AN DEN INNENSECHSKANTSCHRAUBEN ZUR BEFESTIGUNG DES STEILKEGELADAPTERS AM RMP2 ANGEBRACHT WERDEN MÜSSEN. GESCHIEHT DIES NICHT, KÖNNEN SICH DIE INNENSECHSKANTSCHRAUBEN WÄHREND DES MESSTASTERBETRIEBS LÖSEN.

ES MUSS DARAUF GEACHTET WERDEN, DASS BEIM ABNEHMEN DES BATTERIEDECKELS NICHT DIE BATTERIEDECKELDICHUNG BESCHÄDIGT WIRD.

BATTERIEN SIND GEMÄSS DEN ANWEISUNGEN DES HERSTELLERS ZU VERWENDEN. ES SIND NUR EMPFOHLENE BATTERIETYPEN EINZUSETZEN. DIE BATTERIEANSCHLÜSSE DÜRFEN ANDERE METALLISCHE FLÄCHEN NICHT BERÜHREN.

BEI DER VERLEGUNG DES RMM2-KABELS ZUM MASCHINENINTERFACE MI16 MUSS DAS KABEL UNBEDINGT ABSEITS VON BEWEGLICHEN TEILEN GEHALTEN WERDEN, DIE ES ABSCHLEIFEN, VERWICKELN, EINKLEMMEN ODER ABTRENNEN KÖNNEN, WENN DIE WERKZEUGMASCHINE IN BEWEGUNG IST.

Sammelliste mit Warnhinweisen (Warnung und Achtung)
(Fortsetzung)

ACHTUNG! (Fortsetzung)

EIN GRUNDLEGENDES MERKMAL VON FUNKÜBERTRAGUNGSSYSTEMEN SIND DIE REFLEKTIERENDEN SIGNALE, DIE SICH GEGENSEITIG AUFHEBEN UND DAHER ZU EMPFANGSLOSEN BEREICHEN DER WERKZEUGMASCHINE FÜHREN, IN DENEN KEIN SIGNAL AN DER ANTENNE VORHANDEN IST. DIESE BEREICHE WERDEN ALS 'EMPFANGLÖCHER' BEZEICHNET UND KÖNNEN DURCH ANBRINGEN VON ZWEI ANTENNEN STATT EINER EINZELNEN ANTENNE BESEITIGT WERDEN. RENISHAW-FUNKÜBERTRAGUNGSSYSTEME WERDEN STANDARDMÄSSIG MIT ZWEI FUNKANTENNEN GELIEFERT.

BEI UNZUREICHENDEM SCHUTZ DER RMM2-KABEL KÖNNEN SYSTEMSTÖRUNGEN AUFGRUND VON KABELSCHÄDEN ODER AUFGRUND DES EINDRINGENS VON KÜHLMITTEL AUFTRETEN.

DAS OPTISCHE MODUL OM16 SOLLTE NICHT AN STELLEN POSITIONIERT WERDEN, AN DENEN BEARBEITUNGSSPÄNE DIREKT AUF DAS FENSTER DES OM16 AUFTREFFEN KÖNNEN. LANGFRISTIGE EROSION DER SCHEIBE FÜHRT LETZTENDLICH ZUM VERLUST DER OPTISCHEN SIGNALSTÄRKE.

VOR DER MONTAGE DES MESSTASTERS MIT SENDE- UND EMPFANGSMODUL RMP2/RMP2-S IST SICHERZUSTELLEN, DASS DER RMP2/RMP2-S FEST IN SEINEM STEILKEGEL SITZT.

VOR DEM BETRIEB DES MESSTASTERSYSTEMS MÜSSEN SIE DIE SOFTWARE, MIT DER SIE DEN MESSTASTER BETREIBEN WOLLEN, VOLLSTÄNDIG VERSTEHEN. FALSCHES PROGRAMMIERUNG KANN ZUR BESCHÄDIGUNG VON MASCHINE, WERKSTÜCK UND MESSTASTER FÜHREN.

VOR DEM EINSCHALTEN DES MESSTASTERS IST SICHERZUSTELLEN, DASS DER STEILKEGEL FEST IN DER WERKZEUGMASCHINENSPINDEL MONTIERT IST.

BNC-ANSCHLÜSSE DÜRFEN NUR VON ENTSPRECHEND QUALIFIZIERTEM PERSONAL ANGEBRACHT WERDEN, DAS VOLLSTÄNDIG MIT DIESEM VERFAHREN VERTRAUT IST.

BEIM ERSTEN STARTEN EINES TASTZYKLUS WIRD EMPFOHLEN, ALLE EILGANG- UND VORSCHUBBEWEGUNGEN IM PROGRAMM MIT REDUZIERTER GESCHWINDIGKEIT AUSZUFÜHREN, UM BESCHÄDIGUNGEN VON WERKZEUGMASCHINE ODER MESSTASTER ZU VERMEIDEN.

Sammelliste mit Warnhinweisen (Warnung und Achtung)
(Fortsetzung)

ACHTUNG! (Fortsetzung)

DER FEDERDRUCK FÜR DIE ANTASTKRAFT DES TAKTIL SCHALTENDEN MESSTASTERS MP3 IST PRÄZISE EINGESTELLT. ER DARF NUR UNTER BESONDEREN UMSTÄNDEN KORRIGIERT WERDEN, IN DENEN DER MESSTASTER AUFGRUND VON ÜBERGROSSER MASCHINENSCHWINGUNG ODER DER VERWENDUNG LANGER ODER SCHWERER TASTEREINSÄTZE FALSCH AUSGELENKT WIRD.

BEI EINSTELLUNG DES FEDERDRUCKS DES TASTEREINSATZES SOWIE VERWENDUNG VON ANDEREN TASTEREINSÄTZEN ALS ZUR KALIBRIERUNG DES MESSTASTERS VERWENDET, KÖNNEN SICH UNTERSCHIEDE IN DER WIEDERHOLGENAUIGKEIT DES MESSTASTERS GEGENÜBER DENEN, DIE IN DER KALIBRIERBESCHEINIGUNG IM LIEFERUMFANG DES MESSTASTERS ANGEGEBEN SIND, ERGEBEN.

ZU STARKER ANZUG DER EINSTELLSCHRAUBE FÜR DIE MESSTASTERANTASTKRAFT KANN ZU INNERER BESCHÄDIGUNG DES TAKTIL SCHALTENDEN MESSTASTERS MP3 FÜHREN.

F

Liste des avertissements et des mises en garde

AVERTISSEMENTS

L'INSTALLATION DU SYSTÈME DE PALPAGE À DÉCLENCHEMENT PAR CONTACT MP16 NE DOIT ÊTRE ENTREPRISE QUE PAR LE PERSONNEL QUALIFIÉ CONNAISSANT BIEN TOUTES LES PROCÉDURES DE SÉCURITÉ ET LES RÉGLEMENTATIONS EN VIGUEUR DANS LE PAYS D'UTILISATION.

L'INTERFACE MACHINE MI16 DOIT ÊTRE ALIMENTÉE À PARTIR D'UNE ALIMENTATION ÉLECTRIQUE SELV DE CC DE 24 V ENTIÈREMENT CONFORME AUX EXIGENCES ESSENTIELLES DE LA NORME BS EN 61010 OU À UNE SPÉCIFICATION SEMBLABLE.

ASSUREZ-VOUS QUE TOUTES LES SOURCES D'ALIMENTATION ÉLECTRIQUE SONT ÉTEINTES AVANT DE PROCÉDER AU RETRAIT D'UN PANNEAU OU D'UNE PROTECTION SUR LA MACHINE-OUTIL. LORSQUE VOUS METTEZ L'ALIMENTATION ÉLECTRIQUE HORS CIRCUIT AU SECTEUR, VEILLEZ À CE QU'UN PANNEAU D'AVERTISSEMENT SOIT PLACÉ SUR L'INTERRUPTEUR AFIN DE VOUS ASSURER QUE LE COURANT NE SERA PAS RÉTABLI PAR INADVERTANCE.

METTEZ L'ALIMENTATION ÉLECTRIQUE DE 24 V HORS CIRCUIT AVANT DE BRANCHER L'UNITÉ D'INTERFACE MACHINE MI16.

POUR LA PROCÉDURE SUIVANTE, LA BROCHE DE LA MACHINE-OUTIL DOIT PARCOURIR TOUTE L'ENVELOPPE DE FONCTIONNEMENT DE LA MACHINE-OUTIL. TENEZ-VOUS À L'ÉCART DE CETTE ENVELOPPE DE FONCTIONNEMENT À CHAQUE FOIS QUE LA MACHINE-OUTIL EST ACTIVE AFIN D'ÉVITER TOUT RISQUE DE BLESSURE.

PRENEZ GARDE AUX MOUVEMENTS INATTENDUS DE LA MACHINE-OUTIL.

REPORTEZ-VOUS AUX INSTRUCTIONS DE FONCTIONNEMENT DU CONSTRUCTEUR DE LA MACHINE-OUTIL.

NE FAITES JAMAIS TOURNER LE PALPEUR DE LA BROCHE DE LA MACHINE-OUTIL À PLUS DE 1000 TPM.

Liste des avertissements et des mises en garde (suite)

MISES EN GARDE

IL EST IMPORTANT DE VOUS ASSURER QU' AUCUNE SOURCE D'INTERFÉRENCE NE SE TROUVE DANS LES ENVIRONS DE LA MACHINE-OUTIL AVANT D'INSTALLER UN SYSTÈME DE PALPAGE À DÉCLENCHEMENT PAR CONTACT MP16, À LA FRÉQUENCE RADIO À LAQUELLE VOUS VOULEZ TRANSMETTRE LES SIGNAUX. LA LISTE DES DISPOSITIFS PRÉSENTANT UN RISQUE D'INTERFÉRENCE POUR LA TRANSMISSION DES SIGNAUX COMPREND, ENTRE AUTRES, LES SOUDEUSES À L'ARC, LES RÉCEPTEURS DE RADIOMESSAGERIE, LES CLÉS D'ALARME À DISTANCE ET LES TÉLÉPHONES PORTABLES.

LES SYSTÈMES DE PALPAGE À DÉCLENCHEMENT PAR CONTACT DOIVENT SE TROUVER À AU MOINS 100 METRES LES UNS DES AUTRES EN CAS DE FONCTIONNEMENT À LA MÊME FRÉQUENCE RADIO ET SUR LE MÊME CANAL.

LE SYSTÈME DE PALPAGE À DÉCLENCHEMENT PAR CONTACT MP16 EST CONÇU POUR FONCTIONNER À UNE TEMPÉRATURE AMBIANTE COMPRISE ENTRE 0°C ET 60°C. LE FONCTIONNEMENT DU SYSTÈME DE PALPAGE À DÉCLENCHEMENT PAR CONTACT MP16 À UNE TEMPÉRATURE NON COMPRISE DANS CETTE PLAGE ENTRAÎNERA UNE RÉDUCTION DE LA GAMME DE TRANSMISSION DU SYSTÈME.

LE KIT DE MONTAGE DU PALPEUR FOURNI AVEC LE SYSTÈME DE PALPAGE À DÉCLENCHEMENT PAR CONTACT MP16 COMPREND DES RONDELLES ANTI-VIBRATIONS QU'IL FAUT INSÉRER SUR LES VIS À TÊTE CYLINDRIQUE À SIX PANS CREUX UTILISÉES POUR FIXER LA PLAQUE D'ADAPTATION AU RMP2. LE NON-RESPECT DE CETTE CONSIGNE RISQUE D'ENTRAÎNER UN RELÂCHEMENT DES VIS LORS DU FONCTIONNEMENT DU PALPEUR.

FAITES BIEN ATTENTION À NE PAS ENDOMMAGER LE COUVERCLE DE LA PILE LORSQUE VOUS LE DÉVISEZ.

MANIPULEZ LES PILES CONFORMÉMENT AUX INSTRUCTIONS DU CONSTRUCTEUR. N'UTILISEZ QUE LE TYPE DE PILE RECOMMANDÉ. ASSUREZ-VOUS QUE LES BORNES DES PILES N'ENTRENT PAS EN CONTACT AVEC D'AUTRES SURFACES MÉTALLIQUES.

Liste des avertissements et des mises en garde (suite)

MISES EN GARDE (suite)

LORSQUE VOUS RELIEZ LE CÂBLE RMM2 À L'INTERFACE MACHINE MI16, IL FAUT À TOUT PRIX VOUS ASSURER QUE LE CÂBLE NE SE TROUVE PAS PRÈS DE PIÈCES MOBILES RISQUANT DE L'EMMÊLER, OU DE LE ROMPRE LORSQUE LA MACHINE-OUTIL EST EN MOUVEMENT.

LE FAIT QUE LES SIGNAUX RÉFLÉCHIS PEUVENT S'ANNULER MUTUELLEMENT EST UNE CARACTÉRISTIQUE FONDAMENTALE DES SYSTÈMES DE TRANSMISSION RADIO. IL EXISTERA DONC DES ZONES DE LA MACHINE-OUTIL AU SEIN DESQUELLES AUCUN SIGNAL NE SERA CAPTÉ PAR L'ANTENNE. CES ZONES DE NON RÉCEPTION PEUVENT ÊTRE FACILEMENT ÉLIMINÉES EN INSTALLANT LA PAIRE D'ANTENNES RADIO. LES SYSTÈMES DE TRANSMISSION RADIO STANDARD RENISHAW SONT ACCOMPAGNÉS DE DEUX ANTENNES RADIO.

LE NON-RESPECT DES CONSIGNES DE PROTECTION DES CÂBLES RMM2 RISQUE D'ENTRAÎNER UNE DÉFAILLANCE DU SYSTÈME SUITE À L'ENDOMMAGEMENT DU CÂBLE OU À LA PÉNÉTRATION DU LIQUIDE DE REFROIDISSEMENT.

LE MODULE OPTIQUE OM16 NE DOIT PAS SE TROUVER DANS UN ENDROIT OÙ SA FENÊTRE RISQUE DE RECEVOIR DES PROJECTIONS DE COPEAUX. TOUTE ÉROSION DU VERRE À LONG TERME ENTRAÎNERA INÉVITABLEMENT UNE RÉDUCTION DE L'INTENSITÉ DU SIGNAL OPTIQUE.

AVANT DE MONTER LE PALPEUR À MODULE ÉMETTEUR RMP2/RMP2-S SUR LA MACHINE-OUTIL, IL EST IMPORTANT DE VOUS ASSURER QUE LE RMP2/RMP2-S EST BIEN FIXÉ SUR SON CÔNE.

IL EST ESSENTIEL DE BIEN COMPRENDRE LE FONCTIONNEMENT DU LOGICIEL AVEC LEQUEL VOUS VOULEZ CONTRÔLER LE PALPEUR AVANT DE PROCÉDER À TOUTE OPÉRATION. TOUTE PROGRAMMATION INCORRECTE RISQUE D'ENDOMMAGER À LA FOIS LA MACHINE, LA PIÈCE À USINER ET LE PALPEUR LUI-MÊME.

AVANT DE METTRE LE PALPEUR EN MARCHÉ, ASSUREZ-VOUS QUE LE CÔNE EST BIEN FIXÉ DANS LA BROCHE DE LA MACHINE-OUTIL.

Liste des avertissements et des mises en garde (suite)

MISES EN GARDE (suite)

LA MISE EN PLACE DES CONNECTEURS BNC SUR LES CÂBLES RMM2 EST EXCLUSIVEMENT RÉSERVÉE AU PERSONNEL QUALIFIÉ ET CONNAISSANT BIEN CE TYPE DE PROCÉDURE.

LORSQUE VOUS EXÉCUTEZ UN CYCLE DE PALPAGE POUR LA PREMIÈRE FOIS, IL EST RECOMMANDÉ D'EXÉCUTER LE PROGRAMME AVEC DES MOUVEMENTS D'AVANCE RÉDUITS AFIN D'ÉVITER TOUT ENDOMMAGEMENT DE LA MACHINE-OUTIL OU DU PALPEUR.

LA PRESSION DE RESSORT DU PALPEUR À DÉCLENCHEMENT PAR CONTACT MP3 EST RÉGLÉE AVEC PRÉCISION. ELLE NE DOIT ÊTRE AJUSTÉE QUE DANS LES CAS EXTRÊMES OÙ UNE VIBRATION TROP FORTE DE LA MACHINE, OU L'UTILISATION D'UN STYLET TROP LONG OU TROP LOURD ENTRAÎNE UN DÉCLENCHEMENT INTEMPESTIF DU PALPEUR.

TOUT RÉGLAGE DE LA PRESSION DU RESSORT DU STYLET, OU TOUTE UTILISATION D'UN STYLET AUTRE QUE CELUI UTILISÉ POUR L'ÉTALONNAGE DU PALPEUR RISQUENT DE DONNER UNE RÉPÉTABILITÉ DE PALPEUR DIFFÉRENTE DE CELLE INDICÉE SUR LE CERTIFICAT DE CALIBRAGE FOURNI AVEC LE PALPEUR.

LE FAIT DE TROP SERRER LA VIS DE RÉGLAGE DE LA FORCE DU RESSORT DU STYLET RISQUE D'ENDOMMAGER L'INTÉRIEUR DU PALPEUR À DÉCLENCHEMENT PAR CONTACT MP3.

I

Sommario delle avvertenze e degli avvertimenti

AVVERTENZE

LE OPERAZIONI DI INSTALLAZIONE DELLA SONDA MP16 DEVONO ESSERE ESCLUSIVAMENTE ESEGUITE DA PERSONALE SPECIALIZZATO ED AL CORRENTE DELLE PROCEDURE DI SICUREZZA E DELLA LEGISLAZIONE ANTINFORTUNISTICA VIGENTE NEL PAESE D'INSTALLAZIONE.

L'INTERFACCIA MACCHINA MI16 DOVRÁ ESSERE ALIMENTATA DA UNA TENSIONE A 24V C.C. IN PIENA OSSERVANZA DEI REQUISITI DELLO STANDARD BS EN 61010 O DI SPECIFICHE SIMILI.

PRIMA DI ASPORTARE PANNELLI O RIPARI, ACCERTARSI CHE LA MACCHINA UTENSILE SIA STATA ISOLATA ELETTRICAMENTE. DOVE SI UTILIZZI L'INTERRUTTORE GENERALE É ESSENZIALE SISTEMARE SULLO STESSO UN AVVISO IN MODO DA EVITARE CHE LA TENSIONE POSSA ESSERE INSERITA ACCIDENTALMENTE.

PRIMA DI EFFETTUARE IL COLLEGAMENTO DELL'INTERFACCIA MACCHINA MI16, ISOLARE L'ALIMENTAZIONE ELETTRICA DA 24 V.

LE PROCEDURE DETTAGLIATE DI SEGUITO PREVEDONO LO SPOSTAMENTO DEL MANDRINO SU TUTTO IL CAMPO OPERATIVO DELLA MACCHINA. ONDE EVITARE IL RISCHIO DI FERITE PERSONALI, É ESSENZIALE CHE L'OPERATORE SI MANTENGA SEMPRE AL DI FUORI DI DETTO CAMPO OPERATIVO QUANDO LA MACCHINA É IN FUNZIONE.

FARE ATTENZIONE AI MOVIMENTI IMPROVVISI DELLA MACCHINA.

CONSULTARE LE ISTRUZIONI D'USO FORNITE DAL FABBRICANTE DELLA MACCHINA.

EVITARE ASSOLUTAMENTE DI FAR RUOTARE LA SONDA MONTATA SUL MANDRINO DELLA MACCHINA A UN REGIME SUPERIORE A 1000 RPM.

Sommario delle avvertenze e degli avvertimenti (continua)

AVVERTIMENTI

PRIMA DI MONTARE SULLA MACCHINA UTENSILE IL SISTEMA A SONDA MP16, É ESSENZIALE ACCERTARSI CHE L'AMBIENTE SIA ESENTE DA INTERFERENZE ALLA FREQUENZA RADIO DI TRASMISSIONE DEGLI IMPULSI. LE ATTREZZATURE CHE POTREBBERO CREARE INTERFERENZA COMPREDONO, TRA LE ALTRE, LE SALDATRICI AD ARCO, I CERCAPERSONE, I TELECOMANDI PER LA CHIUSURA CENTRALIZZATA ED I TELEFONI CELLULARI.

PER EVITARE IL RISCHIO DI INTERFERENZA INCROCIATA, LASCIARE UNO SPAZIO LIBERO DI ALMENO 100 METRI TRA UN SISTEMA A SONDA E L'ALTRO CHE UTILIZZANO LA STESSA FREQUENZA RADIO E LO STESSO CANALE.

IL SISTEMA A SONDA MP16 É PREVISTO PER L'IMPIEGO A UNA TEMPERATURA AMBIENTE COMPRESA TRA 0°C E 60°C. L'IMPIEGO DEL SISTEMA A SONDA MP16 AD UNA TEMPERATURA AMBIENTE NON COMPRESA TRA DETTI VALORI AVRÁ LA CONSEGUENZA DI RIDURRE LA PORTATA DI TRASMISSIONE DEL SISTEMA.

INCLUDE NEL KIT DI MONTAGGIO DELLA SONDA FORNITO CON IL SISTEMA A SONDA MP16 TROVERETE ALCUNE RONDELLE ANTI VIBRAZIONE DA MONTARE SULLE VITI A BRUGOLA USATE PER BLOCCARE IL RACCORDO DEL CODOLO AL RMP2. L'INOSSERVANZA DI QUESTE ISTRUZIONI POTREBBE PROVOCARE L'ALLENAMENTO DELLE VITI IN FASE DI UTILIZZO DELLA SONDA.

FARE MOLTA ATTENZIONE A NON DANNEGGIARE LA GUARNIZIONE ASPORTANDO IL COPERCHIO DEL VANO DELLA PILA.

MANEGGIARE LE PILE ATTENENDOSI ALLE ISTRUZIONI DEL FABBRICANTE. USARE SOLO IL TIPO DI PILA SPECIFICATO. EVITARE IL CONTATTO TRA I TERMINALI DELLA PILA ED ALTRI OGGETTI METALLICI.

É ESSENZIALE CHE IL CAVO USATO PER IL COLLEGAMENTO DEL RMM2 ALL'INTERFACCIA MACCHINA MI16 SIA TENUTO LONTANO DA COMPONENTI CHE POTREBBERO INTRAPPOLARLO, AVVOLGERLO O PERSINO TAGLIARLO QUANDO LA MACCHINA É IN FUNZIONE.

Sommario delle avvertenze e degli avvertimenti (continua)

AVVERTIMENTI (continua)

UNA DELLE CARATTERISTICHE BASE DEI SISTEMI RADIOTRASMITTENTI É CHE GLI IMPULSI RIFLESSI POSSONO ANNULLARSI RECIPROCAMENTE. DI CONSEGUENZA VI POTREBBERO ESSERE ZONE DELLA MACCHINA UTENSILE COMPLETAMENTE SENZA IMPULSI ALL'ANTENNA, CHIAMATE 'ZONE CIECHE'. PER OVVIARE A TALE INCONVENIENTE BASTERÁ MONTARE DUE ANTENNE INVECE DI UNA. I SISTEMI RADIOTRASMITTENTI RENISHAW SONO FORNITI DI SERIE CON DUE ANTENNE.

É IMPORTANTE CHE I CAVI RMM2 SIANO PROTETTI ADEGUATAMENTE. IN CASO CONTRARIO I CAVI POTREBBERO DANNEGGIARSI O FAVORIRE L'INGRESSO DI LIQUIDO REFRIGERANTE CHE POTREBBE PROVOCARE L'AVARIA DEL SISTEMA.

EVITARE DI POSIZIONARE IL MODULO OTTICO OM16 DOVE I TRUCIOLI DI LAVORAZIONE POTREBBERO INVESTIRE DIRETTAMENTE IL QUADRO. L'IMPATTO CONTINUO CAUSEREBBE L'EROSIONE DEL VETRO E CON L'ANDAR DEL TEMPO POTREBBE RIDURRE L'INTENSITÁ DEL SEGNALE OTTICO.

PRIMA DI ACCINGERSI AL MONTAGGIO SULLA MACCHINA DELLA SONDA A MODULO RADIO RMP2/RMP2-S, VERIFICARE CHE IL MODULO SIA FISSATO SALDAMENTE AL CODOLO.

É ESSENZIALE, PRIMA DI ACCINGERSI AL FUNZIONAMENTO DEL SISTEMA A SONDA, CHE L'OPERATORE ABBA ACQUISITO UNA PROFONDA CONOSCENZA DEL SOFTWARE CHE PROGRAMMA LA SONDA STESSA. EVENTUALI ERRORI DI PROGRAMMAZIONE POTREBBERO PROVOCARE DANNI SERI ALLA MACCHINA, AL PEZZO NONCHÉ ALLA SONDA STESSA.

PRIMA DI ACCENDERE LA SONDA, CONTROLLARE CHE IL CODOLO SIA MONTATO SALDAMENTE SUL MANDRINO DELLA MACCHINA UTENSILE.

L'INSTALLAZIONE DI CONNETTORI BNC AI CAVI DEL RMM2 É UN'OPERAZIONE RISERVATA AL PERSONALE SPECIALIZZATO IN QUESTO TIPO DI INTERVENTO.

Sommario delle avvertenze e degli avvertimenti (continua)

AVVERTIMENTI (continua)

QUANDO SI ESEGUE PER LA PRIMA VOLTA LA SEQUENZA DI ISPEZIONE, SI RACCOMANDA DI ESEGUIRE ALLA MINIMA VELOCITÀ GLI SPOSTAMENTI DI RAPIDA E DI AVANZAMENTO – SI EVITERANNO IN TAL MODO DANNI ALLA MACCHINA ED ALLA SONDA.

LA PRESSIONE DELLA MOLLA DELLA SONDA MP3 É STATA REGOLATA DI PRECISIONE. LA REGOLAZIONE É RICHIESTA SOLO IN CASI ESTREMI OVE LE VIBRAZIONI DELLA MACCHINA O L'USO DI UNO STILO DI UNA LUNGHEZZA O PESO ECCESSIVI POTREBBERO FALSARE LO SCATTO.

LA REGOLAZIONE DELLA PRESSIONE DELLA MOLLA DELLO STILO E L'USO DI UNO STILO DIVERSO (SALVO DI QUELLO ADIBITO PER L'AZZERAMENTO DELLA SONDA) POTREBBERO FALSARE LA RIPETIBILITÀ DELLA SONDA RISPETTO AI VALORI SPECIFICATI SUL CERTIFICATO DI CALIBRAZIONE CHE ACCOMPAGNA LA SONDA.

L'AUMENTO ECCESSIVO DELLA PRESSIONE DELLA MOLLA DELLO STILO APPLICATA CON LA VITE DI REGOLAZIONE POTREBBE DANNEGGIARE IL MECCANISMO DELLA SONDA MP3.

E

Lista combinada de advertencias y precauciones

ADVERTENCIAS

LA INSTALACIÓN DEL SISTEMA DE SONDA DE CONTACTO-DISPARO MP16 ÚNICAMENTE DEBE REALIZARSE POR PERSONAL CUALIFICADO Y COMPLETAMENTE FAMILIARIZADO CON TODOS LOS PROCEDIMIENTOS DE SEGURIDAD Y LEGISLACIÓN VIGENTE EN EL PAÍS DE USO.

LA INTERFACE DE LA MÁQUINA MI16 DEBE CONECTARSE A UN SUMINISTRO DE ALIMENTACIÓN SELV DE 24 V DC QUE CUMPLA TOTALMENTE CON LOS REQUISITOS ESENCIALES DE BS EN 61010 O ESPECIFICACIONES SIMILARES.

ASEGÚRESE DE QUE TODAS LAS FUENTES DE CORRIENTE ESTÁN DESCONECTADAS ANTES DE RETIRAR CUALQUIER PANEL O CUBIERTA DE LA MÁQUINA HERRAMIENTA. SI SE AÍSLA LA CORRIENTE EN EL INTERRUPTOR PRINCIPAL, ASEGÚRESE DE COLOCAR UNA SEÑAL RELATIVA A ESTE EFECTO EN EL INTERRUPTOR PARA EVITAR QUE SE VUELVA A DAR CORRIENTE DE NUEVO INADVERTIDAMENTE.

AÍSLE EL SUMINISTRO DE CORRIENTE DE 24 VOLTIOS ANTES DE CONECTAR LA INTERFACE DE LA MÁQUINA MI16.

EL PROCEDIMIENTO SIGUIENTE REQUIERE QUE EL EJE DE LA MÁQUINA HERRAMIENTA SE DESPLACE POR TODA LA ENVOLTURA DE TRABAJO DE LA MÁQUINA HERRAMIENTA. PARA EVITAR DAÑOS, ASEGÚRESE DE PERMANECER FUERA DE LA ENVOLTURA DE TRABAJO SIEMPRE QUE LA MÁQUINA HERRAMIENTA ESTÉ ACTIVA.

TENGA CUIDADO CON LOS MOVIMIENTOS INESPERADOS DE LA MÁQUINA HERRAMIENTA.

CONSULTE LAS INSTRUCCIONES DE FUNCIONAMIENTO PROPORCIONADAS POR EL FABRICANTE DE LA MÁQUINA HERRAMIENTA.

NUNCA GIRE LA SONDA EN EL EJE DE LA MÁQUINA HERRAMIENTA A VELOCIDADES SUPERIORES A LAS 1000 RPM.

Lista combinada de advertencias y precauciones **(continuación)**

PRECAUCIONES

ANTES DE INSTALAR EL SISTEMA DE SONDA DE CONTACTO-DISPARO MP16 EN UNA MÁQUINA HERRAMIENTA, ASEGÚRESE DE QUE EL ENTORNO ESTÁ LIBRE DE INTERFERENCIAS EN LA RADIOFRECUENCIA A LA QUE DESEA TRANSMITIR SEÑALES. LOS DISPOSITIVOS QUE PUEDEN INTERFERIR CON LA TRANSMISIÓN DE SEÑALES INCLUYEN, ENTRE OTROS, SOLDADORAS POR ARCO, RADIOBUSCAS, LLAVES DE ALARMA POR CONTROL REMOTO Y TELÉFONOS MÓVILES.

PARA EVITAR INTERFERENCIAS CRUZADAS, DEBE DEJARSE UN MÍNIMO DE 100 METROS (328ft) ENTRE CADA SISTEMA DE SONDA DE CONTACTO-DISPARO, SI SE REALIZA EL FUNCIONAMIENTO EN LA MISMA FRECUENCIA Y CANAL DE RADIO.

EL SISTEMA DE SONDA DE CONTACTO-DISPARO MP16 ESTÁ DISEÑADO PARA FUNCIONAR CON TEMPERATURAS AMBIENTALES ENTRE 0°C Y 60°C (32°F TO 104°F). LA UTILIZACIÓN DEL SISTEMA DE SONDA FUERA DE ESTE INTERVALO DE TEMPERATURAS PROVOCARÁ UNA REDUCCIÓN DEL ALCANCE DE TRANSMISIÓN DEL SISTEMA.

EL KIT DE MONTAJE SUMINISTRADO CON EL SISTEMA DE SONDA DE CONTACTO-DISPARO MP16 INCLUYE ARANDELAS ANTI VIBRACIONES, LAS CUALES DEBEN AJUSTARSE EN LOS TORNILLOS CON ENCASTRE EN LA CABEZA, UTILIZADOS PARA FIJAR EL ADAPTADOR DEL VÁSTAGO AL RMP2. EN CASO DE NO FIJAR ESTAS ARANDELAS, SE PUEDEN SOLTAR LOS TORNILLOS CON ENCASTRE EN LA CABEZA DURANTE EL FUNCIONAMIENTO DE LA SONDA.

DEBE TENERSE CUIDADO DE NO DAÑAR EL PRECINTO PROTECTOR DE LA BATERÍA CUANDO SE RETIRE LA CUBIERTA DE LA MISMA.

MANIPULE LAS BATERÍAS SEGÚN LAS INSTRUCCIONES DEL FABRICANTE. UTILICE SÓLO EL TIPO DE BATERÍA RECOMENDADO. NO PERMITA QUE LOS BORNES DE LA BATERÍA ENTREN EN CONTACTO CON OTRAS SUPERFICIES METÁLICAS.

CUANDO LLEVE EL CABLE DEL RMM2 A LA INTERFAZ DE LA MÁQUINA MI16, ES FUNDAMENTAL QUE EL CABLE SE MANTENGA ALEJADO DE PIEZAS MÓVILES QUE LO PUEDAN ENGANCHAR, ENREDAR, ATRAPAR O DAÑAR CUANDO LA MÁQUINA HERRAMIENTA ESTÁ EN MOVIMIENTO.

Lista combinada de advertencias y precauciones **(continuación)**

PRECAUCIONES (continuación)

UNA CARACTERÍSTICA FUNDAMENTAL DE LOS SISTEMAS DE TRANSMISIÓN ES QUE LAS SEÑALES REFLEJADAS PUEDEN ANULARSE UNAS A OTRAS, PROVOCANDO QUE NO HAYA SEÑAL PRESENTE EN LA ANTENA EN ALGUNAS ÁREAS DE LA MÁQUINA HERRAMIENTA. DICHAS ÁREAS SE DENOMINAN 'PUNTOS CIEGOS' Y PUEDEN ELIMINARSE FÁCILMENTE MONTANDO UN PAR DE ANTENAS DE RADIO, EN VEZ DE USAR SÓLO UNA ANTENA EN EL AISLAMIENTO. LOS SISTEMAS DE TRANSMISIÓN POR RADIO DE RENISHAW SE SUMINISTRAN CON DOS ANTENAS DE RADIO COMO ESTÁNDAR.

EN CASO DE NO PROTEGER ADECUADAMENTE LOS CABLES DEL RMM2, SE PUEDE OCASIONAR UN FALLO EN EL SISTEMA DEBIDO A DAÑOS EN LOS MISMOS O POR INTRODUCCIÓN DE REFRIGERANTE.

EL MÓDULO ÓPTICO OM16 NO DEBE COLOCARSE DONDE LAS VIRUTAS DEL MECANIZADO PUEDAN IMPACTAR DIRECTAMENTE CON SU VENTANA. EL DESGASTE A LARGO PLAZO DEL CRISTAL TENDRÁ COMO CONSECUENCIA UNA PÉRDIDA DE LA INTENSIDAD DE LA SEÑAL ÓPTICA.

ANTES DE MONTAR EL MÓDULO DE RADIO RMP2/RMP2-S EN LA MÁQUINA HERRAMIENTA, ES IMPORTANTE ASEGURARSE DE QUE EL RMP2/RMP2-S ESTÉ BIEN MONTADO EN SU VÁSTAGO.

ANTES DE LA UTILIZACIÓN DEL SISTEMA DE SONDA, ES MUY IMPORTANTE QUE ENTIENDA COMPLETAMENTE EL SOFTWARE CON EL QUE DESEA 'CONTROLAR' LA SONDA. UNA PROGRAMACIÓN INCORRECTA PUEDE OCASIONAR DAÑOS EN LA MÁQUINA, EN LA PIEZA DE TRABAJO Y EN LA MISMA SONDA.

ANTES DE CONECTAR LA SONDA, ASEGÚRESE DE QUE EL VÁSTAGO ESTÁ BIEN MONTADO EN EL EJE DE LA MÁQUINA HERRAMIENTA.

LA COLOCACIÓN DE CONECTORES BNC EN LOS CABLES DEL RMM2 SÓLO DEBE REALIZARSE POR PERSONAL DEBIDAMENTE CUALIFICADO Y COMPLETAMENTE FAMILIARIZADO CON ESTE TIPO DE PROCEDIMIENTO.

CUANDO SE REALICE POR PRIMERA VEZ UN CICLO DE SONDA, SE RECOMIENDA QUE EL PROGRAMA SE EJECUTE A UNA VELOCIDAD REDUCIDA DEL MOVIMIENTO RÁPIDO Y VELOCIDAD DE ALIMENTACIÓN, PARA EVITAR DAÑOS EN LA MÁQUINA HERRAMIENTA O EN LA SONDA.

Lista combinada de advertencias y precauciones
(continuación)

PRECAUCIONES (continuación)

EL RESORTE DEL INTERIOR DE LA Sonda DE CONTACTO-DISPARO MP3 ESTÁ AJUSTADA CON PRECISIÓN. SÓLO DEBE AJUSTARSE EN CIRCUNSTANCIAS EXTREMAS EN LAS QUE UNA VIBRACIÓN EXCESIVA DE LA MÁQUINA O LA UTILIZACIÓN DE ESTILETES MUY LARGOS O PESADOS SEAN LA CAUSA DE QUE LA Sonda DISPARE EN FALSO.

EL AJUSTE DEL RESORTE DEL ESTILETE, ASÍ COMO EL USO DE UN ESTILETE DISTINTO DEL UTILIZADO EN LA INDICACIÓN DE REFERENCIA DE LA Sonda, PUEDE OCASIONAR DIFERENCIAS EN LA REPETIVIDAD DE LA Sonda SOBRE LAS INDICADAS EN EL CERTIFICADO DE CALIBRACIÓN SUMINISTRADO CON LA Sonda.

SI SE APRIETA DEMASIADO EL TORNILLO DE AJUSTE DEL RESORTE DEL ESTILETE, SE PUEDEN OCASIONAR DAÑOS INTERNOS EN LA Sonda DE CONTACTO-DISPARO MP3.

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Lista consolidada de avisos e precauções

AVISOS

A INSTALAÇÃO DO APALPADOR MP16 DEVE SER REALIZADA APENAS POR TÉCNICOS QUALIFICADOS E FAMILIARIZADOS COM TODOS OS PROCEDIMENTOS DE SEGURANÇA E LEGISLAÇÕES EM VIGOR NO PAÍS DE UTILIZAÇÃO.

A INTERFACE DE MÁQUINA MI16 DEVE RECEBER ALIMENTAÇÃO DE UMA FONTE DE DE 24V CC EM CONFORMIDADE COM OS REQUISITOS FUNDAMENTAIS DO PADRÃO BS EN 61010 OU ESPECIFICAÇÕES EQUIVALENTES.

ASSEGURE-SE DE QUE TODAS AS FONTES DE ALIMENTAÇÃO ESTÃO DESLIGADAS ANTES DE REMOVER QUALQUER PAINEL OU COBERTURA DA MÁQUINA-FERRAMENTA. SE DECIDIR ISOLAR A ALIMENTAÇÃO USANDO O INTERRUPTOR DA REDE, ASSEGURE-SE DE QUE É COLOCADO UM AVISO NO INTERRUPTOR APONTADO PARA ESSE, PARA EVITAR QUE A CORRENTE SEJA LIGADA INADVERTIDAMENTE.

DESLIGUE A FONTE DE ALIMENTAÇÃO DE 24 V ANTES DE CONECTAR A UNIDADE DE INTERFACE DE MÁQUINA MI16.

O PROCEDIMENTO SEGUINTE EXIGE QUE O EIXO DA MÁQUINA SEJA MOVIDO AO LONGO DE TODO O CURSO DE FUNCIONAMENTO DA MÁQUINA. PARA EVITAR FERIMENTOS, ASSEGURE-SE DE ESTAR SEMPRE FORA DA ÁREA DE MOVIMENTAÇÃO ENQUANTO A MÁQUINA ESTIVER EM OPERAÇÃO.

CUIDADO COM MOVIMENTOS INEXPERADOS DA MÁQUINA.

CONSULTE AS INSTRUÇÕES DE UTILIZAÇÃO DO FABRICANTE DA MÁQUINA-FERRAMENTA.

A VELOCIDADE DE ROTAÇÃO DO APALPADOR NO FUSO DA MÁQUINA-FERRAMENTA NUNCA DEVE SER SUPERIOR A 1000 RPM.

Lista consolidada de avisos e precauções (continuação)

PRECAUÇÕES

ANTES DE INSTALAR O APALPADOR MP16 NUMA MÁQUINA-FERRAMENTA, É IMPORTANTE QUE SE ASSEGURE DE QUE NÃO EXISTIRÃO INTERFERÊNCIAS NA RADIOFREQUÊNCIA EM QUE DESEJA TRANSMITIR OS SINAIS. OS DISPOSITIVOS QUE PODERÃO INTERFERIR NA TRANSMISSÃO DE SINAIS SÃO, ENTRE OUTROS, OS SEGUINTE: SOLDADORES DE ARCO ELÉCTRICOS, PAGERS, CONTROLES REMOTAOS PORTATÉIS, COMO DE AUTOMOVÉIS, TELEFONES CELULARES, ETC.

PARA EVITAR A INTERFERÊNCIA MÚTUA, ASSEGURE-SE DE QUE EXISTE UMA DISTÂNCIA MÍNIMA DE 100 METROS ENTRE CADA APALPADOR A OPERAR NO MESMO CANAL DE RÁDIO.

A APALPADOR MP16 FOI CONCEBIDA PARA FUNCIONAR A TEMPERATURAS AMBIENTES ENTRE 0°C E 60°C. A OPERAÇÃO DO APALPADOR EM TEMPERATURAS INFERIORES OU SUPERIORES ÀS MENCIONADAS RESULTARÁ NUMA REDUÇÃO DO ALCANCE DA TRANSMISSÃO DO MESMO.

O KIT DE MONTAGEM OFERECIDO COM A APALPADOR MP16 INCLUI ARRUELAS ANTIVIBRAÇÃO QUE DEVEM SER ENCAIXADAS NOS PARAFUSOS ALLEN USADOS PARA FIXAR O ADAPTADOR DA HASTE AO RMP2. SE NÃO FOREM UTILIZADOS ESTAS ARRUELAS, OS PARAFUSOS PODERÃO DESAPERTAR-SE E SOLTAR-SE QUANDO O APALPADOR ESTIVER EM FUNCIONAMENTO.

AO RETIRAR A TAMPA DA BATERIA TENHA CUIDADO PARA NÃO DANIFICAR A JUNTA.

UTILIZE AS BATERIAS SEGUNDO AS INSTRUÇÕES DO FABRICANTE. USE APENAS O TIPO DE BATERIAS RECOMENDADO. NÃO PERMITA QUE OS TERMINAIS DAS BATERIAS ENTREM EM CONTACTO COM OUTRAS SUPERFÍCIES METÁLICAS.

AO CONECTAR O CABO RMM2 À INTERFACE MI16, É EXTREMAMENTE IMPORTANTE QUE O CABO SEJA COLOCADO AFASTADO DE QUAISQUER PEÇAS MÓVEL QUE POSSA: PUXAR, PRENDER, ENROLAR OU ATÉ MESMO CORTAR O COBO ENQUANTO A MÁQUINA ESTIVAR EM MOVIMENTO.

Lista consolidada de avisos e precauções (continuação)

PRECAUÇÕES (continuação)

UMA DAS CARACTERÍSTICAS FUNDAMENTAIS DOS SISTEMAS DE RADIOTRSMISSÃO SÃO QUE OS SINAIS REFLECTIDOS PODEM CANCELAR-SE MUTUAMENTE, CRIANDO ÁREAS DE SINAL NULO NA MÁQUINA, NORMALMENTE CHAMADOS DE “PONTOS CEGOS” ESTES PODEM SER FACILMENTE ELIMINADOS MONTANDO-SE DUAS ANTENAS AO INVEZ DE UMA. OS SISTEMAS RENISHAW SÃO, POR NORMA, FORNECIDOS COM DUAS ANTENAS.

A NÃO PROTEÇÃO ADEQUADA DOS CABOS RMM2 PODERÁ RESULTAR NUMA AVARIA DO SISTEMA DEVIDO A DANOS NO CABO OU INFILTRAÇÃO DE FLUIDO REFRIGERANTE.

O MÓDULO ÓPTICO OM16 NÃO DEVE SER COLOCADO ONDE SUA JANELA POSSA SER ATINGIDA POR CAVACOS. O DESGASTE A LONGO PRAZO DO VIDRO RESULTARÁ INEVITAVELMENTE NUMA PERDA DE POTENCIA DO SINAL ÓPTICO.

ANTES DE MONTAR O MÓDULO DO APALPADOR RMP2/RMP2-S NA MÁQUINA FERRAMENTA É MUITO IMPORTANTE QUE SE ASSEGURE DE QUE O MESMO ESTÁ BEM FIXO À SUA HASTE.

ANTES DE UTILIZAR O APALPADOR, É EXTREMAMENTE IMPORTANTE QUE COMPREENDA PERFEITAMENTE O SOFTWARE QUE CONTROLA O SISTEMA. A SUA INCORRECTA PROGRAMAÇÃO PODERÁ CAUSAR DANOS TANTO NA MÁQUINA COMO NA PEÇA, ASSIM COMO TAMBÉM NO PRÓPRIA APALPADOR.

ANTES DE LIGAR O APALPADOR, ASSEGURE-SE DE QUE A HASTE ESTÁ BEM ENCAIXADA NO FUSO DA MÁQUINA-FERRAMENTA.

A MONTAGEM DE CONECTORES BNC NOS CABOS RMM2 SÓ DEVE SER REALIZADA POR TÉCNICOS QUALIFICADOS E FAMILIARIZADOS COM ESTE TIPO DE PROCEDIMENTO.

AO REALIZAR O CICLO DE INSPEÇÃO PELA PRIMEIRA VEZ, RECOMENDA-SE QUE O PROGRAMA SEJA EXECUTADO A UMA VELOCIDADE DE AVANÇO REDUZIDA PARA EVITAR CAUSAR DANOS À MÁQUINA-FERRAMENTA OU O APALPADOR.

Lista consolidada de avisos e precauções (continuação)

PRECAUÇÕES (continuação)

A PRESSÃO DE MOLA DENTRO DO APALPADOR MP3 FOI PRE-ESTABELECIDADA DE FORMA PRECISA. ESTA SÓ DEVERÁ SER AJUSTADA EM CIRCUNSTÂNCIAS EXTREMAS EM QUE A VIBRAÇÃO EXCESSIVA DA MÁQUINA OU A UTILIZAÇÃO DE PONTAS EXTREMAMENTE LONGAS E PESADAS FAÇA COM QUE O APALPADOR ACIONE EM FALSO DURANTE A MOVIMENTAÇÃO.

O AJUSTE DA PRESSÃO DA MOLA, ASSIM COMO A UTILIZAÇÃO DE PONTAS QUE NÃO CORRESPONDEM COMO AS REFERÊNCIAS, PODERÁ RESULTAR EM DIFERENÇAS NA REPETIBILIDADE DO APALPADOR EM RELAÇÃO AO CITADO NO CERTIFICADO DE CALIBRAÇÃO QUE ACOMPANHA O SISTEMA.

O APERTO EXCESSIVO DO PARAFUSO DE AJUSTE DA MOLA, PODERÁ CAUSAR DANOS INTERNOS NO APALPADOR MP3.

NL

Verzamellijst van Waarschuwingen

WAARSCHUWING

HET INSTALLEREN VAN HET MP16 TASTSYSTEEM MAG UITSLUITEND WORDEN UITGEVOERD DOOR VOLLEDIG GEKWALIFICEERD EN BEVOEGD PERSONEEL DAT VOLLEDIG OP DE HOOGTE IS VAN ALLE VEILIGHEIDSPROCEDURES EN WETGEVING DIE IN HET LAND VAN GEBRUIK VAN KRACHT ZIJN.

DE MI16 MACHINE-INTERFACE DIENT GEVOED TE WORDEN DOOR EEN 24V DC SELV VOEDING DIE VOLLEDIG VOLDOET AAN DE EISEN VAN BS EN 61010 OF GELIJKWAARDIGE SPECIFICATIES.

ZORG ERVOOR DAT ALLE SPANNINGSBRONNEN UITGESCHAKELD ZIJN VOORDAT ENIG PANEEL OF AFDEKPLAAT VAN DE MACHINE WORDT VERWIJDERD. INDIEN DE SPANNING WORDT UITGESCHAKELD BIJ DE HOOFDSCHAKELAAR, DIENT U ERVOOR TE ZORGEN DAT DIT WORDT AANGEGEVEN BIJ DE SCHAKELAAR OM TE VOORKOMEN DAT DE SPANNINGSBRON PER ONGELUK WEER INGESHAKELD WORDT.

SCHAKEL DE 24 V VOEDING UIT VOORDAT U DE MI16 INTERFACE AANSLUIT.

VOOR DE VOLGENDE PROCEDURE IS HET NOODZAKELIJK DAT DE MACHINESPIL OVER HET GEHELE BEREIK VAN DE MACHINE WORDT VERPLAATST. OM LICHAAMELIJK LETSEL TE VOORKOMEN, DIENT U BUITEN DIT BEREIK TE BLIJVEN WANNEER DE MACHINE IN BEDRIJF IS.

LET OP VOOR ONVERWACHT BEWEGINGEN VAN DE MACHINE.

ZIE DE GEBRUIKSAANWIJZING VAN DE FABRIKANT DE MACHINE.

LAAT DE TASTER NOOIT IN DE MACHINESPIL DRAAIEN MET SNELHEDEN VAN MEER DAN 1000 TOEREN/MIN.

Verzamellijst van Waarschuwingen (vervolg)

LET OP

HET IS BELANGRIJK OM ERVOOR TE ZORGEN DAT, VOORDAT U HET MP16 TASTSYSTEEM OP DE MACHINE INSTALLEERT, DE OMGEVING VRIJ IS VAN STORING OP DE RADIOFREQUENTIE WAAROP U SIGNALEN WILT GAAN UITZENDEN. APPARATEN DIE STORING KUNNEN VEROORZAKEN OP HET TRANSMISSIE SIGNAAL ZIJN ONDER ANDERE: BOOGLASAPPARATEN, SEMAFOONS, SLEUTELS MET AFSTANDBEDIENING (ZENDER) VOOR ALARMINSTALLATIES EN MOBIELE TELEFOONS.

OM ONDERLINGE STORING DOOR ANDERE SIGNALEN TE VOORKOMEN, DIENT ER MINSTENS 100 METER (328 VOET) AFSTAND TE WORDEN GELATEN TUSSEN ELK TASTERSYSTEEM, WANNEER DEZE OP DEZELFDE RADIOFREQUENTIE EN HETZELFDE KANAAL OPEREREN.

HET MP16 TASTERSYSTEEM IS ONTWORPEN VOOR GEBRUIK BIJ OMGEVINGSTEMPERATUREN DIE TUSSEN 0°C EN 60°C (32°F EN 104°F) LIGGEN. WANNEER HET MP16 TASTERSYSTEEM BUITEN DIT TEMPERATUURBEREIK WORDT GEBRUIKT, KAN DIT LEIDEN TOT EEN VERKLEINING VAN HET ZENDBEREIK VAN HET SYSTEEM.

DE TASTER BEVESTIGINGSET DIE MET DE MP16 TASTSYSTEEM MEEGELEVERD WORDT, BEVAT ANTI-TRILLINGSRINGETJES DIE OM DE INBUSBOUTEN, DIE DE CONUSADAPTOR AAN DE RMP2 BEVESTIGT, MOETEN WORDEN GEPLAATST. INDIEN DEZE RINGETJES NIET WORDEN GEBRUIKT, KUNNEN DE INBUSBOUTEN TIJDENS HET GEBRUIK VAN DE TASTER LOS GAAN.

ER DIENT VOOR GEZORD TE WORDEN DAT DE AFDICHTING VAN HET BATTERIJ-DEKSEL NIET WORDT BESCHADIGD TIJDENS HET VERWIJDEREN VAN DE BATTERIJ-DEKSEL.

GERBRUIK DE BATTERIJEN VOLGENS DE INSTRUCTIES VAN DE FABRIKANT. GEBRUIK UITSLUITEND HET AANBEVOLEN TYPE BATTERIJEN. ZORG ERVOOR DAT DE BATTERIJPOLEN NIET IN CONTACT KOMEN MET ANDERE METALEN OPPERVLAKKEN.

WANNEER U DE RMM2 KABEL NAAR DE MI16 MACHINE-INTERFACE LEGT, IS HET BELANGRIJK DAT DE KABEL GOED UIT DE BUURT GELEGD WORDT VAN BEWEGENDE DELEN DIE HEM KUNNEN GRIJPEN, VERWARREN, BEKNELLEN OF DOORSNIJDEN WANNEER DE MACHINE IN BEWEGING IS.

Verzamellijst van Waarschuwingen (vervolg)

LET OP (vervolg)

EEN FUNDAMENTELE EIGENSCHAP VAN RADIOZENDERSYSTEMEN IS DAT GEREFLLECTEERDE SIGNALLEN ELKAAR OP KUNNEN OPHEFFEN, WAARDOOR HET MOGELIJK IS DAT ER PLAATSEN ONTSTAAN BIJ DE MACHINE WAAR DE ANTENNE GEEN SIGNAAL ONTVANGT. DERGELIJKE PLAATSEN WORDEN 'DODE HOEKEN' GENOEMD EN KUNNEN EENVOUDIGWEG WORDEN OPGEHEVEN DOOR TWEE RADIO-ANTENNES IN PLAATS VAN ÉÉN ENKELE TE GEBRUIKEN. RENISHAW RADIOZENDERSYSTEMEN WORDEN STANDAARD GELEVERD MET TWEE ANTENNES.

INDIEN DE RMM2 KABELS NIET NAAR BEHOREN WORDEN BESCHERMD KAN DIT LEIDEN TOT STORINGEN IN HET SYSTEEM VANWEGE KABELBESCHADIGINGEN OF DE INWERKING VAN KOELVLOEISTOF.

DE OM16 OPTISCHE MODULE MAG NIET DAAR WORDEN GEPLAATST WAAR SPANEN RECHTSTREEKS TEGEN HET VENSTER TERECHT KUNNEN KOMEN. INDIEN HET GLAS LANGDURIG HIERAAN WORDT BLOOTGESTELD, ZAL UITEINDELIJK HET OPTISCHE SIGNAAL WORDEN VERZWAKT.

HET IS BELANGRIJK OM VOORDAT DE RMP2/RMP2-S RADIO MODULE TASTER OP DE MACHINE WORDT GEPLAATST, TE CONTROLEREN OF DE RMP2/RMP2-S STEVIG OPNDE CONUS IS GEMONTEERD.

HET IS VAN GROOT BELANG DAT U VOORDAT HET TASTSYSTEEM IN GEBRUIK GENOMEN WORDT VOLLEDIG VERTROUWD BENT MET DE SOFTWARE WAARMEE U DE TASTER WILT BESTUREN. DOOR ONJUISTE PROGRAMMERING KUNNEN ZOWEL DE MACHINE, HET WERKSTUK ALS DE TASTER WORDEN BESCHADIGD.

VOORDAT DE TASTER WORDT INGESCHAKELD, DIEN T U ER ZEKER VAN TE ZIJN DAT DE CONUS STEVIG IN DE MACHINESPIL IS GEPLAATST.

HET AANSLUITEN VAN BNC STEKKERS AAN DE RMM2 KABELS MAG UITSLUITEND UITGEVOERD WORDEN DOOR DESKUNDIG GEKWALIFICEERD PERSONEEL DAT VOLLEDIG VERTROUWD IS MET DEZE WERKZAAMHEDEN.

WANNEER VOOR HET EERST EEN TASTCYCLUS WORDT UITGEVOERD, IS HET AAN TE BEVELEN DAT HET PROGRAMMA WORDT UITGEVOERD MET ALLE IJLGANGEN OP EEN GEREDUCEERDE SNELHEID, OM TE VOORKOMEN DAT ER SCHADE AAN DE MACHINE OF DE TASTER ONTSTAAT.

Verzamellijst van Waarschuwingen (vervolg)

LET OP (vervolg)

DE VEERSpanNING VAN HET MP3 TASTERSYSTEEM IS NAUWKEURIG INGESTELD, EN MAG UITSLUITEND WORDEN BIJGESTELD ONDER EXTREME OMSTANDIGHEDEN WANNEER BOVENMATIGE MACHINETRILLINGEN OF HET GEBRUIK VAN EXTREEM LANGE OF ZWARE MEETSTIFTEN ERTOE LEIDEN DAT DE TASTER ONJUIST WORDT GEACTIVEERD.

HET VERANDEREN VAN DE VEERSpanNING EVENALS HET GEBRUIK VAN ANDERE MEETSTIFTEN DAN DIE WAARMEE DE TASTER WERD GEKALIBREERD, KAN LEIDEN TOT AFWIJKINGEN QUA HERHAALBARHEID TEN OPZICHTE VAN DE VERMELDE HERHAALBARHEID OP HET KALIBRATIECERTIFICAAT WELKE MEEGELEVERD WORDT MET DE TASTER.

DOOR DE STELSCHROEF VAN VEERSpanNING TE STRAK AAN TE DRAAIEN, KAN DE MP3 TASTERSYSTEEM INTERN WORDEN BESCHADIGD.

DK

En samlet liste over advarsler og påmindelser

ADVARSLER

MONTERING AF MP16 TOUCH-TRIGGER PROBESYSTEMET MÅ KUN UDFØRES AF FULDT KVALIFICERET PERSONALE, SOM ER FULDT FORTROLIG MED ALLE SIKKERHEDSPROCEDURER OG DEN RELEVANTE LOVGIVNING I DET LAND DET SKAL ANVENDES I.

MI16 MASKININTERFACE SKAL FORSYNES FRA EN 24V JÆVNSTRØMS STRØMFORSYNING, DER TIL FULDE OPFYLDER DE VIGTIGE KRAV I BS EN 61010 ELLER TILSVARENDE SPECIFIKATION.

SØRG FOR, AT DER ER SLUKKET FOR ALLE STRØMKILDER, FØR DEMONTERING AF PANELER ELLER AFSKÆRMNINGER FRA VÆRKTØJSMASKINEN. HVIS DER AFBRYDES FOR STRØMMEN VED HOVEDAFBRYDEREN, SKAL DER SÆTTES ET SKILT DEROM PÅ SELVE AFBRYDEREN FOR AT FOREBYGGE AT STRØMMEN UTILSIGTET TILSLUTTES IGEN.

AFBRYD 24 V STRØMFORSYNING EN, FØR MI16 MASKINENS PROBE - INTERFACE TILSLUTTES.

DEN EFTERFØLGENDE PROCEDURE KRÆVER AT VÆRKTØJSMASKINENS SPINDEL FØRES GENNEM HELE VÆRKTØJSMASKINENS ARBEJDSOMRÅDE. UNDGÅ TILSKADEKOMST VED AT SØRGE FOR AT STÅ UDEN FOR DETTE ARBEJDSOMRÅDE, NÅR VÆRKTØJSMASKINEN ER I DRIFT.

PAS PÅ EVT. UVENTEDE BEVÆGELSER FRA VÆRKTØJSMASKINEN.

SE I ØVRIGT BRUGSVEJLEDNINGEN FRA FABRIKANTEN AF VÆRKTØJSMASKINEN.

PROBEN MÅ ALDRIG ROTERES I VÆRKTØJSMASKINENS SPINDEL MED EN HASTIGHED PÅ OVER 1000 OMDR./MIN.

En samlet liste over advarsler og påmindelser (fortsat)

PÅMINDELSER

DET ER VIGTIGT, FØR MONTERING AF MP16 TOUCH-TRIGGER PROBESYSTEMET PÅ EN VÆRKTØJSMASKINE, AT SIKRE, AT DET OMGIVENDE MILJØ ER FRI FOR INTERFERENS PÅ DEN RADIOFREKVENNS DE ØNSKER AT SENDE SIGNALER. ANORDNINGER, DER KAN HAVE INDFLYDELSE PÅ SIGNALTRANSMISSION OMFATTER, MEN ER IKKE BEGRÆNSET TIL, LYSBUESVEJSEMASKINER, RADIOPERSONSØGERE, FJERNBETJENINGSBILNØGLER OG MOBILTELEFONER.

FOR AT UNDGÅ KRYDSINTERFERENS SKAL DER VÆRE MINDST 100 METER MELLEM HVER ENKELT TOUCH-TRIGGER PROBESYSTEM, HVIS DE ARBEJDER PÅ SAMME RADIOFREKVENNS OG KANAL.

MP16 TOUCH-TRIGGER PROBESYSTEMET ER KONSTRUERET TIL AT ARBEJDE I RUMTEMPERATURER PÅ MELLEM 0°C OG 60°C. ANVENDELSE AF MP16 TOUCH-TRIGGER PROBESYSTEMET UDEN FOR DETTE TEMPERATUROMRÅDE VIL RESULTERE I EN REDUKTION AF SYSTEMETS SENDEOMRÅDE.

PROBEMONTERINGSPAKKEN, DER LEVERES MED MP16 TOUCH-TRIGGER PROBESYSTEMET OMFATTER VIBRATIONSDÆMPENDE SPÆNDESKIVER, SOM SKAL SÆTTES PÅ CYLINDERSKRUERNE MED PINOLHOVED, DER BRUGES TIL AT HOLDE SKAFTADAPTEREN FAST PÅ RMP2. UNDLADES DET AT MONTERE DISSE SPÆNDESKIVER, KAN DET RESULTERE I AT CYLINDERSKRUERNE LØSNER SIG, MENS PROBESYSTEMET ER I BRUG.

PAS PÅ IKKE AT BESKADIGE PAKNINGEN PÅ LÅGET TIL BATTERIET, NÅR DETTE TAGES AF.

BATTERIER SKAL HÅNDBETJENES SOM BESKREVET I BRUGSVEJLEDNINGEN TIL BATTERIET. BRUG KUN DE ANBEFALEDE TYPER BATTERIER. BATTERIKLEMMERNE MÅ IKKE KOMME I KONTAKT MED ANDRE METALFLADER.

NÅR RMM2-KABLET FØRES HEN TIL MI16 INTERFACET, ER DET MEGET VIGTIGT, AT KABLET IKKE LIGGER TÆT PÅ BEVÆGELIGE DELE, SOM DET VILLE KUNNE HÆNGE FAST I, BLIVE VIKLET OMKRING, FANGET AF ELLER SKÅRET OVER AF, NÅR VÆRKTØJSMASKINEN ER I BEVÆGELSE.

En samlet liste over advarsler og påmindelser (fortsat)

PÅMINDELSER (fortsat)

ET GRUNDLÆGGENDE TRÆK VED RADIOTRANSMISSIONSSYSTEMER ER, AT REFLEKTEREDE SIGNALER KAN ANNULLERE HINANDEN OG SÅLEDES GIVE OMRÅDER PÅ VÆRKTØJSMASKINEN, HVOR DER IKKE ER NOGET SIGNAL TIL STEDE VED ANTENNER. SÅDANNE OMRÅDER KALDES 'BLINDE PLETTER', OG DE KAN NEMT ELIMINERES VED AT MONTERE ET SÆT RADIOANTENNER, I STEDET FOR AT BRUGE EN ENKELT ANTENNE HELT ALENE. RENISHAW RADIOTRANSMISSIONSSYSTEMER LEVERES MED TO ANTENNER SOM STANDARD.

UNDLADES DET AT BESKYTTE RMM2-KABLERNE TILSTRÆKKELIGT, KAN DET RESULTERE I SYSTEMSVIGT, SOM FØLGE AF BESKADIGELSE AF KABLET ELLER INDTRÆNGEN AF SKÆREOLIE.

DET OPTISKE MODUL, OM16, BØR IKKE PLACERES ET STED, HVOR METALSPÅNER VIL KUNNE BLIVE KASTET DIREKTE MOD DETS VINDUE. LANGVARIG FORVITRING AF GLASSET VIL EFTERHÅNDEN FØRE TIL AT DET OPTISKE SIGNAL TABER I STYRKE

FØR MONTERING AF RMP2/RMP2-S RADIOMODULPROBEN PÅ VÆRKTØJSMASKINEN, ER DET VIGTIGT AT SIKRE, AT RMP2/RMP2-S ER MONTERET SIKKERT PÅ SKAFTET.

FØR PROBESYSTEMET SÆTTES IGANG, ER DET YDERST VIGTIGT, AT DE FULDT UD FORSTÅR DEN SOFTWARE, SOM DE ØNSKER AT 'KØRE' PROBEN MED. FORKERT PROGRAMMERING KAN MEDFØRE BESKADIGELSE AF MASKINEN, ARBEJDSEMNET OG SELVE PROBEN.

FØR DER TÆNDES FOR PROBEN, SKAL DET SIKRES, AT SKAFTET ER MONTERET SIKKERT I VÆRKTØJSMASKINENS SPINDEL.

MONTERING AF BNC-KONNEKTORER PÅ RMM2-KABLER MÅ KUN FORETAGES AF PERSONALE MED RELEVANTE KVALIFIKATIONER, DER ER FULDT FORTROLIG MED DENNE TYPE FREMGANGSMÅDE.

NÅR PROBECYKLEN KØRES FØRSTE GANG, ANBEFALES DET, AT KØRE ALLE PROGRAMMETS ILGANGS- OG TILSPÆNDINGSBEVÆGELSER MED REDUCERET HASTIGHED FOR AT UNDGÅ EVT. BESKADIGELSE AF ENTEN VÆRKTØJSMASKINEN ELLER PROBEN.

En samlet liste over advarsler og påmindelser (fortsat)**PÅMINDELSER (fortsat)**

FJEDERTRYKKET I MP3 TOUCH-TRIGGER PROBEN ER INDSTILLET PRÆCIST. DET MÅ KUN JUSTERES UNDER EKSTREME FORHOLD, HVOR DER FOREKOMMER MEGET STOR MASKINVIBRATION, ELLER VED ANVENDELSE AF MEGET LANGE ELLER TUNGE STYLI FÅR PROBEN TIL AT FEJLUDLØSE.

JUSTERING AF STYLUS FJEDERTRYK SÅ VEL SOM BRUGEN AF ANDRE STYLI END DEN, DER BLEV BRUGT TIL AT REFERERE PROBEN, KAN RESULTERE I FORSKELLE I SONDEGENTAGELIGHED OVER DE, DER ANGIVES I KALIBRERINGSCERTIFIKATET, DER LEVERES MED PROBEN.

STRAMMES STYLUS FJEDERKRAFTJUSTERINGSSKRUE FOR MEGET, KAN DET RESULTERE I INDVENDIG BESKADIGELSE AF MP3 TOUCH-TRIGGER PROBEN.

FIN

Varoitusten ja muistutusten yhteisluettelo

VAROITUKSIA

MP16 - KOSKETUSMITTA-ANTURIN ASENNUS ON ANNETTAVA AINOASTAAN SELLAISEN TÄYSIN PÁTEVÁN ASENTAJAN SUORITETTAVAKSI, JOKA ON TIETOINEN KAIKISTA TURVALLISUUTTA KOSKEVISTA TOIMENPITEISTÁ JA KYSEISESSÁ KÁYTTOMAASSA VOIMASSA OLEVASTA LAINSÁÁDÁNNOSTÁ.

MI16-KONEEN SOVITEOSAN VIRRAN SYOTTO ON TULTAVA 24V DC SELV -VIRTALÁHTEESTÁ, JOKA ON TÁYSIN BS EN 61010 TAI VASTAAVAN STANDARDIN SPESIFIKAATION ASETTAMIEN VAATIMUSTEN MUKAINEN.

VARMISTA, ETTÁ KAIKKI JÁNNITELÁHTEET ON KATKAISTU ENNEN PANEELIEN TAI SUOJUSTEN POISTAMISTA TYOSTOKONEESTA. JOS VIRTA KATKAISTAAN PÁÁVIRTAKYTKIMESTÁ, VARMISTA, ETTÁ TÁTÁ KOSKEVA ILMOITUS ON ASETETTU KYTKIMEEN VIRRAN VAHINGOSSA TAPAHTUVAN TAKAISINKYTKENNÁN ESTÁMISEKSI.

KYTKE 24 VOLTIN JÁNNITTEEN SYOTTO IRTI ENNEN MI16-KONEEN SOVITEOSAN LIITTÁMISTÁ.

SEURAAVA TOIMENPIDE VAATII, ETTÁ TYOSTOKONEEN KARAA LIIKUTELLAAN KONEEN KOKO LIIKEALUEELLA. LOUKKAANTUMISEN ESTÁMISEKSI VARMISTA, ETTÁ PYSYTTELET TÁMÁN LIIKEALUEEN ULKOPUOLELLA AINA KUN KONE ON TOIMINNASSA.

OLE VAROVAINEN, SILLÁ TYOSTOKONE VOI ALKAA LIIKKUA ODOTTAMATTA.

TUTUSTU TYOSTOKONEEN VALMISTAJAN TOIMITTAMIIN KÁYTTOOHJEISIIN.

ÁLÁ KOSKAAN PYORITÁ MITTA-ANTURIA TYOSTOKONEEN KARALLA YLI 1000 1/MIN NOPEUDELLA.

Varoitusten ja muistutusten yhteisluettelo (jatkoa)

MUISTUTUKSIA

ENNEN MP16-KOSKETUSMITTA-ANTURIN ASENNUSTA TYOSTOKONEESEEN ON TÄRKEÄÄ VARMISTAA, ETTÄ SIINÄ YMPÄRISTOSSÄ, JOSSA HALUAT LÄHETTÄÄ SIGNAALEJA, EI OLE RADIOTAAJUUSHÄIRIOITÄ. SIGNAALIEN LÄHETYSTÄ HÄIRITSEVIÄ LAITTEITA OVAT ESIMERKIKSI, MUTTA EIVÄT PELKÄSTÄÄN, MM. KAARIHITSAUSKONEET, RADIOHAKULAITTEET, KAUKO-OHJATUT HÄLYTYSPAINIKKEET JA MATKAPUHELIMET.

MIKÄLI TOIMINTA TAPAHTUU SAMALLA RADIOTAAJUUDELLA JA KANAVALLA ON POIKITTAISHÄIRIOIDEN ESTÄMISEKSI JÄTETTÄVÄ VÄHINTÄÄN 100 METRIN ETÄISYYS KUNKIN KOSKETUSMITTA-ANTURIJÄRJESTELMÄN VÄLILLE.

MP16-KOSKETUSMITTA-ANTURIJÄRJESTELMÄ ON SUUNNITELTU TOIMIMAAN YMPÄRISTOLÄMPOTILOISSA, JOTKA OVAT VÄLILLÄ 0C - 60C. KOSKETUSMITTA-ANTURIJÄRJESTELMÄN KÄYTTÖ NÄIDEN LÄMPOTILOJEN ULKOPUOLELLA KAVENTAA JÄRJESTELMÄN LÄHETYSALUETTA.

MP16-KOSKETUSMITTA-ANTURIJÄRJESTELMÄN YHTEYDESSÄ TOIMITETTUIHIN MITTA-ANTURIN KIINNITYSTARVIKKEISIIN SISÄLTYY TÄRINÄÄ KESTÄVIÄ ALUSLEVYJÄ, JOTKA ON ASENNETTAVA KIINNITYSRUUVIIN, JOITA KÄYTETÄÄN TYOKALUKARTION ADAPTERIN KIINNITTÄMISEKSI RMP2: EEN. NÄIDEN ALUSLEVYJEN ASENTAMISEN LAIMINLYOMINEN VOI SAADA AIKAAN KIINNITYSRUUVIEN LOYSTYMISEN MITTA-ANTURIN KÄYTON AIKANA.

PARISTON SUOJUSTA POISTETTAESSA ON NOUDATETTAVA VAROVAISUUTTA JOTTA PARISTON SUOJUKSEN TIIVISTE EI PÄÄSE VAHINGOITTUMAAN.

KÄSITTELE PARISTOJA TUOTEVALMISTAJAN ANTAMIEN OHJEIDEN MUKAISESTI. KÄYTÄ VAIN SUOSITELTUJA PARISTOTYPPEJÄ. ÄLÄ ANNA PARISTOJEN NAPOJEN JOUTUA KOSKETUKSIIN MUIDEN METALLIPINTOJEN KANSSA.

RMM2-KAAPELIA REITITETTÄESSÄ MI16-KONEEN SOVITEOSAAN ON EHDOTTOMAN TÄRKEÄÄ, ETTÄ KAAPELI PIDETÄÄN POISSA LIIKKUVIEN OSIEN TIELTÄ, JOTKA VOIVAT TYOSTOKONEEN LIIKKUESSA AIHEUTTAA SIIHEN HALKEAMIA TAI SAADA SEN JUUTTUMAAN TAI TAKERTUMAAN TAI KATKAISTA SEN.

Varoitusten ja muistutusten yhteisluettelo (jatkoa)

MUISTUTUKSIA (jatkoa)

RADIOLÁHETYSJÄRJESTELMIEN PERUSOMINAISUUKSIA ON SE, ETTÄ HEIJASTUVAT SIGNAALIT PYSTYVÄT KUMOAMAAN TOISENSA, JOTEN TYOSTOKONEESSA ON ALUEITA, JOISSA ANTENNIIN EI SAAVU LAINKAAN SIGNAALEJA. NÄITÄ ALUEITA KUTSUTAAN SOKEIKSI TÄPLIKSI JA NE VOIDAAN HELPOSTI ELIMINOIDA ASENTAMALLA RADIOANTENNIPARI YHDEN ERILLISEN ANTENNIN SIJASTA. RENISHAW - RADIOLÁHETYSJÄRJESTELMIEN TOIMITUKSIIN SISÄLLYTETÄÄN VAKIONA KAKSI RADIOANTENNA.

JOS RMM2-KAAPELIEN ASIANMUKAINEN SUOJAUS LAIMINLYODÁÁN, VOI SEURAUKSENA OLLA JÄRJESTELMÁN VIOITTUMINEN KAAPELIN VAURIOITUMISEN TAI LEIKKUUNESTEEN SISÁÁNPÁÁSYN AIHEUTTAMANA.

OPTISTA OM16-MODUULIA EI SAA ASETTAA PAIKKAAN, JOSSA KONEEN LASTUT VOIVAT ISKEYTYÁ SUORAAN SEN IKKUNAA VASTEN. LASIN PITKÁLLÁ AJALLA TAPAHTUVA KULUMINEN SAA VÁHITELLEN AIKAAN OPTISEN SIGNAALIN VOIMAKKUUDEN HEIKKENEMISEN.

ENNEN RMP2/RMP2-S-RADIOMITTA-ANTURIN KIINNITTÁMISTÁ TYOSTOKONEESEEN ON TÁRKEÁÁ VARMISTAA, ETTÁ RMP2/RMP2-S ON KIINNITETTY KUNNOLLA TYOKALUKARTIOLLE.

ENNEN MITTA-ANTURIJÄRJESTELMÁN KÁYTTÖÁ ON ERITTÁIN TÁRKEÁTÁ ETTÁ YMMÁRRÁT TÁYSIN OHJELMAN, JONKA HALUAT - AJAVAN- ANTURIA. VÁÁRÁ OHJELMOINTI VOI VAHINGOITTA SEKÁ KONETTA, TYOKAPPALETTA ETTÁ ITSE ANTURIA.

ENNEN ANTURIN PÁÁLLEKYTKEMISTÁ VARMISTA, ETTÁ TYOKALUKARTIO ON KIINNITETTY KUNNOLLA TYOSTOKONEEN KARALLE.

BNC - LIITTIMIEN ASENNUS RMM - KAAPELEIHIN ON ANNETTAVA SELLAISEN ASIANMUKAISEN PÁTEVYYDEN OMAAVAN HENKILON SUORITETTAVAKSI, JOKA TUNTEE TÁYSIN TÁMÁNTYYPPISEN TOIMENPITEEN.

MITTAUSTYOKIERTOJA ENSIMMÁISTÁ KERTAA SUORITETTAESSA ON TYOSTOKONEEN TAI MITTA-ANTURIN VAURIOITUMISEN ESTÁMISEKSI SUOSITELTAVAA, ETTÁ OHJELMA AJETAAN KAIKKIEN PIKA- JA SYOTTOLIIKKEIDEN ALENNETUILLA ARVOILLA.

Varoitusten ja muistutusten yhteisluettelo (jatkoa)

MUISTUTUKSIA (jatkoa)

MP3 - KOSKETUSMITTA-ANTURIN JOUSEN PAINE ON TARKASTI SÁÁDETTY. SITÁ SAADAAN SÁÁTÁÁ VAIN ÁÁRIMMÁISSÁ OLOSUHTEISSA, JOISSA ERITTÁIN VOIMAKAS KONEEN TÁRINÁ TAI ERITTÁIN PITKIEN TAI RASKAIDEN MITTAKÁRKIEN KÁYTTÖ SAA MITTA-ANTURIN LIIPASEMAAN VIRHEELLISESTI.

MITTAKÁRJEN JOUSEN PAINEEN SÁÁTÁMINEN, SAMOIN KUIN MUUN KUIN KALIBROIDUN MITTAKÁRJEN KÁYTTÖ VOI SAADA AIKAAN EROJA MITTA-ANTURIN TOISTOTARKKUUDESSA VERRATTUNA MITTA-ANTURIN MUKANA TOIMITETUN KALIBROINTITODISTUKSEN ARVOIHIN.

MITTAKÁRJEN JOUSEN SÁÁTORUUVIN YLIKIRISTYS VOI JOHTAA MP3 - KOSKETUSMITTA-ANTURIN SISÁOSAN VAURIOITUMISEEN.

SW

Sammanslagen lista med varningar och försiktighetsnoter

VARNINGAR

INSTALLATION AV PROBESYSTEM MP16 FÖR BERÖRINGS-AVKÄNNINGAR FÅR ENDAST UTFÖRAS AV BEHÖRIG PERSONAL, SOM ÄR ORDENTLIGT INSATT I ALLA SÄKERHETS-FÖRFARANDE OCH I DEN LAGSTIFTNING SOM GÄLLER I ANVÄNDNINGSLANDET.

MI16-MASKININTERFACE MÅSTE STRÖMFÖRSÖRJAS FRÅN EN NÄTDEL FÖR 24 V LIKSTRÖM, SOM TILL FULLO UPPFYLLER KRAVEN I BS EN 61010 ELLER MOTSVARANDE SPECIFIKATION.

KONTROLLERA ATT ALLA STRÖMKÄLLOR HAR KOPPLATS BORT INNAN NÅGON PANEL ELLER NÅGOT SKYDD TAS BORT FRÅN VERKTYGSMASKINEN. OM STRÖMMEN SLÅS AV VID HUVUDSTRÖMBRYTAREN MÅSTE DU SE TILL ATT EN SKYLTA SOM MEDDELAR DETTA PLACERAS VID BRYTAREN, FÖR ATT ELMINERA RISKEN FÖR ATT STRÖMMEN KAN KOMMA ATT SLÅS PÅ IGEN AV MISSTAG.

KOPPLA BORT STRÖMKÄLLAN PÅ 24 V INNAN MI16:S MASKININTERFACE ANSLUTS.

FÖRFARANDE NEDAN KRÄVER ATT VERKTYGSMASKINENS SPINDEL KÖRS GENOM HELA VERKTYGSMASKINENS ARBETSOM. RÅDE ELMINERA RISKEN FÖR PERSONSKADOR GENOM ATT ALLTID VARA NOGA MED ATT HÅLLA DIG UTANFÖR DETTA ARBETSOMRÅDE NÄR VERKTYGSMASKINEN ÄR AKTIV.

VAR PÅ DIN VAKT MOT OVÄNTADE VERKTYGSMASKINSRÖRELSER.

SE VERKTYGSMASKINSTILLVERKARENS DRIFTSANVISNINGAR.

ROTERA ALDRIG PROBEN MED VERKTYGSMASKINSSPINDELN MED HÖGRE VARVTAL ÄN 100 VARV/MIN

Sammanslagen lista med varningar och försiktighetsnoter (fortsättning)

FÖRSIKTIGHETSNOTER

INNAN PROBESYSTEMET MP16 INSTALLERAS PÅ EN VERKTYGSMASKIN ÄR DET VIKTIGT ATT KONTROLLERA ATT MILJÖN KOMMER ATT VARA FRI FRÅN STÖRNINGAR PÅ DEN RADIOFREKVENNS DU SKA ANVÄNDA FÖR ATT ÖVERFÖRA SIGNALER. NÅGRA, MEN INTE ALLA, ANORDNINGAR SOM KAN STÖRA SIGNALÖVERFÖRINGEN ÄR BÅGSVETSAR, RADIOPERSONSÖKARE, FJÄRRKONTROLLARMNYCKLAR OCH MOBILTELEFONER.

FÖR UNDVIKANDE AV INBÖRDES STÖRNINGAR MÅSTE DET VARA ETT AVSTÅND PÅ MINST 100 METER (328 fot) MELLAN OLIKA PROBESYSTEM, OM DE ANVÄNDER SIG AV SAMMA RADIOFREKVENNS OCH KANAL.

PROBESYSTEM MP16 ÄR AVSETT FÖR ANVÄNDNING I OMGIVNINGSTEMPERATURER PÅ MELLAN 0°C OCH 60°C (32°F OCH 104°F). OM PROBESYSTEM MP16 ANVÄNDS UTANFÖR DETTA TEMPERATUROMFÅNG KOMMER SYSTEMETS ÖVERFÖRINGSRÄCKVIDD ATT BLI BEGRÄNSAT.

DEN PROBEMONTERINGSSATS SOM LEVERERAS MED PROBESYSTEM MP16 INNEFATTAR ETT ANTAL ANTIVIBRATIONSBRICKOR, VILKA MÅSTE MONTERAS PÅ DE INSEXSKRUVAR SOM HÅLLER FAST SKAFTADAPTERN VID RMP2. OM DESSA BRICKOR INTE ANVÄNDS KAN INSEXSKRUVARNA KOMMA ATT LOSSNA NÄR PROBEN ANVÄNDS.

VAR NOGA MED ATT INTE SKADA BATTERILOCKETS TÄTNING NÄR BATTERILOCKET TAS AV.

HANTERA BATTERIER I ENLIGHET MED TILLVERKARENS ANVISNINGAR. ANVÄND ENDAST DEN TYP AV BATTERIER SOM REKOMMENDERAS. BATTERIUTTAGEN FÅR INTE KOMMA I KONTAKT MED NÅGRA METALLYTOR.

NÄR RMM2-KABELN DRAS TILL MI16-MASKININTERFACET ÄR DET VIKTIGT ATT HÅLLA DEN BORTA ORDENTLIGT FRÅN RÖRLIGA DELAR, SOM ANNARS KAN KOMMA I KONTAKT MED DEN ELLER SKADA DEN NÄR VERKTYGSMASKINEN ÄR I RÖRELSE.

Sammanslagen lista med varningar och försiktighetsnoter (fortsättning)

FÖRSIKTIGHETSNOTER (fortsättning)

ETT GRUNDLÄGGANDE KARAKTERISTIKA FÖR RADIOÖVERFÖRINGSSYSTEM ÄR ATT REFLEKTERADE SIGNALER KAN KOMMA ATT TA UT VARANDRA, VILKET RESULTERAR I ATT DELAR AV VERKTYGSMASKINEN KOMMER ATT SAKNA FÖRELIGGANDE SIGNAL VID ANTENNEN. SÅDANA OMRÅDEN KALLAS FÖR 'BLINDA FLÄCKAR' OCH KAN LÄTT ELIMINERAS GENOM ATT ETT PAR ANTENNER ANVÄNDS I STÄLLET FÖR BARA EN ENDA ANTENN. RENISHAWS RADIOÖVERFÖRINGSSYSTEM LEVERERAS SOM STANDARD MED TVÅ RADIOANTENNER.

OM RMM2-KABLARNA INTE SKYDDAS TILLRÄCKLIGT VÄL KAN SYSTEMFEL UPPKOMMA, TILL FÖLJD AV KABELSKADOR ELLER INTRÄNGNING AV KYLVÄTSKA.

DEN OPTISKA MODULEN OM16 SKA INTE PLACERAS DÄR SPÅN FRÅN BEARBETNINGEN KAN KOMMA I DIREKT KONTAKT MED DESS YTA. ERODERING AV GLASET KAN SÅ SMÅNINGOM RESULTERA I ATT DEN OPTISKA SIGNALSTYRKAN GÅR FÖRLORAD.

INNAN RADIOMODULPROBE RMP2/RMP2-S MONTERAS PÅ VERKTYGSMASKINEN ÄR DET VIKTIGT ATT KONTROLLERA ATT RMP2/RMP2-S ÄR MONTERAD PÅ SIN AXEL PÅ ETT SÄKERT SÄTT.

INNAN PROBESYSTEMET ANVÄNDS ÄR DET YTTERST VIKTIGT ATT DU ÄR VÄL INSATT I DEN PROGRAMVARA DU SKA ANVÄNDA FÖR ATT 'DRIVA' PROBEN. FELAKTIG PROGRAMMERING KAN RESULTERA I SKADOR PÅ MASKINEN, DETALJEN ELLER SJÄLVA PROBEN.

INNAN PROBEN SLÅS PÅ MÅSTE DU KONTROLLERA ATT SKAFTET ÄR MONTERAD I VERKTYGSMASKINENS SPINDEL PÅ ETT SÄKERT SÄTT.

BNC-KONTAKTDONET FÅR BARA ANSLUTAS TILL RMM2-KABLARNA AV PERSONAL MED LÄMPLIGA KVALIFIKATIONER, SOM ÄR VÄL FÖRTROGEN MED DENNA TYP AV FÖRFARANDEN.

VID DEN FÖRSTA KÖRNINGEN AV EN AVKÄNNINGSCYKEL REKOMMENDERAR VI ATT ALLA PROGRAMMETS SNABBGÅNGS- OCH MATNINGSHASTIGHETSÖRELSER KÖRS MED REDUCERAD HASTIGHET, FÖR UNDVIKANDE AV SKADOR PÅ VERKTYGSMASKINEN ELLER PÅ PROBEN.

Sammanlagen lista med varningar och försiktighetsnoter
(fortsättning)

FÖRSIKTIGHETSNOTER (FORTSÄTTNING)

FJÄDERTRYCKET I PROBE MP3 ÄR PRECISIONSINSTÄLLT. DET FÅR BARA JUSTERAS UNDER EXTREMA OMSTÄNDIGHETER, DÅ ALLTFÖR OMFATTANDE MASKINVIBRATIONER, ELLER ANVÄNDNING AV MYCKET LÅNGA ELLER TUNGA MÄTSPETSAR, FÅR PROBEN ATT LÖSA UT FELAKTIGT.

JUSTERING AV MÄTSPETSSENS FJÄDERTRYCK KAN, LIKSOM ANVÄNDNING AV EN ANNAN MÄTSPETS ÄN DEN SOM ANVÄNDES FÖR INSTÄLLNING AV PROBEN, LEDA TILL FÖRÄNDRING AV PROBENS REPETERBARHET JÄMFÖRT MED VAD SOM SPECIFICERAS I PROBENS KALIBRERINGSCERTIFIKAT.

ALLTFÖR HÅRD ÅTDRAGNING AV MÄTSPETSSENS FJÄDERINSTÄLLNINGSSKRUV KAN MEDFÖRA INTERNA SKADOR PÅ PROBE MP3.

GR

Ενοποιημένος κατάλογος προειδοποιήσεων και προφυλάξεων

ΠΡΟΕΙΔΟΠΟΙΗΣΕΙΣ

Η ΕΓΚΑΤΑΣΤΑΣΗ ΤΟΥ ΣΥΣΤΗΜΑΤΟΣ ΑΝΙΧΝΕΥΣΗΣ MP16 ΜΕ
ΕΝΕΡΓΟΠΟΙΗΣΗ ΔΙΑ ΕΠΑΦΗΣ, ΠΡΕΠΕΙ ΝΑ ΔΙΕΝΕΡΓΕΙΤΑΙ ΜΟΝΟ ΑΠΟ
ΚΑΤΑΛΛΗΛΑ ΕΚΠΑΙΔΕΥΜΕΝΟ ΠΡΟΣΩΠΙΚΟ, ΠΛΗΡΩΣ ΕΞΟΙΚΕΙΩΜΕΝΟ
ΜΕ ΟΛΕΣ ΤΙΣ ΔΙΑΔΙΚΑΣΙΕΣ ΚΑΙ ΤΗΝ ΙΣΧΥΟΥΣΑ ΝΟΜΟΘΕΣΙΑ ΠΕΡΙ
ΑΣΦΑΛΕΙΑΣ ΣΤΗ ΧΩΡΑ ΧΡΗΣΗΣ ΤΟΥ ΣΥΣΤΗΜΑΤΟΣ.

Η ΜΟΝΑΔΑ ΔΙΑΣΥΝΔΕΣΗΣ MI16 ΤΟΥ ΜΗΧΑΝΗΜΑΤΟΣ ΠΡΕΠΕΙ ΝΑ
ΤΡΟΦΟΔΟΤΕΙΤΑΙ ΑΠΟ ΤΡΟΦΟΔΟΤΙΚΟ ΣΥΝΕΧΟΥΣ ΤΑΣΗΣ 24V ΤΥΠΟΥ
SELV, ΠΛΗΡΩΣ ΣΥΜΦΩΝΟ ΜΕ ΤΙΣ ΟΥΣΙΩΔΕΙΣ ΑΠΑΙΤΗΣΕΙΣ ΤΟΥ
ΒΡΕΤΑΝΙΚΟΥ ΠΡΟΤΥΠΟΥ EN 61010 'Η ΑΛΛΗΣ ΠΑΡΟΜΟΙΑΣ
ΠΡΟΔΙΑΓΡΑΦΗΣ.

ΠΡΙΝ ΑΦΑΙΡΕΣΕΤΕ ΟΠΟΙΟΔΗΠΟΤΕ ΚΑΠΑΚΙ 'Η ΠΡΟΣΤΑΤΕΥΤΙΚΟ
ΚΑΛΥΜΜΑ ΑΠΟ ΤΗΝ ΕΡΓΑΛΕΙΟΜΗΧΑΝΗ, ΒΕΒΑΙΩΘΕΙΤΕ ΟΤΙ ΕΧΕΤΕ
ΔΙΑΚΟΨΕΙ ΤΗΝ ΠΑΡΟΧΗ ΑΠΟ ΟΛΕΣ ΤΙΣ ΠΗΓΕΣ ΡΕΥΜΑΤΟΣ. ΑΝ
ΑΠΟΜΟΝΩΣΕΤΕ ΤΟ ΔΙΚΤΥΟ ΑΠΟ ΤΟΝ ΚΕΝΤΡΙΚΟ ΔΙΑΚΟΠΤΗ,
ΒΕΒΑΙΩΘΕΙΤΕ ΟΤΙ ΕΧΕΤΕ ΑΦΗΣΕΙ ΕΝΑ ΣΧΕΤΙΚΟ ΣΗΜΕΙΩΜΑ ΠΑΝΩ ΣΤΟ
ΔΙΑΚΟΠΤΗ, ΩΣΤΕ ΝΑ ΑΠΟΤΡΑΠΕΙ Η ΚΑΤΑ ΛΑΘΟΣ ΑΠΟΚΑΤΑΣΤΑΣΗ ΤΗΣ
ΣΥΝΔΕΣΗΣ ΜΕ ΤΟ ΔΙΚΤΥΟ ΡΕΥΜΑΤΟΣ.

ΠΡΙΝ ΣΥΝΔΕΣΕΤΕ ΤΗ ΜΟΝΑΔΑ ΔΙΑΣΥΝΔΕΣΗΣ MI16 ΤΟΥ
ΜΗΧΑΝΗΜΑΤΟΣ, ΑΠΟΜΟΝΩΣΤΕ ΤΗΝ ΠΑΡΟΧΗ ΤΑΣΗΣ 24 V.

ΚΑΤΑ ΤΗ ΔΙΑΔΙΚΑΣΙΑ ΠΟΥ ΑΚΟΛΟΥΘΕΙ, Ο ΑΞΟΝΑΣ ΤΗΣ
ΕΡΓΑΛΕΙΟΜΗΧΑΝΗΣ ΘΑ ΠΡΕΠΕΙ ΝΑ ΜΕΤΑΚΙΝΕΙΤΑΙ ΚΑΘ' ΟΛΟ ΤΟ
ΕΥΡΟΣ ΕΡΓΑΣΙΑΣ ΤΗΣ ΕΡΓΑΛΕΙΟΜΗΧΑΝΗΣ. ΓΙΑ ΝΑ ΑΠΟΦΥΓΕΤΕ
ΤΡΑΥΜΑΤΙΣΜΟΥΣ, ΠΑΡΑΜΕΝΕΤΕ ΠΑΝΤΑ ΕΚΤΟΣ ΤΟΥ ΕΥΡΟΥΣ
ΕΡΓΑΣΙΑΣ, ΚΑΘΕ ΦΟΡΑ ΠΟΥ Η ΕΡΓΑΛΕΙΟΜΗΧΑΝΗ ΕΚΤΕΛΕΙ ΚΑΠΟΙΑ
ΕΡΓΑΣΙΑ.

ΝΑ ΠΡΟΣΕΧΕΤΕ ΓΙΑ ΤΥΧΟΝ ΑΙΦΝΙΔΙΕΣ ΚΙΝΗΣΕΙΣ ΤΗΣ
ΕΡΓΑΛΕΙΟΜΗΧΑΝΗΣ.

ΑΝΑΤΡΕΞΕΤΕ ΣΤΙΣ ΟΔΗΓΙΕΣ ΧΕΙΡΙΣΜΟΥ ΠΟΥ ΔΙΑΤΙΘΕΝΤΑΙ ΑΠΟ ΤΟΝ
ΚΑΤΑΣΚΕΥΑΣΤΗ ΤΗΣ ΕΡΓΑΛΕΙΟΜΗΧΑΝΗΣ.

ΠΟΤΕ ΜΗΝ ΠΕΡΙΣΤΡΕΦΕΤΕ ΤΟΝ ΑΝΙΧΝΕΥΤΗ ΕΝΤΟΣ ΤΟΥ ΑΞΟΝΑ ΤΗΣ
ΕΡΓΑΛΕΙΟΜΗΧΑΝΗΣ ΜΕ ΤΑΧΥΤΗΤΑ ΥΨΗΛΟΤΕΡΗ ΤΩΝ 1000 Σ.Α.Λ.

Ενοποιημένος Κατάλογος Προειδοποιήσεων και Προφυλάξεων (συνέχεια)

ΠΡΟΦΥΛΑΞΕΙΣ

ΠΡΙΝ ΑΠΟ ΤΗΝ ΕΓΚΑΤΑΣΤΑΣΗ ΤΟΥ ΑΝΙΧΝΕΥΤΗ ΜΡ16 ΜΕ ΕΝΕΡΓΟΠΟΙΗΣΗ ΔΙΑ ΕΠΑΦΗΣ ΣΕ ΚΑΠΟΙΟ ΜΗΧΑΝΗΜΑ, ΕΙΝΑΙ ΣΗΜΑΝΤΙΚΟ ΝΑ ΒΕΒΑΙΩΝΕΣΤΕ ΟΤΙ ΔΕΝ ΥΠΑΡΧΟΥΝ ΠΑΡΕΜΒΟΛΕΣ ΣΤΗ ΡΑΔΙΟΣΥΧΝΟΤΗΤΑ ΣΤΗΝ ΟΠΟΙΑ ΘΕΛΕΤΕ ΝΑ ΜΕΤΑΔΙΔΟΝΤΑΙ ΤΑ ΣΗΜΑΤΑ ΣΤΟ ΠΕΡΙΒΑΛΛΟΝ ΕΡΓΑΣΙΑΣ. ΣΥΣΚΕΥΕΣ ΠΟΥ ΘΑ ΜΠΟΡΟΥΣΑΝ ΝΑ ΠΡΟΚΑΛΕΣΟΥΝ ΠΑΡΕΜΒΟΛΕΣ ΣΤΗ ΜΕΤΑΔΟΣΗ ΤΩΝ ΣΗΜΑΤΩΝ ΕΙΝΑΙ, ΜΕΤΑΞΥ ΑΛΛΩΝ, ΟΙ ΕΞΗΣ: ΟΙ ΣΥΣΚΕΥΕΣ ΗΛΕΚΤΡΟΣΥΓΚΟΛΛΗΣΗΣ, ΤΑ ΤΗΛΕΧΕΙΡΙΣΤΗΡΙΑ ΣΥΝΑΓΕΡΜΩΝ ΚΑΙ ΤΑ ΚΙΝΗΤΑ ΤΗΛΕΦΩΝΑ.

ΓΙΑ ΝΑ ΑΠΟΦΕΥΓΕΤΕ ΤΙΣ ΠΑΡΕΜΒΟΛΕΣ ΜΕΤΑΞΥ ΤΩΝ ΣΥΣΤΗΜΑΤΩΝ ΑΝΙΧΝΕΥΣΗΣ ΜΕ ΕΝΕΡΓΟΠΟΙΗΣΗ ΔΙΑ ΕΠΑΦΗΣ ΠΟΥ ΕΚΠΕΜΠΟΥΝ ΣΤΗΝ ΙΔΙΑ ΡΑΔΙΟΣΥΧΝΟΤΗΤΑ ΚΑΙ ΤΟ ΙΔΙΟ ΚΑΝΑΛΙ, Η ΕΛΑΧΙΣΤΗ ΜΕΤΑΞΥ ΤΟΥΣ ΑΠΟΣΤΑΣΗ ΠΡΕΠΕΙ ΝΑ ΕΙΝΑΙ 100 ΜΕΤΡΑ (328 ΠΟΔΙΑ).

ΤΟ ΣΥΣΤΗΜΑ ΑΝΙΧΝΕΥΣΗΣ ΜΡ16 ΜΕ ΕΝΕΡΓΟΠΟΙΗΣΗ ΔΙΑ ΕΠΑΦΗΣ ΕΙΝΑΙ ΣΧΕΔΙΑΣΜΕΝΟ ΝΑ ΛΕΙΤΟΥΡΓΕΙ ΣΕ ΘΕΡΜΟΚΡΑΣΙΕΣ ΠΕΡΙΒΑΛΛΟΝΤΟΣ ΜΕΤΑΞΥ 0 °C ΚΑΙ 60 °C (32 °F ΚΑΙ 104 °F). ΑΝ ΤΟ ΣΥΣΤΗΜΑ ΑΝΙΧΝΕΥΣΗΣ ΜΡ16 ΜΕ ΕΝΕΡΓΟΠΟΙΗΣΗ ΔΙΑ ΕΠΑΦΗΣ ΛΕΙΤΟΥΡΓΗΣΕΙ ΕΚΤΟΣ ΑΥΤΗΣ ΤΗΣ ΚΛΙΜΑΚΑΣ ΘΕΡΜΟΚΡΑΣΙΩΝ, ΘΑ ΜΕΙΩΘΕΙ Η ΕΜΒΕΛΕΙΑ ΜΕΤΑΔΟΣΗΣ ΤΟΥ ΣΥΣΤΗΜΑΤΟΣ.

ΤΟ ΣΕΤ ΣΤΕΡΕΩΣΗΣ ΤΟΥ ΑΝΙΧΝΕΥΤΗ ΠΟΥ ΔΙΑΤΙΘΕΤΑΙ ΜΑΖΙ ΜΕ ΤΟ ΣΥΣΤΗΜΑ ΑΝΙΧΝΕΥΣΗΣ ΜΡ16 ΜΕ ΕΝΕΡΓΟΠΟΙΗΣΗ ΔΙΑ ΕΠΑΦΗΣ ΠΕΡΙΛΑΜΒΑΝΕΙ ΑΝΤΙΚΡΑΔΑΣΜΙΚΕΣ ΡΟΔΕΛΕΣ, ΟΙ ΟΠΟΙΕΣ ΠΡΕΠΕΙ ΝΑ ΤΟΠΟΘΕΤΟΥΝΤΑΙ ΣΤΙΣ ΒΙΔΕΣ ΤΥΠΟΥ ΑΛΕΝ ΠΟΥ ΧΡΗΣΙΜΟΠΟΙΟΥΝΤΑΙ ΓΙΑ ΤΗ ΣΤΕΡΕΩΣΗ ΤΟΥ ΠΡΟΣΑΡΜΟΣΤΗ ΤΟΥ ΒΡΑΧΙΟΝΑ ΣΤΟ RMP2. ΑΝ ΔΕΝ ΤΟΠΟΘΕΤΗΘΟΥΝ ΟΙ ΡΟΔΕΛΕΣ ΑΥΤΕΣ, ΕΙΝΑΙ ΠΙΘΑΝΟΝ ΝΑ ΧΑΛΑΡΩΣΟΥΝ ΟΙ ΒΙΔΕΣ ΤΥΠΟΥ ΑΛΕΝ ΚΑΤΑ ΤΗ ΛΕΙΤΟΥΡΓΙΑ ΤΟΥ ΑΝΙΧΝΕΥΤΗ.

ΟΤΑΝ ΑΦΑΙΡΕΙΤΕ ΤΟ ΚΑΠΑΚΙ ΤΗΣ ΜΠΑΤΑΡΙΑΣ, ΠΡΟΣΕΧΕΤΕ ΝΑ ΜΗΝ ΠΡΟΚΑΛΕΣΕΤΕ ΖΗΜΙΑ ΣΤΗΝ ΤΣΙΜΟΥΧΑ ΤΟΥ.

ΝΑ ΧΕΙΡΙΖΕΣΤΕ ΤΙΣ ΜΠΑΤΑΡΙΕΣ ΣΥΜΦΩΝΑ ΜΕ ΤΙΣ ΟΔΗΓΙΕΣ ΤΟΥ ΚΑΤΑΣΚΕΥΑΣΤΗ. ΧΡΗΣΙΜΟΠΟΙΕΙΤΕ ΜΟΝΟ ΤΟΝ ΣΥΝΙΣΤΩΜΕΝΟ ΤΥΠΟ ΜΠΑΤΑΡΙΑΣ. ΜΗΝ ΑΦΗΝΕΤΕ ΤΟΥΣ ΠΟΛΟΥΣ ΤΗΣ ΜΠΑΤΑΡΙΑΣ ΝΑ ΕΡΘΟΥΝ ΣΕ ΕΠΑΦΗ ΜΕ ΑΛΛΕΣ ΜΕΤΑΛΛΙΚΕΣ ΕΠΙΦΑΝΕΙΕΣ.

ΚΑΤΑ ΤΗ ΔΙΕΥΘΕΤΗΣΗ ΤΟΥ ΚΑΛΩΔΙΟΥ RMM2 ΣΤΗ ΜΟΝΑΔΑ ΔΙΑΣΥΝΔΕΣΗΣ MI16 ΤΟΥ ΜΗΧΑΝΗΜΑΤΟΣ, ΕΙΝΑΙ ΣΗΜΑΝΤΙΚΟ ΝΑ ΤΟ ΠΡΟΦΥΛΑΣΣΕΤΕ ΑΠΟ ΤΑ ΔΙΑΦΟΡΑ ΚΙΝΟΥΜΕΝΑ ΜΕΡΗ, ΣΤΑ ΟΠΟΙΑ ΜΠΟΡΕΙ ΝΑ ΣΚΑΛΩΣΕΙ, ΝΑ ΜΠΕΡΔΕΥΤΕΙ, ΝΑ ΠΑΓΙΔΕΥΤΕΙ Ή ΚΑΙ ΝΑ ΚΟΠΕΙ, ΟΤΑΝ ΛΕΙΤΟΥΡΓΕΙ Η ΕΡΓΑΛΕΙΟΜΗΧΑΝΗ.

Ενοποιημένος κατάλογος προειδοποιήσεων και προφυλάξεων (συνέχεια)

ΠΡΟΦΥΛΑΞΕΙΣ (συνέχεια)

ΕΝΑ ΒΑΣΙΚΟ ΧΑΡΑΚΤΗΡΙΣΤΙΚΟ ΤΩΝ ΣΥΣΤΗΜΑΤΩΝ ΡΑΔΙΟΜΕΤΑΔΟΣΗΣ ΕΙΝΑΙ ΟΤΙ ΤΑ ΑΝΑΚΛΩΜΕΝΑ ΣΗΜΑΤΑ ΕΝΔΕΧΕΤΑΙ ΝΑ ΑΛΛΗΛΟΑΝΑΪΡΟΥΝΤΑΙ, ΜΕ ΑΠΟΤΕΛΕΣΜΑ ΝΑ ΥΠΑΡΧΟΥΝ ΠΕΡΙΟΧΕΣ ΤΗΣ ΕΡΓΑΛΕΙΟΜΗΧΑΝΗΣ ΟΠΟΥ ΔΕΝ ΥΠΑΡΧΕΙ ΣΗΜΑ ΣΤΗΝ ΚΕΡΑΙΑ. ΟΙ ΠΕΡΙΟΧΕΣ ΑΥΤΕΣ ΕΙΝΑΙ ΓΝΩΣΤΕΣ ΩΣ «ΤΥΦΛΑ ΣΗΜΕΙΑ» ΚΑΙ ΜΠΟΡΟΥΝ ΕΥΚΟΛΑ ΝΑ ΕΞΑΛΕΙΦΘΟΥΝ ΜΕ ΤΗΝ ΤΟΠΟΘΕΤΗΣΗ ΖΕΥΓΟΥΣ ΡΑΔΙΟΚΕΡΑΙΩΝ ΑΝΤΙ ΜΙΑΣ ΚΕΡΑΙΑΣ. Ο ΒΑΣΙΚΟΣ ΕΞΟΠΛΙΣΜΟΣ ΤΩΝ ΣΥΣΤΗΜΑΤΩΝ ΡΑΔΙΟΜΕΤΑΔΟΣΗΣ ΤΗΣ RENISHAW ΠΕΡΙΛΑΜΒΑΝΕΙ ΔΥΟ ΡΑΔΙΟΚΕΡΑΙΕΣ.

ΑΝ ΤΑ ΚΑΛΩΔΙΑ RMM2 ΔΕΝ ΕΙΝΑΙ ΕΠΑΡΚΩΣ ΠΡΟΣΤΑΤΕΥΜΕΝΑ, ΕΙΝΑΙ ΠΙΘΑΝΟΝ ΝΑ ΠΡΟΚΛΗΘΕΙ ΒΛΑΒΗ ΤΟΥ ΣΥΣΤΗΜΑΤΟΣ ΛΟΓΩ ΖΗΜΙΑΣ ΣΤΑ ΚΑΛΩΔΙΑ Ή ΕΙΣΡΟΗΣ ΨΥΚΤΙΚΟΥ ΥΓΡΟΥ.

Η ΟΠΤΙΚΗ ΜΟΝΑΔΑ ΕΛΕΓΧΟΥ OM16 ΔΕΝ ΠΡΕΠΕΙ ΝΑ ΤΟΠΟΘΕΤΕΙΤΑΙ ΣΕ ΣΗΜΕΙΑ ΟΠΟΥ ΡΙΝΙΣΜΑΤΑ ΑΠΟ ΤΗ ΜΗΧΑΝΙΚΗ ΕΠΕΞΕΡΓΑΣΙΑ ΜΠΟΡΕΙ ΠΕΦΤΟΥΝ ΑΠΕΥΘΕΙΑΣ ΣΤΗ ΘΥΡΙΔΑ ΤΗΣ. Η ΑΝΑΠΟΦΕΥΚΤΗ ΔΙΑΒΡΩΣΗ ΤΟΥ ΚΡΥΣΤΑΛΛΟΥ ΘΑ ΠΡΟΚΑΛΕΣΕΙ ΜΑΚΡΟΠΡΟΘΕΣΜΑ ΜΕΙΩΣΗ ΤΗΣ ΕΝΤΑΣΗΣ ΤΟΥ ΟΠΤΙΚΟΥ ΣΗΜΑΤΟΣ.

ΠΡΙΝ ΤΟΠΟΘΕΤΗΣΕΤΕ ΤΟΝ ΑΝΙΧΝΕΥΤΗ RMP2/RMP2-S ΜΕ ΜΟΝΑΔΑ ΕΛΕΓΧΟΥ ΡΑΔΙΟΣΥΧΝΟΤΗΤΩΝ ΣΤΗΝ ΕΡΓΑΛΕΙΟΜΗΧΑΝΗ, ΠΡΕΠΕΙ ΝΑ ΔΙΑΣΦΑΛΙΣΕΤΕ ΟΤΙ ΤΟ RMP2/RMP2-S ΕΙΝΑΙ ΣΩΣΤΑ ΣΤΕΡΕΩΜΕΝΟ ΣΤΟ ΒΡΑΧΙΟΝΑ ΤΟΥ.

ΠΡΙΝ ΘΕΣΕΤΕ ΣΕ ΛΕΙΤΟΥΡΓΙΑ ΤΟ ΣΥΣΤΗΜΑ ΑΝΙΧΝΕΥΣΗΣ, ΠΡΕΠΕΙ ΝΑ ΕΧΕΤΕ ΚΑΤΑΝΟΗΣΕΙ ΠΛΗΡΩΣ ΤΟΥ ΛΟΓΙΣΜΙΚΟ ΜΕ ΤΟ ΟΠΟΙΟ ΘΑ «ΟΔΗΓΕΙΤΕ» ΤΟΝ ΑΝΙΧΝΕΥΤΗ. Ο ΕΣΦΑΛΜΕΝΟΣ ΠΡΟΓΡΑΜΜΑΤΙΣΜΟΣ ΜΠΟΡΕΙ ΝΑ ΟΔΗΓΗΣΕΙ ΣΤΗΝ ΠΡΟΚΛΗΣΗ ΖΗΜΙΑΣ ΣΤΟ ΜΗΧΑΝΗΜΑ, ΣΤΟ ΑΝΤΙΚΕΙΜΕΝΟ ΠΟΥ ΕΛΕΓΧΕΤΕ, Ή ΚΑΙ ΣΤΟΝ ΙΔΙΟ ΤΟΝ ΑΝΙΧΝΕΥΤΗ.

ΠΡΙΝ ΘΕΣΕΤΕ ΣΕ ΛΕΙΤΟΥΡΓΙΑ ΤΟΝ ΑΝΙΧΝΕΥΤΗ, ΒΕΒΑΙΩΘΕΙΤΕ ΟΤΙ Ο ΒΡΑΧΙΟΝΑΣ ΕΙΝΑΙ ΣΩΣΤΑ ΣΤΕΡΕΩΜΕΝΟΣ ΣΤΟΝ ΑΞΟΝΑ ΤΗΣ ΕΡΓΑΛΕΙΟΜΗΧΑΝΗΣ.

Η ΠΡΟΣΑΡΜΟΓΗ ΒΥΣΜΑΤΩΝ ΤΥΠΟΥ BNC ΣΤΑ ΚΑΛΩΔΙΑ RMM2 ΠΡΕΠΕΙ ΝΑ ΓΙΝΕΤΑΙ ΜΟΝΟ ΑΠΟ ΚΑΤΑΛΛΗΛΑ ΕΚΠΑΙΔΕΥΜΕΝΟ ΠΡΟΣΩΠΙΚΟ, ΠΛΗΡΩΣ ΕΞΟΙΚΕΙΩΜΕΝΟ ΜΕ ΑΥΤΗ ΤΗ ΔΙΑΔΙΚΑΣΙΑ.

ΟΤΑΝ ΕΚΤΕΛΕΙΤΕ ΓΙΑ ΠΡΩΤΗ ΦΟΡΑ ΕΝΑΝ ΚΥΚΛΟ ΑΝΙΧΝΕΥΣΗΣ, ΣΥΝΙΣΤΑΤΑΙ ΝΑ ΕΚΤΕΛΕΙΤΕ ΤΟ ΠΡΟΓΡΑΜΜΑ ΜΕ ΟΛΕΣ ΤΙΣ ΤΑΧΕΙΕΣ ΚΙΝΗΣΕΙΣ ΚΑΙ ΚΙΝΗΣΕΙΣ ΡΥΘΜΟΥ ΤΡΟΦΟΔΟΤΗΣΗΣ ΣΕ ΜΕΙΩΜΕΝΗ ΤΑΧΥΤΗΤΑ, ΓΙΑ ΝΑ ΑΠΟΦΥΓΕΤΕ ΤΗΝ ΠΡΟΚΛΗΣΗ ΖΗΜΙΑΣ ΣΤΗΝ ΕΡΓΑΛΕΙΟΜΗΧΑΝΗ Ή ΣΤΟΝ ΑΝΙΧΝΕΥΤΗ.

Ενοποιημένος κατάλογος προειδοποιήσεων και προφυλάξεων (συνέχεια)

ΠΡΟΦΥΛΑΞΕΙΣ (συνέχεια)

Η ΠΙΕΣΗ ΤΟΥ ΕΛΑΤΗΡΙΟΥ ΕΝΤΟΣ ΤΟΥ ΑΝΙΧΝΕΥΤΗ ΜΡ3 ΜΕ ΕΝΕΡΓΟΠΟΙΗΣΗ ΔΙΑ ΕΠΑΦΗΣ ΕΙΝΑΙ ΡΥΘΜΙΣΜΕΝΗ ΜΕ ΑΚΡΙΒΕΙΑ. ΠΡΕΠΕΙ ΝΑ ΑΝΑΠΡΟΣΑΡΜΟΖΕΤΑΙ ΜΟΝΟ ΣΕ ΕΞΑΙΡΕΤΙΚΕΣ ΠΕΡΙΠΤΩΣΕΙΣ, ΟΠΟΥ ΟΙ ΕΚΤΕΤΑΜΕΝΟΙ ΚΡΑΔΑΣΜΟΙ ΤΟΥ ΜΗΧΑΝΗΜΑΤΟΣ Ή Η ΧΡΗΣΗ ΑΚΙΔΩΝ ΕΞΑΙΡΕΤΙΚΑ ΜΕΓΑΛΟΥ ΜΗΚΟΥΣ Ή ΒΑΡΟΥΣ ΠΡΟΚΑΛΟΥΝ ΤΗΝ ΕΣΦΑΛΜΕΝΗ ΕΝΕΡΓΟΠΟΙΗΣΗ ΤΟΥ ΑΝΙΧΝΕΥΤΗ.

Η ΡΥΘΜΙΣΗ ΤΗΣ ΠΙΕΣΗΣ ΤΟΥ ΕΛΑΤΗΡΙΟΥ ΤΗΣ ΑΚΙΔΑΣ, ΚΑΘΩΣ ΚΑΙ Η ΧΡΗΣΗ ΑΚΙΔΩΝ ΔΙΑΦΟΡΕΤΙΚΩΝ ΑΠΟ ΕΚΕΙΝΕΣ ΠΟΥ ΧΡΗΣΙΜΟΠΟΙΗΘΗΚΑΝ ΓΙΑ ΤΗΝ ΑΡΧΙΚΗ ΒΑΘΜΟΝΟΜΗΣΗ ΤΟΥ ΑΝΙΧΝΕΥΤΗ, ΜΠΟΡΕΙ ΝΑ ΟΔΗΓΗΣΕΙ ΣΕ ΔΙΑΦΟΡΕΣ ΣΤΗΝ ΕΠΑΝΑΛΗΠΤΙΚΟΤΗΤΑ ΤΩΝ ΜΕΤΡΗΣΕΩΝ ΤΟΥ ΑΝΙΧΝΕΥΤΗ ΣΕ ΣΧΕΣΗ ΜΕ ΤΙΣ ΤΙΜΕΣ ΠΟΥ ΑΝΑΦΕΡΟΝΤΑΙ ΣΤΟ ΠΙΣΤΟΠΟΙΗΤΙΚΟ ΒΑΘΜΟΝΟΜΗΣΗΣ ΠΟΥ ΤΟΝ ΣΥΝΟΔΕΥΕΙ.

Η ΥΠΕΡΒΟΛΙΚΗ ΣΥΣΦΙΞΗ ΤΗΣ ΒΙΔΑΣ ΡΥΘΜΙΣΗΣ ΔΥΝΑΜΗΣ ΤΟΥ ΕΛΑΤΗΡΙΟΥ ΤΗΣ ΑΚΙΔΑΣ, ΜΠΟΡΕΙ ΝΑ ΟΔΗΓΗΣΕΙ ΣΤΗΝ ΠΡΟΚΛΗΣΗ ΕΣΩΤΕΡΙΚΗΣ ΖΗΜΙΑΣ ΣΤΟΝ ΑΝΙΧΝΕΥΤΗ ΜΡ3 ΜΕ ΕΝΕΡΓΟΠΟΙΗΣΗ ΔΙΑ ΕΠΑΦΗΣ.

Before you begin

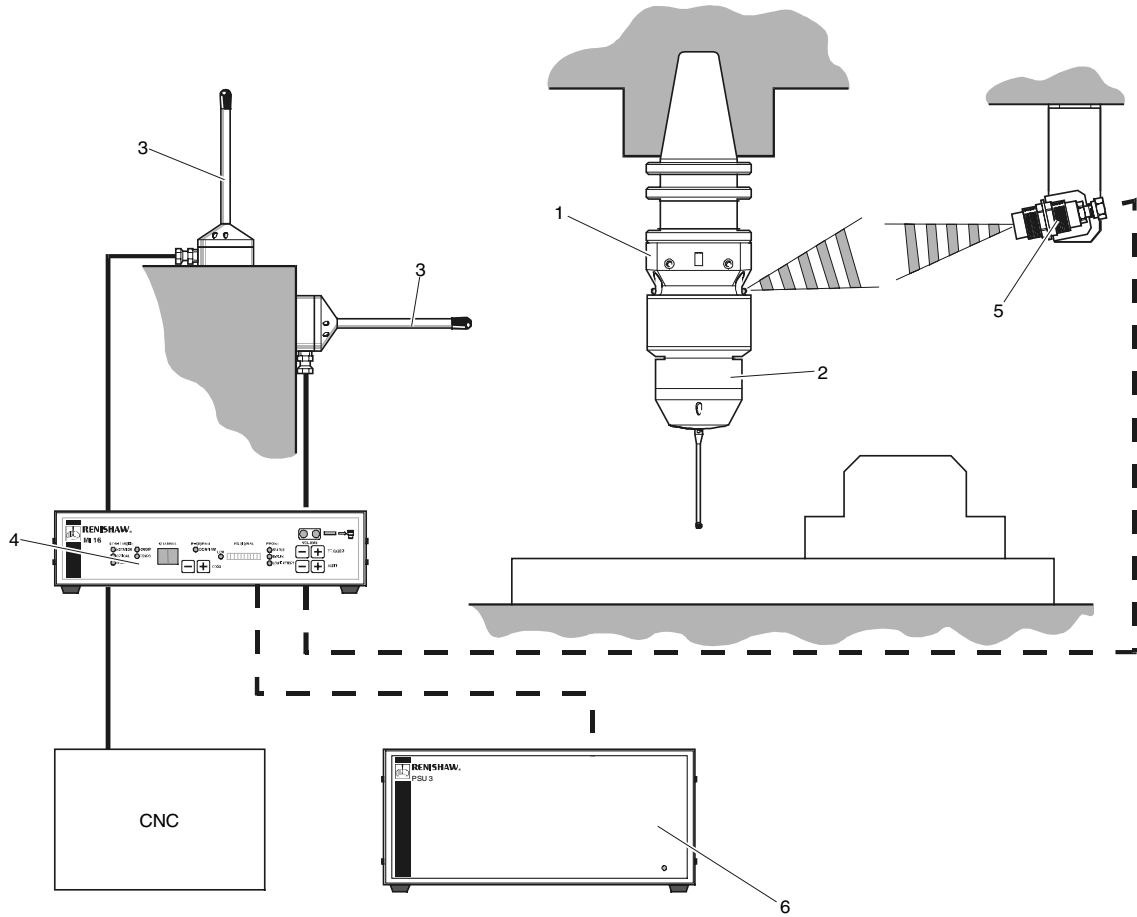
This installation and user's guide supports the Renishaw MP16 touch-trigger probe system (MP3 probe with selectable channel radio transmission) (see Figure 1).

Split into four self-contained chapters, the guide is structured to provide you with an understanding of the MP16 touch-trigger probe system, as well as providing comprehensive installation and maintenance instructions for each of its components. A comprehensive spares list is also provided to assist in the identification and ordering of replacement parts:

- **CHAPTER 1 – SYSTEM DESCRIPTION:** provides detailed information on the MP16 touch-trigger probe system and its individual parts.
- **CHAPTER 2 – SYSTEM INSTALLATION:** provides detailed instructions on how to install the MP16 touch-trigger probe system to your machine tool.
- **CHAPTER 3 – SYSTEM OPERATION:** provides detailed information on how to operate the MP16 touch-trigger probe system.
- **CHAPTER 4 – SYSTEM MAINTENANCE AND TROUBLESHOOTING:** provides detailed instructions on how to maintain, adjust and troubleshoot the MP16 touch-trigger probe system.

Note...

The general instructions within this publication relate to MP16 touch-trigger probe systems which incorporate a MK2 radio module probe (RMP2) fitted with two 9V batteries. In instances where your RMP2 is fitted with six 1.5V batteries, please refer to the addendum contained at the back of this publication.



1. Mk2 radio module probe (RMP2/RMP2-S) (transmitter)
2. MP3 probe head
3. Mk2 radio module machine (RMM2) (2off)
4. MI16 machine interface (receiver)
5. Optical module (OM16) (**optional**)
6. PSU3 power supply unit (**optional**)

Figure 1 – The Renishaw MP16 touch-trigger probe system

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Gloucestershire
United Kingdom
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- The type of hardware that you are using, including all serial numbers.
- The version of software that you are using.
- The machine tool and machine controller type.
- An account of what happened and what you were doing when the problem occurred.
- An account of how you tried to solve the problem.

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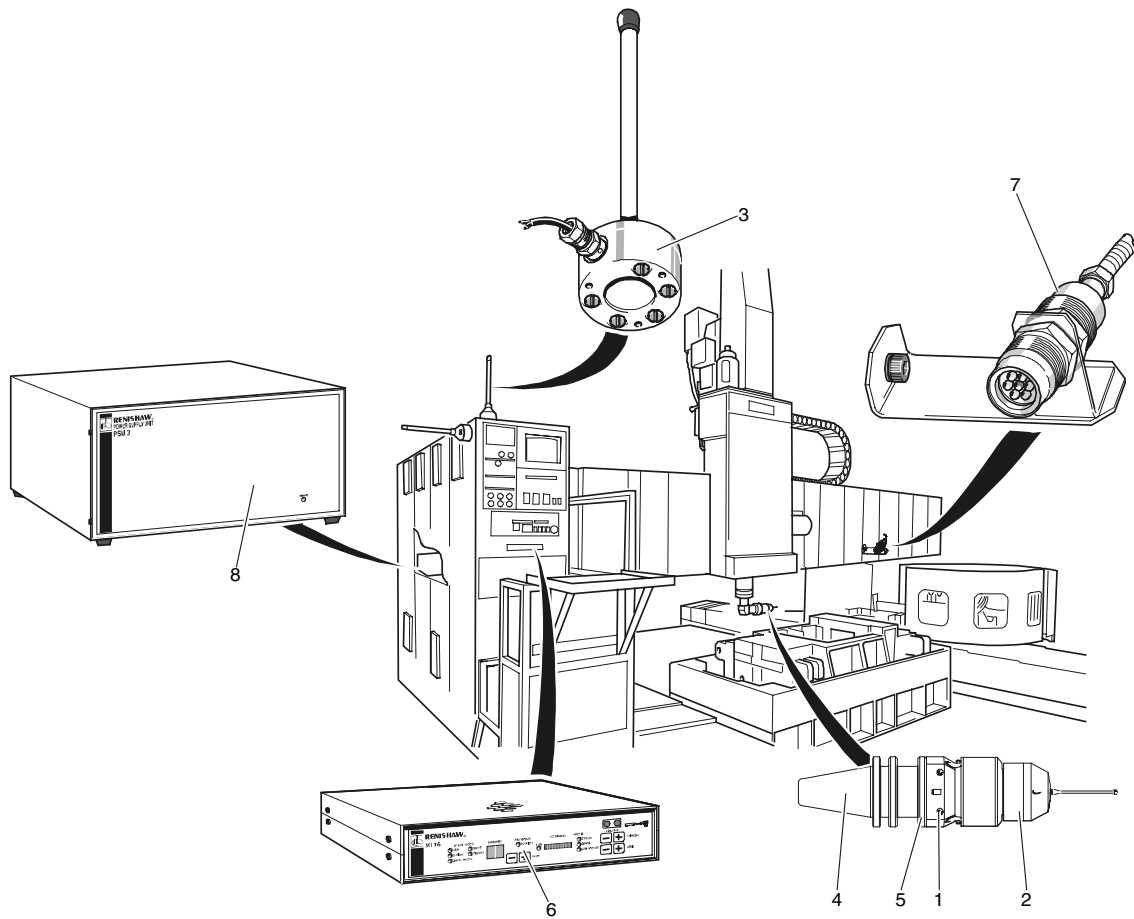
Renishaw's MP16 touch-trigger probe system (MP3 probe with selectable channel radio transmission)

Renishaw's MP16 touch-trigger probe system (MP3 probe with selectable channel radio transmission) includes:

- Programmable transmission channel selection.
- Programmable probe 'switch on' and 'switch off' mode selection.
- Optional optical transmitter module facility available for switching the probe both on and off using M code.

Each MP16 probe system is supplied in kit form and typically comprises the following (see Figure 2):

- Mk 2 radio module probe (**RMP2**) or Mk2 radio module probe with shank switch activation (**RMP2-S**) [1].
- MP3 probe head [2].
- Mk2 radio module machine (**RMM2**) [3] (2 off).
- Shank [4] (**optional**).
- Shank adaptor [5].
- Machine interface (**MI16**) [6].
- Optical module (**OM16**) [7] (**optional**).
- Power supply unit (**PSU3**) [8] (**optional**).
- Probe head tool kit (comprising: TP3 stylus tool, 1.5 mm AF allen key, 2.0 mm AF allen key, 2.5 mm AF allen key, 3.0 mm AF allen key, 4.0 mm AF allen key).



- | | |
|---------------------|--------------------|
| 1. RMP2/RMP2-S | 6. MI16 |
| 2. MP3 probe head | 7. OM16 (optional) |
| 3. RMM2 (2off) | 8. PSU3 (optional) |
| 4. Shank (optional) | |
| 5. Shank adaptor | |

Figure 2 – Components of the MP16 touch-trigger probe system

CHAPTER 1

System description

Reading this chapter will provide you with a detailed knowledge of the MP16 probe system. It includes:

- A detailed description of each of your systems components.
- A detailed description of how each system component interacts.

Contained in this chapter

■ Description of the MP16 touch-trigger probe system (MP3 probe with selectable channel radio transmission) 1-2	■ The OM16 1-19
■ The RMP2/RMP2-S 1-4	■ The shank adaptor..... 1-20
■ The MP3 touch-trigger probe 1-10	■ The shank 1-21
■ The MI16 1-13	■ The PSU3..... 1-22
■ The RMM2..... 1-18	■ Technical data 1-23

Description of the MP16 touch-trigger probe system (MP3 probe with selectable channel radio transmission)

The MP16 touch-trigger probe system (MP3 probe with selectable channel radio transmission) provides a means of workpiece measurement and job set-up on machine tools. Probe 'trigger' signals can be transmitted over distances of up to 15 metres (49.2 feet), with non-line-of-sight operation.

The MP16 probe system:

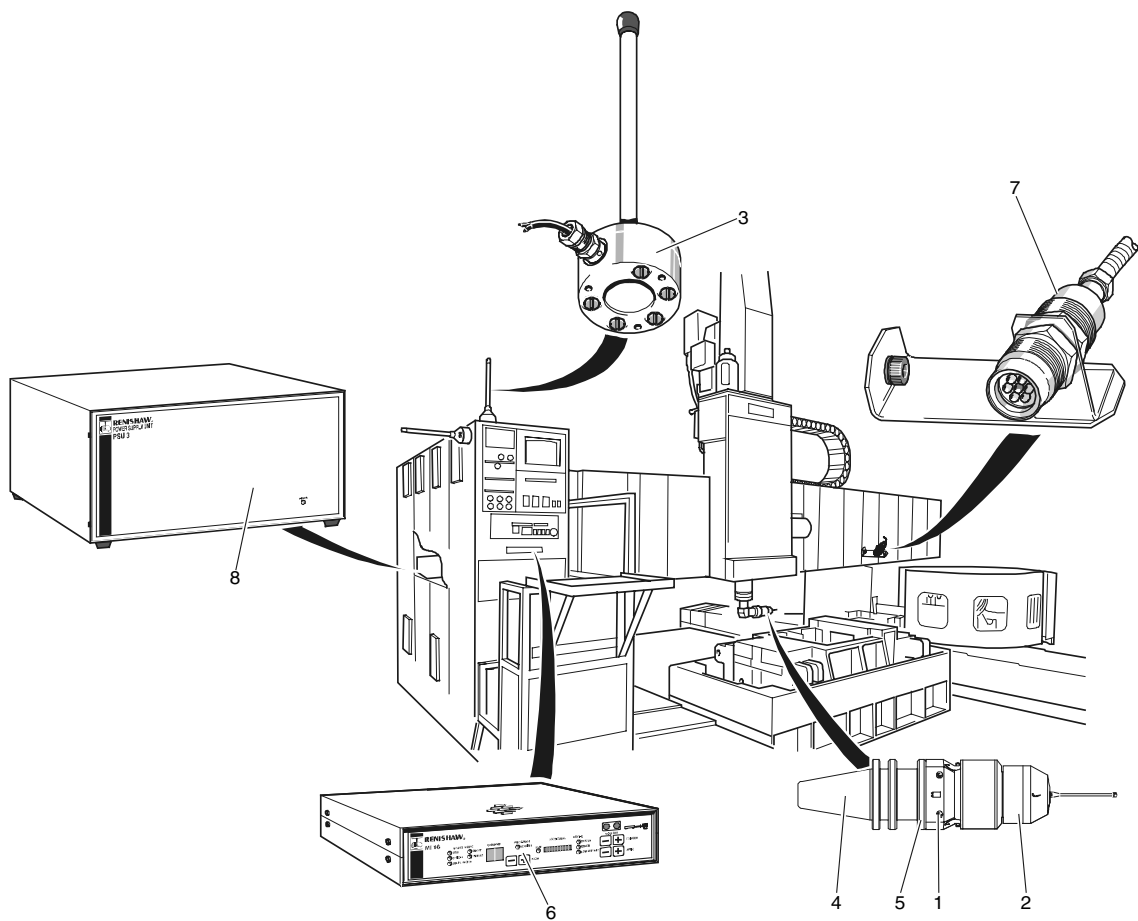
- Allows transmission of probe 'trigger' signals using FM radio transmission.
- Provides up to 69 user-selectable, programmable transmission channels (Continental Europe and UK only).
- Allows the user to both select and program the probe 'switch on' and 'switch off' mode.
- Incorporates an optional optical module (OM16) which allows the probe to be 'switched on' and 'switched off' using M code.

The MP16 probe system contains the following primary components (see Figure 1.1):

- Mk 2 radio module probe (**RMP2**) or Mk2 radio module probe with shank switch activation (**RMP2-S**) [1].
- MP3 probe head [2].
- Mk2 radio module machine (**RMM2**) [3] (2 off).
- Shank [4] (**optional**).
- Shank adaptor [5].
- Machine interface (**MI16**) [6].
- Optical module (**OM16**) [7] (**optional**).
- Power supply unit (**PSU3**) [8] (**optional**).

During operation, probe 'trigger' signals from the RMP2/RMP2-S are transmitted to the RMM2 receivers using frequency modulated (FM) radio waves. The frequency of these radio waves will be dependent on the country within which the MP16 probe system is to be operated; see "**Technical data**" later in this chapter. Each frequency range is divided into separate channels, each channel having a typical band width of 25 kHz to permit many systems to operate in close proximity without the danger of interference.

The signals received by each RMM2 are passed to the MI16, via coaxial cable, which decodes and converts them into solid state relay (SSR) form for use by the machine tool's CNC controller.



- 1. RMP2/RMP2-S
- 2. MP3 probe head
- 3. RMM2 (2off)
- 4. Shank (optional)
- 5. Shank adaptor

- 6. MI16
- 7. OM16 (optional)
- 8. PSU3 (optional)

Figure 1.1 – Primary components of the MP16 touch-trigger probe system (MP3 probe with selectable channel radio transmission)

The RMP2/RMP2-S

Note...

The following information relates to MK2 radio module probes fitted with two 9 V batteries. In instances where your RMP2 is fitted with six 1.5 V batteries, please refer to Addendum A at the back of this publication.

The RMP2

The RMP2, on which the MP3 probe is mounted, generates the radio signals necessary for the transmission of probe data over a distance of up to 15 metres (49.2 feet). The RMP2 comprises (see Figure 1.2):

- Probe status light emitting diode (LED) [1].
- Programming LED [2].
- Three receiving diodes [3].
- RMP2 body [4].
- Battery cover [5].
- Battery cover seal [6].
- Two alkaline PP3 9 V batteries [7].
- Socket [8].
- 'O' ring [9].
- Spherical seat [10].

Housed within the RMP body [4], the following light emitting diodes (LEDs) and receiving diodes provide the communication links between the RMP2, the MI16 and the optional OM16 (if fitted):

Fig. No	LED/receiving diode	Purpose
1	Probe status LED	Offers a visual indication of the probe status. The Probe status LED will: <ul style="list-style-type: none"> • Flash green when the MP3 probe is 'SEATED'. • Flash red when the MP3 probe is 'OPEN'.
2	Clear LED (transmitting)	Transmits infra-red signals to the MI16 to relay the current 'Switch On'/'Switch Off' mode settings and channel selection of the RMP2/RMP2-S.
3	Receiving diode (3 off)	Receives infra-red optical signals from the MI16 and optional OM16 (if fitted) through a full 360°. The receiving diode nearest the clear (transmitting) LED [2] receives all programming signals during mode and channel selection (refer to "Chapter 2 – System installation").

Continued on Page 1-6

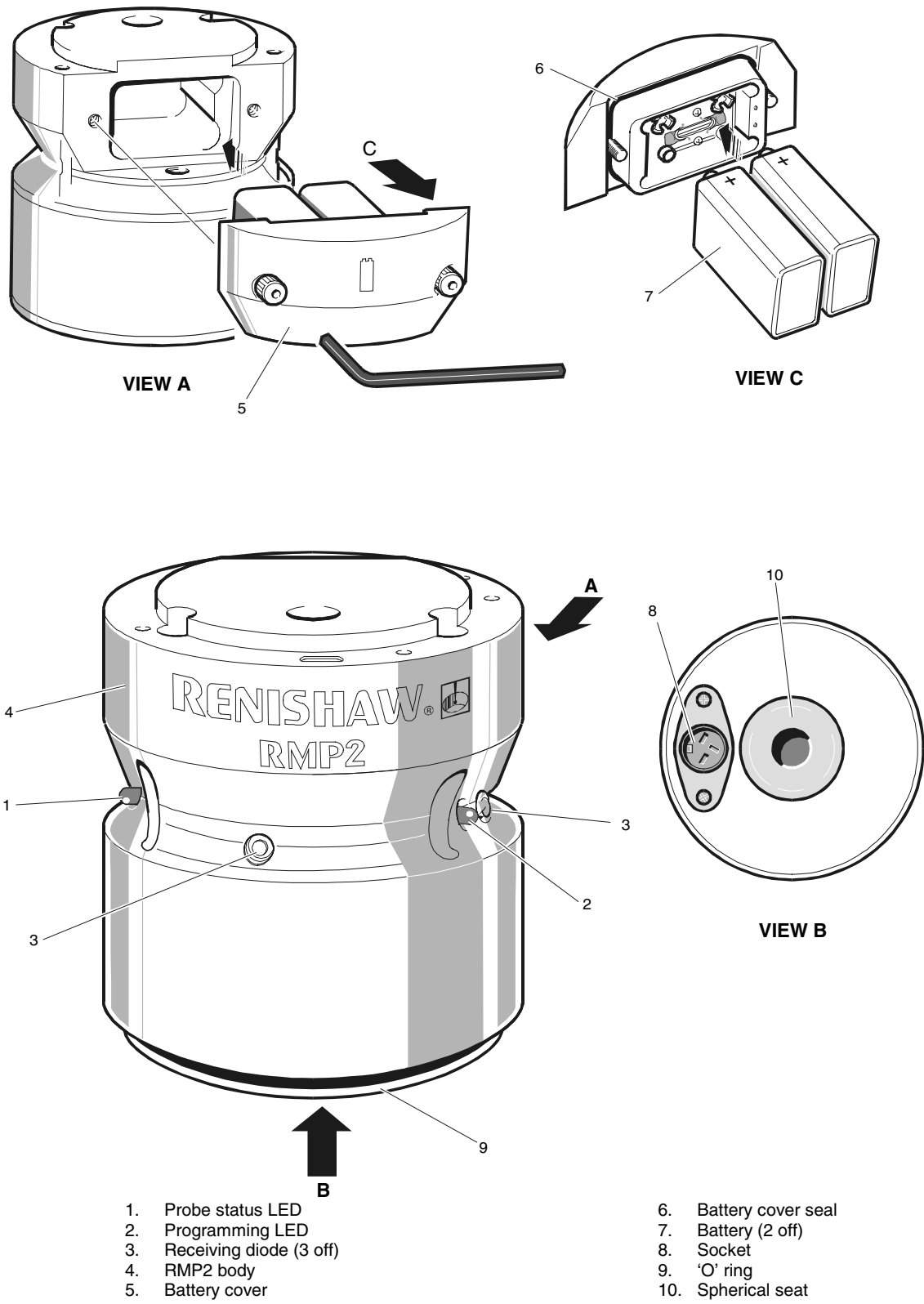


Figure 1.2 – The RMP2

1-6 System description

The RMP2, which can be mounted directly to a shank via the shank adaptor supplied (see “**The shank adaptor**” later in this chapter), has the following ‘switch on’/‘switch off’ options available; all methods are selectable via the MI16 (refer to “**The MI16**” later in this chapter):

Switch on method	Switch off method
<p>M Code (optical)</p> <p>An optical signal, generated by the OM16 in response to a machine M code, switches the RMP2 on.</p>	<p>M Code (optical)</p> <p>An optical signal, generated by the OM16 in response to a machine M code, switches the RMP2 off.</p>
<p>M Code (optical)</p> <p>An optical signal, generated by the OM16 in response to a machine M code, switches the RMP2 on.</p>	<p>Time-out</p> <p>The RMP2 automatically switches off after a period of 180 seconds (± 1 second) has elapsed from when the RMP2 was switched on. The time-out period is reset for a further 180 seconds by a probe trigger signal.</p>
<p>Spin</p> <p>The RMP2 is switched on by rotating it in the machine spindle at 500 rpm (± 50 rpm). A minimum spin of 1 second is recommended to ensure reliable switch on.</p>	<p>Spin</p> <p>The RMP2 is switched off by rotating it in the machine spindle at 500 rpm (± 50 rpm). A minimum spin of 1 second is recommended to ensure reliable switch off.</p>
<p>Spin</p> <p>The RMP2 is switched on by rotating it in the machine spindle at 500 rpm (± 50 rpm). A minimum spin of 1 second is recommended to ensure reliable switch on.</p>	<p>Time-out</p> <p>The RMP2 automatically switches off after a period of 180 seconds (± 1 second) has elapsed from when the RMP2 was switched on. The time-out period is reset for a further 180 seconds by a probe trigger signal.</p>

Notes...

All switch on/switch off methods are selectable on the MI16 machine interface and must be programmed into the RMP2 from the MI16 machine interface (refer to “Chapter 2 – System installation”).

When a particular switch on/switch off method is selected, all other methods are disabled.

After the RMP2 has been switched on, to account for the ‘debounce’ period it cannot be switched off again until a period of 2 seconds has elapsed. Similarly, after switch off, it cannot be switched on again until a period of 2 seconds has elapsed.

There are three versions of RMP; the radio transmission system of each being programmed to operate only within the strict parameters imposed by the regulating authority responsible for the country in which it is to operate. For further information relating to the specific transmission frequency range on each unit, refer to “**Technical data**” later in this chapter.

The general parameters within which each version of RMP is designed to operate are given below.

Country of use	Nominal transmission frequency (MHz)	Number of available transmission channels	Channel separation (kHz)	Operating range (Metres)
Continental Europe and United Kingdom	433	69	25	15
USA	224	40	25	6
Japan	224	40	25	8

Selection of the RMP2 transmission channel is performed on the MI16 and transferred to the RMP2 via a short range optical link (refer to “**The MI16** ” later in this chapter).

Power to the MP3 probe, when attached to the RMP2, is provided via the socket [8].

The RMP2-S

Each version of the RMP2-S is identical to the corresponding version of RMP2, but each is fitted with a dedicated shank [11] which houses a shank switch [12] for switching the RMP2-S both on and off.

The RMP2-S comprises (see Figure 1.3):

- Probe status light emitting diode (LED) [1].
- Programming LED [2].
- Three receiving diodes [3].
- RMP2-S body [4].
- Battery cover [5].
- Battery cover seal [6].
- Two alkaline PP3 9 V batteries [7].
- Shank adaptor [8].
- Socket [9].
- 'O' ring [10].
- Shank [11].
- Shank switch [12].
- Spherical seat [13].

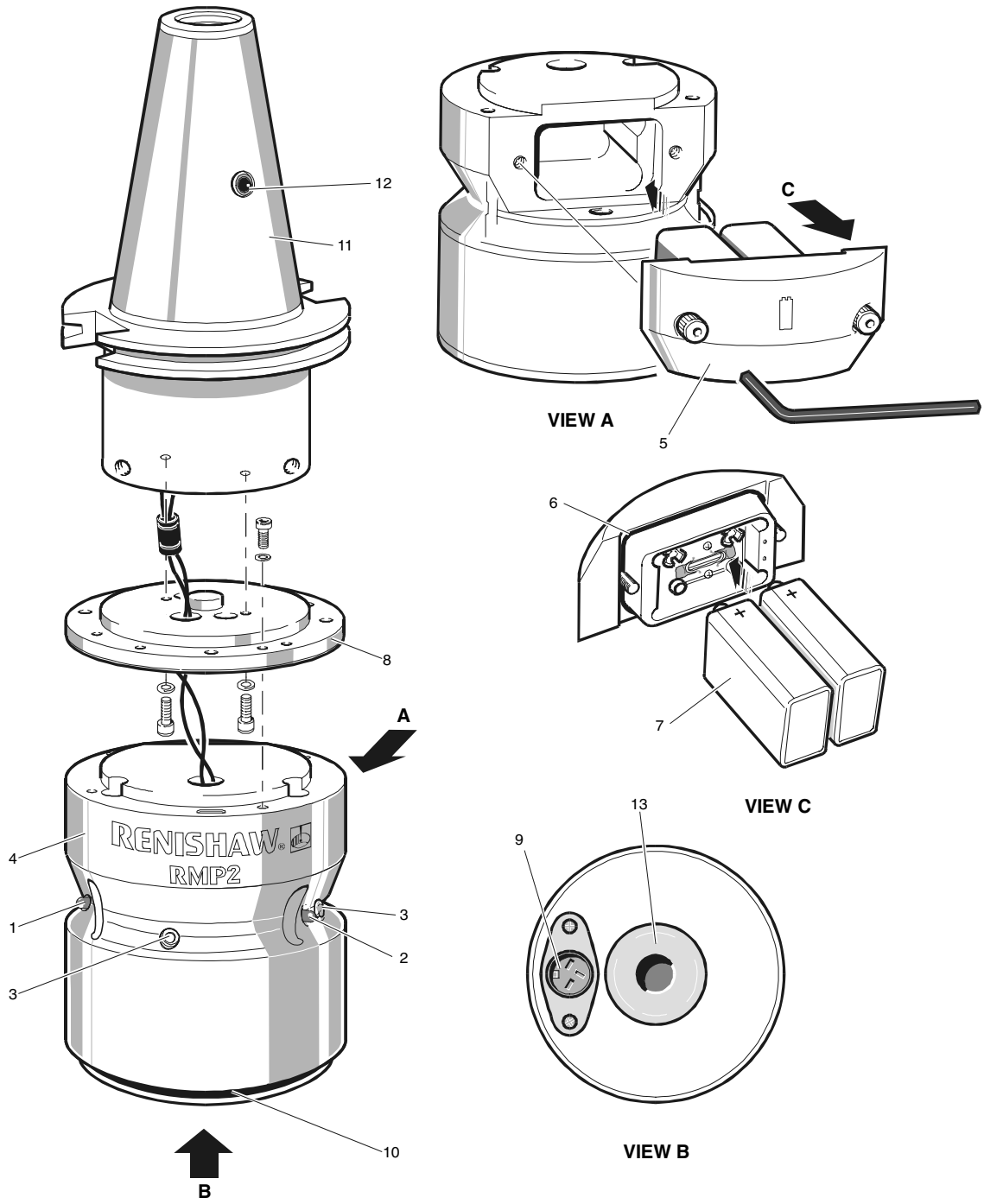
Unlike the RMP2, the RMP2-S can only be switched on and off by the shank switch [12] incorporated within the shank [11] (supplied). Again, the method of switching on and off the RMP2-S, as well as radio channel selection, is programmable via the MI16 (refer to “**The MI16**” later in this chapter) and transferred the RMP2-S. The shank switch operates as follows:

- Switches on the RMP2-S when the shank is inserted into the machine spindle.
- Switches off the RMP2-S when the shank is removed from the machine spindle.

Power to the MP3 probe, when mounted on the RMP2-S, is supplied via the socket [9].

NOTE ...

The RMP2-S is subject to a 2 second ‘debounce’ period which prevents the unit being deactivated for 2 seconds following insertion of the shank [11] into the machine tool spindle and subsequent depression of the shank switch [12]. Similarly, following deactivation of the unit by removal of the shank from the machine tool spindle, the unit cannot be reactivated for a period of 2 seconds.



- | | |
|----------------------------|--------------------|
| 1. Probe status LED | 8. Shank adaptor |
| 2. Programming LED | 9. Socket |
| 3. Receiving diode (3 off) | 10. 'O' ring |
| 4. RMP2-S body | 11. Shank |
| 5. Battery cover | 12. Shank switch |
| 6. Battery cover seal | 13. Spherical seat |
| 7. Battery (2 off) | |

Figure 1.3 – The RMP2-S

The MP3 touch-trigger probe

The MP3 is a conventional touch-trigger probe comprising the following (see Figure 1.4):

- Probe body (with integral kinematic location) [1].
- Front cover [2].
- Two front cover retaining screws [3].
- Stylus mounting [4].
- Outer diaphragm [5].
- Inner diaphragm [6].
- On-centre adjustment mechanism [7].
- Four probe head retaining/adjustment screws [8].
- Stylus spring pressure adjustment screw [9].

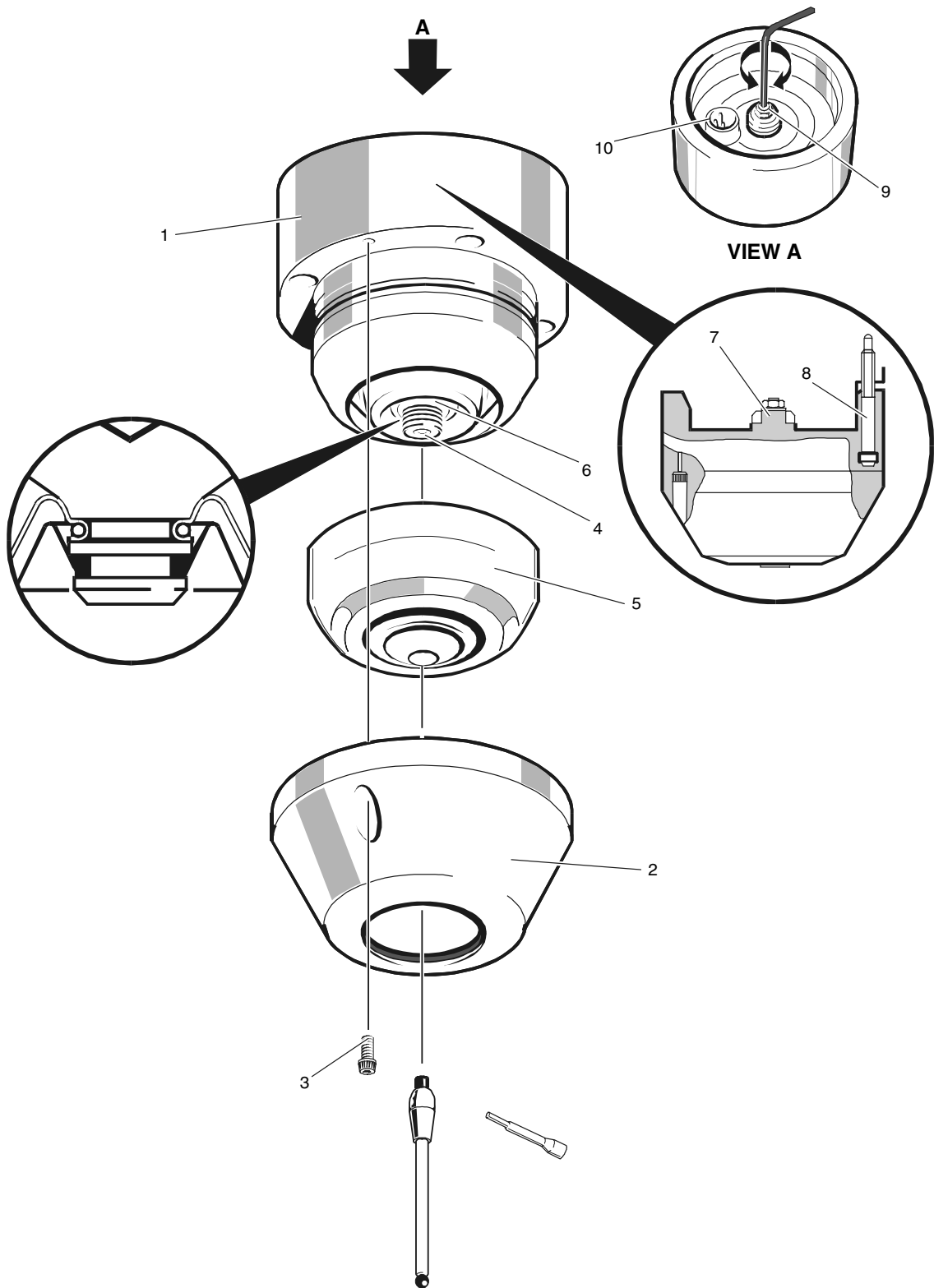
The probe body [1], which houses both the kinematic location and on-centre adjustment mechanism [7], is mounted directly on the RMP2/RMP2-S using the four probe head retaining/adjustment screws [8]. The internal components of the probe body are sealed from the external environment by the front cover [2], outer diaphragm [4] and inner diaphragm [5]. The front cover is secured to the probe body by two retaining screws [3].

A stylus spring pressure adjustment screw [8] is provided to allow the compression force of the helical compression spring within the kinematic location to be reduced/increased for special applications, specifically where the factory setting would prove unsuitable due to poor probe repeatability, excessive machine vibration or the use of very long styli. Reducing the compression of the helical compression spring will increase the sensitivity of the kinematic location; alternatively, increasing the compression force will decrease the sensitivity of the kinematic location (refer to “**Chapter 4 – Maintenance and troubleshooting**”).

The on-centre adjustment mechanism [6], comprising a spherical seat which allows movement of the probe head in the X and Y axes, provides the facility to position the MP16 such that the centre-line of the stylus corresponds to the centre-line of the machine tool spindle axis (refer to “**Chapter 4 – Maintenance and troubleshooting**”).

Power to the MP3 is supplied via the plug [10].

Continued on Page 1-12



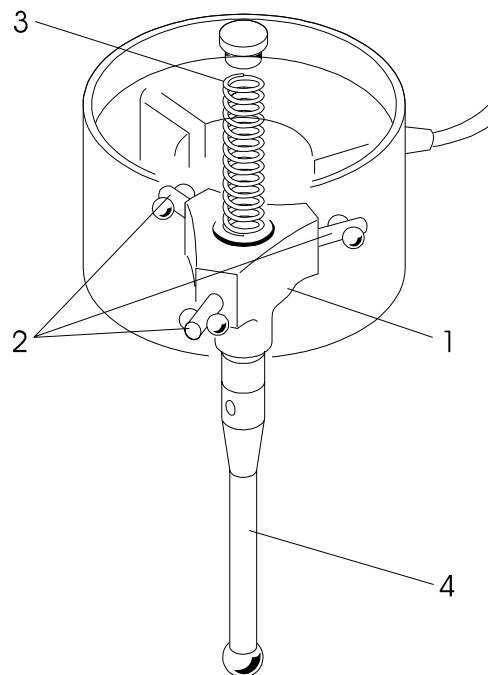
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|--|--|
| 1. Probe body | 6. Inner diaphragm |
| 2. Front cover | 7. On-centre adjustment mechanism |
| 3. Front cover retaining screw (2 off) | 8. Probe head retaining/adjustment screw (4 off) |
| 4. Stylus mounting | 9. Stylus spring force adjustment screw |
| 5. Outer diaphragm | 10. Plug |

Figure 1.4 – The MP3

The kinematic location

The kinematic location (see Figure 1.5) is a mechanical device that maintains the probe mechanism in an exact, but flexible position. Its purpose is to ensure that the stylus [4] always returns to the same position.

The kinematic location consists of a pivotal plate [1] which seats across three bearing points [2] and is held in position by a helical compression spring [3]. Each bearing point, formed by a combination of cylinders and spheres, also acts as an electrical contact. Thus, when the probe contacts a surface and subsequently 'triggers' (i.e. deflection of the stylus [4] causes the plate to deflect or pivot on one or more of these bearing points), an increase in the electrical resistance through the kinematic location occurs. Once detected, this increase in electrical resistance causes the probe system to produce a binary signal to inform the CNC controller that data should be taken. As the probe moves away from the surface, spring force causes the plate to reseal. When the kinematic location is seated, the probe is referred to as 'closed'. When the kinematic location is deflected, the probe is referred to as 'open'.



- | | |
|------------------|-------------------------------|
| 1. Pivotal plate | 3. Helical compression spring |
| 2. Bearing point | 4. Stylus |

Figure 1.5 – Kinematic location (typical)

The MI16

NOTE ...

For instructions on how to program the MI16, please refer to “Chapter 2 – System installation”.

The MI16 (see Figure 1.6) converts received signals into a form acceptable to the machine tool’s CNC controller, displays system diagnostics and provides the means necessary to program both the radio transmission channel and switch on/switch off modes of the RMP2/RMP2-S.

The front panel of the MI16, which displays visible information on both system and probe status, provides the means to program the radio transmission channel and switch on/switch off modes of the RMP2/RMP2-S (refer to “**The MI16 front panel**” later in this section).

All connections to the machine controller, the power supply input and the RMM2 are located on the rear panel of the MI16 (refer to “**The MI16 rear panel**” later in this section).

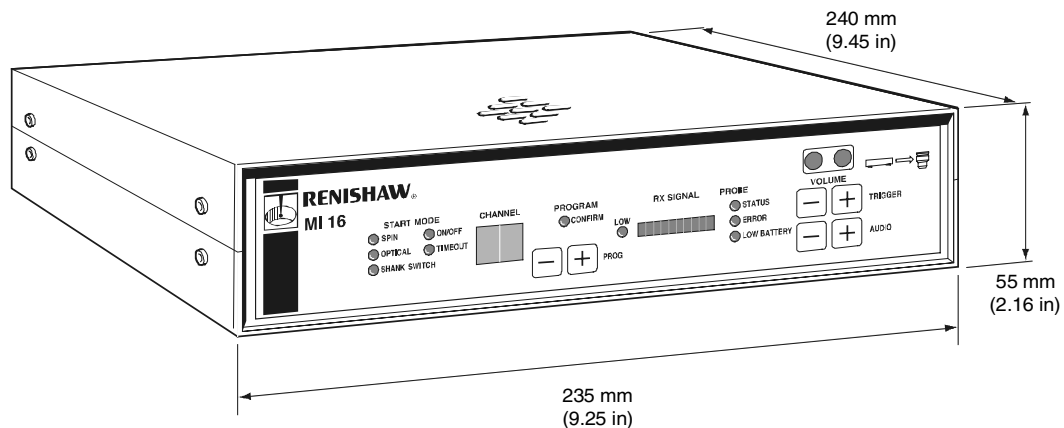
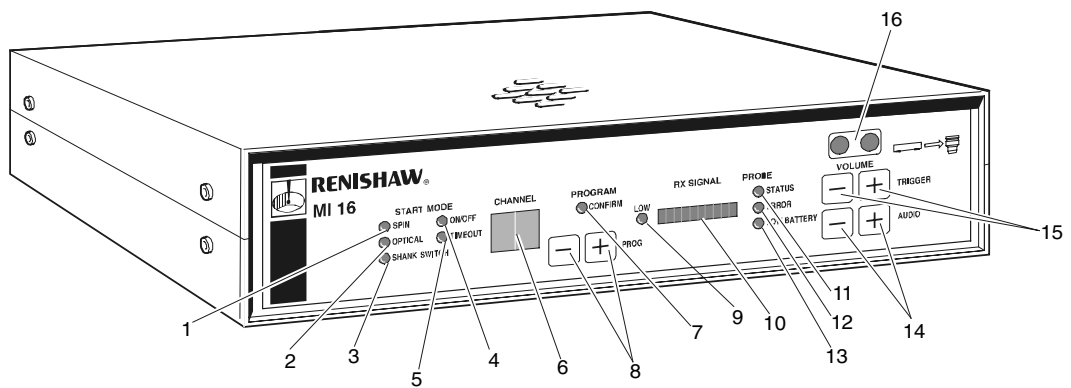


Figure 1.6 – The MI16

The MI16 front panel

The front panel of the MI16 contains the following components (see Figure 1.7):

<u>Fig. No.</u>	<u>Part Description</u>
1	'SPIN' LED: indicates that the RMP2 will be switched on when the machine spindle is rotated at 500 rpm (± 50 rpm).
2	'OPTICAL' LED: indicates that an optical signal, generated by the OM16 in response to a machine M code, will switch the RMP2 on.
3	'SHANK SWITCH' LED: indicates that the RMP2-S will be switched on and off by way of a switch located within the dedicated shank supplied.
4	'ON/OFF' LED: indicates that the selected 'switch on'/'switch off' method is acting to switch the RMP2/RMP2-S both on and off.
5	'TIMEOUT' LED: indicates that the RMP2 is set to automatically switch off after a period of 180 seconds (± 1 second) has elapsed from when the RMP2 was switched on.
6	'CHANNEL' Display: the selected radio transmission channel of the RMP2/RMP2-S is displayed within the display window.
7	'PROGRAM CONFIRM' LED: illuminates to indicate the successful programming of the RMP2/RMP2-S radio transmission channel and start mode.
8	PROGRAMMING 'PROG' BUTTONS: used to select the required radio transmission channel and start mode of the RMP2/RMP2-S.
9	'RX SIGNAL LOW' LED: illuminated to indicate that the received signal level is too weak (three segments or less on the RX SIGNAL Display illuminated).
10	'RX SIGNAL' DISPLAY: segmented display illuminates to indicate the strength of the received signal. All ten segments illuminated indicates a strong signal, no segments illuminated indicates the RMP2/RMP2-S is switched off.
11	'PROBE STATUS' LED: illuminates when the MP3 probe is 'triggered'. Extinguished when the MP3 is 'seated'.
12	'PROBE ERROR' LED: illuminates when an error occurs in the transmission signal, or when the RMP2/RMP2-S is switched off.
13	'PROBE LOW BATTERY' LED: illuminates when the battery voltage falls below 7 V. The batteries should be replaced immediately that this LED illuminates.
14	'VOLUME AUDIO' BUTTONS: used to adjust the volume of the audible transmission monitor which may be used to diagnose sources of interference.
15	'VOLUME TRIGGER' BUTTONS: used to adjust the volume of the audible indicator which may be used to provide an audible indication of when the MP16 'triggers' and to confirm programming operations.
16	PROGRAMMING WINDOW: contains the two LEDs which are used to program the RMP2/RMP2-S. To program the RMP2/RMP2-S, its programming LEDs must be aligned with this window.



- | | |
|-------------------------------|------------------------------|
| 1. 'SPIN' LED | 9. 'RX SIGNAL LOW' LED |
| 2. 'OPTICAL' LED | 10. 'RX SIGNAL' display |
| 3. 'SHANK SWITCH' LED | 11. 'PROBE STATUS' LED |
| 4. 'ON/OFF' LED | 12. 'PROBE ERROR' LED |
| 5. 'TIMEOUT' LED | 13. 'PROBE LOW BATTERY' LED |
| 6. 'CHANNEL' Display | 14. 'VOLUME AUDIO' buttons |
| 7. 'PROGRAM CONFIRM' LED | 15. 'VOLUME TRIGGER' buttons |
| 8. Programming 'PROG' Buttons | 16. Programming window |

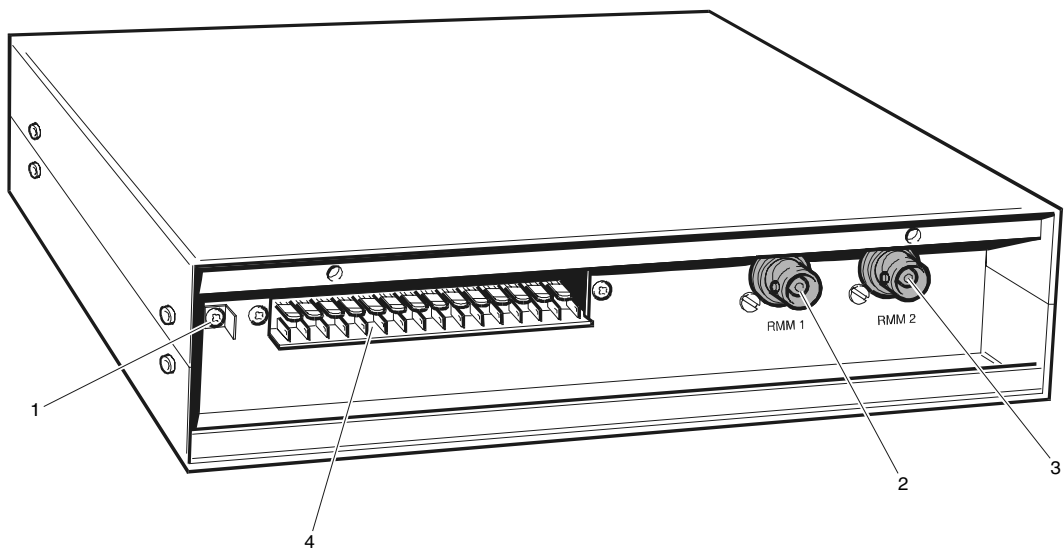
Figure 1.7 – MI16 front panel

The MI16 rear panel

The rear panel of the MI16 (see Figure 1.8) houses the chassis ground terminal [1], both radio module machine cable connectors [2] and [3], and the main terminal block [4].

The chassis ground terminal [1] provides the means of grounding the chassis of the MI16 by connecting this terminal to the nearest available ground connector on the machine tool.

The radio module machine cable connectors [2] and [3] (identified as RMM1 and RMM2) provide the means of connecting the cables of both RMM2s to the MI16.



1. Chassis ground terminal
2. Radio module machine cable connector (RMM1)
3. Radio module machine cable connector (RMM2)
4. Main terminal block

Figure 1.8 – MI16 rear panel

NOTE ...

The rear panel of the MI16 MK3 version is fitted with a switch that is used to select the radio reception sensitivity level. Refer to Addendum B, 'Selection of MI16 radio reception sensitivity' for information describing use of this switch.

The main terminal block

The main terminal block (see Figure 1.9) comprises a 16-pin connector; the function of each pin is as listed below:

<u>Pin Number.</u>	<u>Function</u>
1	GROUND
2	+24 V DC ($\pm 10\%$), capable of supplying 500 mA.
3	0 V
4	OM SCREEN: connection for OM16 cable screen
5	+ ve OM16 CONNECTION
6	- ve OM16 CONNECTION
7	+ ve MACHINE START
8	- ve MACHINE START
9	ERROR SSR
10	ERROR SSR
11	LOW BATTERY SSR
12	LOW BATTERY SSR
13	PROBE STATUS SSR (NORMALLY CLOSED)
14	PROBE STATUS SSR (NORMALLY CLOSED)
15	PROBE STATUS SSR (NORMALLY OPEN)
16	PROBE STATUS SSR (NORMALLY OPEN)

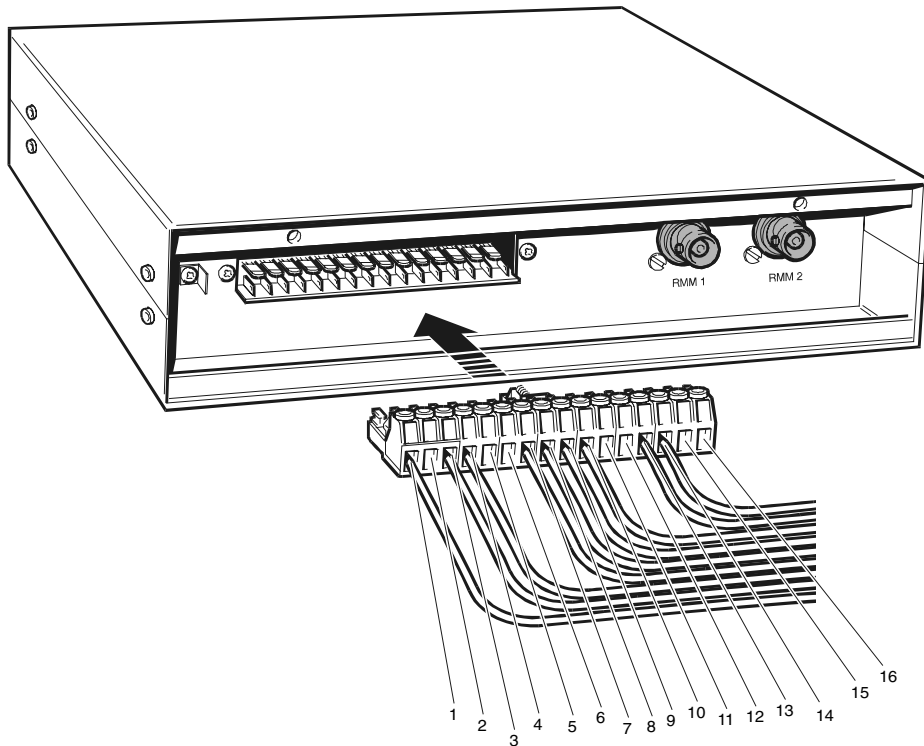


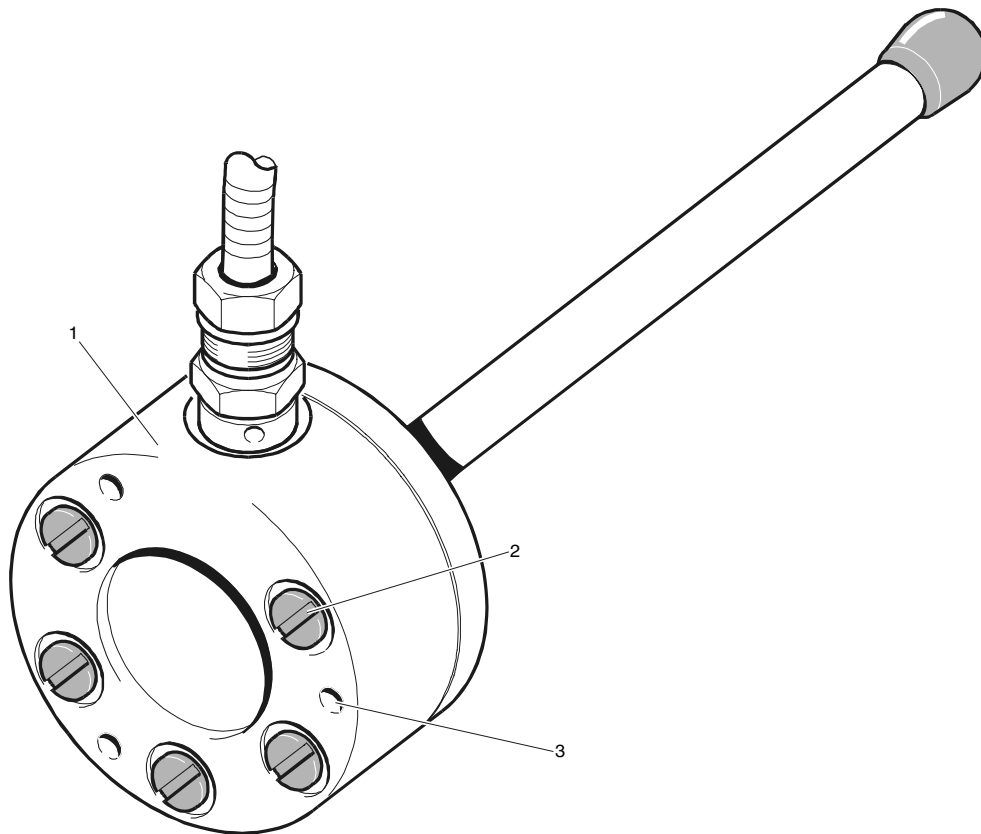
Figure 1.9 – MI16 main terminal block

The RMM2

The RMM2 (Mk2) radio module machine (see Figure 1.10) is primarily an antenna designed to receive radio transmission signals from the RMP2/RMP2-S. Two RMM2 units are supplied as part of your system.

Each RMM2 is supplied with 10 metres (32.8 feet) of coaxial cable to allow connection of the units to the MI16. Where required, a 10 metre (32.8 foot) extension cable (part no. A-2056-0322) may be ordered.

The base [1] of the RMM2 incorporates five permanent magnets [2], and three M4 threaded fixing holes [3]. This allows you to choose the best fixing method for your specific application.



1. Base
2. Permanent magnet (5 off)
3. M4 fixing hole (3 off)

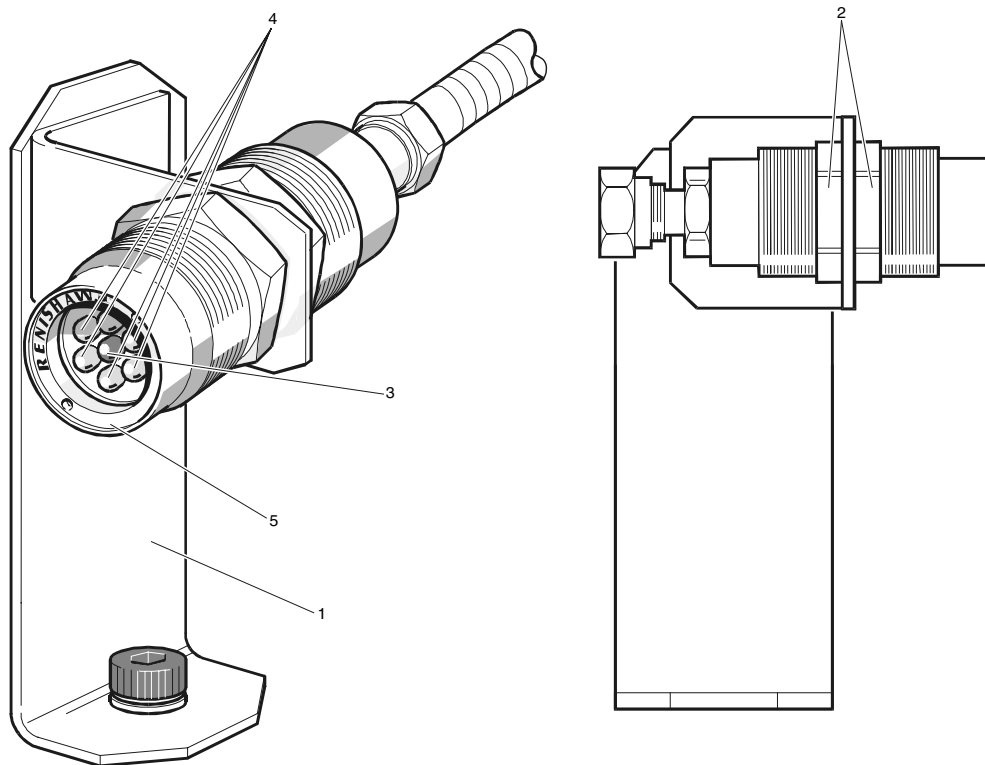
Figure 1.10 – The RMM2

The OM16

The OM16 optical module (see Figure 1.11) is an optional, optical transmission module which provides the additional facility of M-code activation and de-activation of the RMP2/RMP2-S. It is designed to be mounted on the machine tool via the mounting bracket [1] supplied, or alternatively it can be mounted directly to the machine guarding using the two M32x1.5 locknuts [2] provided.

The OM16 incorporates:

- An LED [3], visible through the window [5], which illuminates orange when a signal is sent.
- Three transmitting diodes [4], visible through the window [5], which transmit start signals to the RMP2/RMP2-S.



1. Mounting bracket
2. M32x1.5 locknut (2 off)
3. LED
4. Transmitting diode (3 off)
5. Window

Figure 1.11 – The OM16

The shank adaptor

The shank adaptor (see Figures 1.12 and 1.13) is designed to provide a method for mounting the RMP2/RMP2-S on the shank.

Two types of shank adaptor are available for mounting the RMP2 on a shank. These are:

- Shank adaptor (part no. A-2056-0979) – which is suitable for mounting shanks incorporating two M8 grub screws that can be tightened against the spherical seat of the shank adaptor to retain the shank in position (see Figure 1.12).
- Shank adaptor (part no. M-2056-0293) – which can be used for mounting shanks incorporating two M4 threaded mounting holes within their front mounting face and which can be screwed directly to the shank adaptor (see Figure 1.13).

The RMP2-S can only be mounted on a shank using shank adaptor (part no. M-2056-0293).

For further information on shank/shank adaptor compatibility, refer to Renishaw's "**Taper shanks for machine tool probe data sheet – Part No. H-2000-2011**". Where necessary, this document may be obtained from your supplier or nearest Renishaw Group company; refer to the last page of this publication for a list of the countries where Renishaw companies are located.

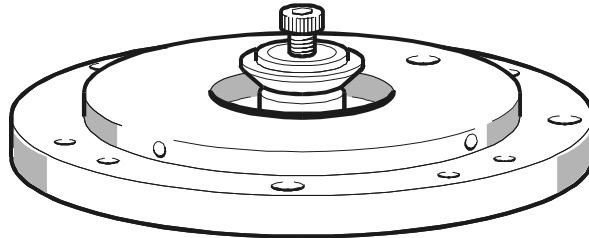


Figure 1.12 – Shank adaptor (part no. A-2056-0979)

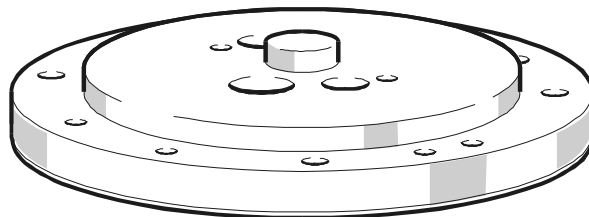


Figure 1.13 – Shank adaptor (part no. M-2056-0293)

The shank

Renishaw supplies a variety of shanks conforming to DIN 2080, DIN 69871, ANSI B5.50-1985 CAT and BT-1982. For further information on the range and size of the shanks available, please refer to Renishaw's "**Taper shanks for machine tool probe data sheet - Part No. H-2000-2011**". Where necessary, this document may be obtained from your supplier or nearest Renishaw Group company; refer to the last page of this publication for a list of the countries where Renishaw companies are located.

The shank supplied with your MP16 probe system will have been determined at the time of order.

The PSU3

Note...

Further information on the PSU3 can be obtained from reading the “PSU3 power supply unit installation and user's guide – Part No. H-2000-5057”.

The PSU3 supplies power to the probe system and comprises the following primary components (see Figure 1.14):

- Box and cover [1].
- A 'POWER' LED [2] which illuminates when the power supply is on.
- Main's plug and socket [3].
- ON/OFF switch [4].
- Output terminal block [5].

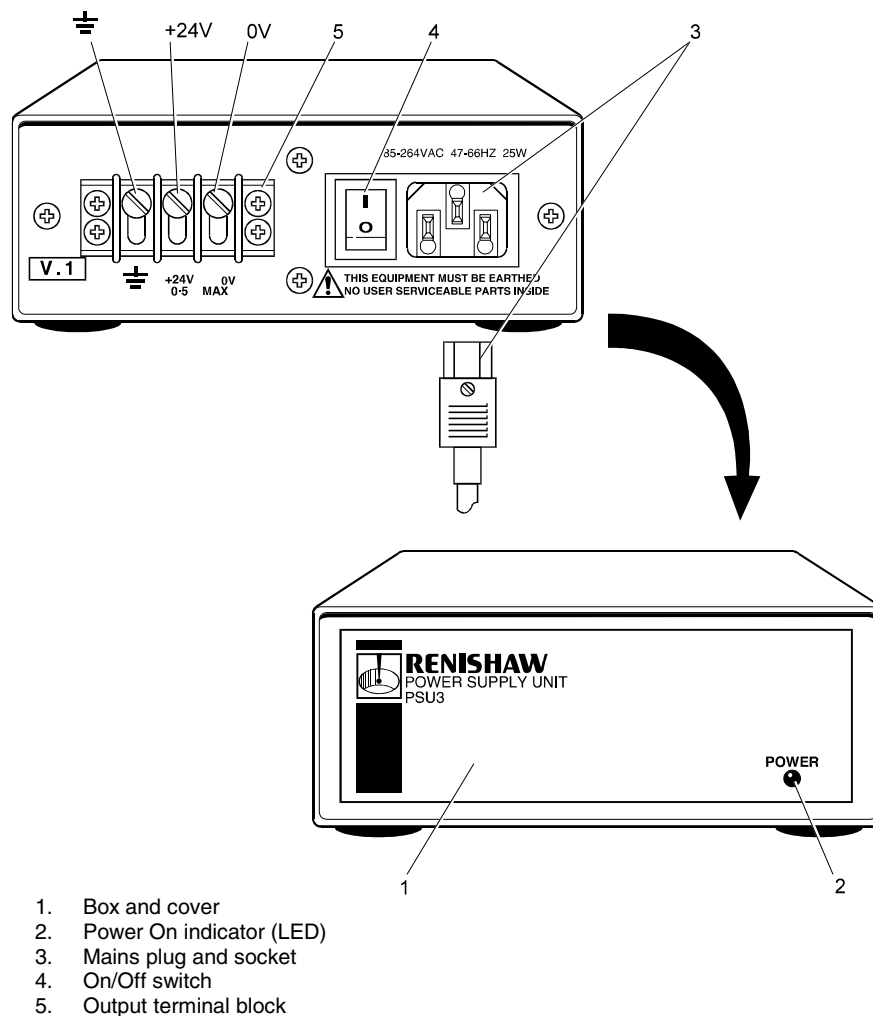


Figure 1.14 – The PSU3

Technical data

MP3 touch-trigger probe – technical specification

Probe dimensions

Note...

The dimensions of the MP3 probe, when mounted on the RMP2/RMP2S, are shown with and without shank adaptor (M-2056-0293) fitted. The overall length of the assembly, when shank adaptor (A-2056-0979) is fitted, will be reduced by 2 mm.

The dimensions of the probe, when mounted on the RMP2/RMP2S, are as shown in Figure 1.15:

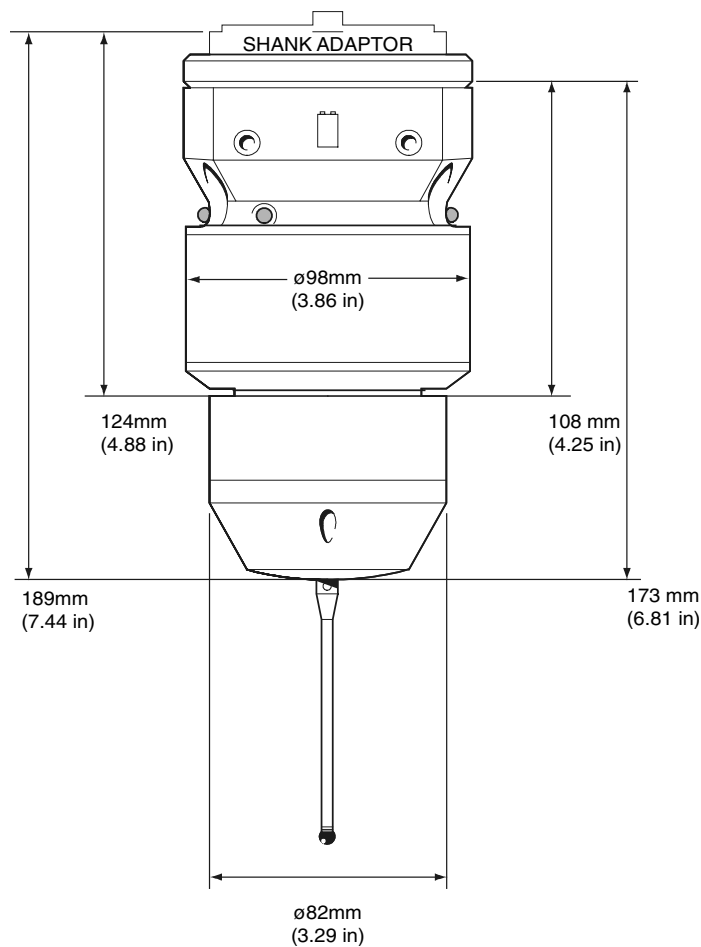


Figure 1.15 – Dimensions of the MP3 touch-trigger probe when mounted on RMP2/RMP2-S

Probe specification

Primary application:	Machining centre inspection probe
Sense directions:	5-way
Trigger force (50 mm stylus):	X Y 75 g – 150 g (2.64 oz – 5.29 oz) Z 548 g (19.32 oz)
Overtravel force (50 mm stylus):	X Y 75 g (2.64 oz): low force direction X Y 150 g (5.29 oz): high force direction Z 548 g (19.32 oz)
Overtravel (50 mm stylus): (100 mm stylus):	X Y 36 mm (1.4 in) Z 17 mm (0.67 in.) X Y 60 mm (2.6 in) Z 17 mm (0.67 in.)
Repeatability:	Maximum 2σ value of 1.0 μm (40 μin) is achievable at the stylus tip, using a 50 mm (1.97 in) long stylus, at a test velocity of 480 mm/min (1.57 ft/min).
Maximum recommended stylus length:	200 mm (7.87 in.)
Recommended trigger speed:	3 metres/min (10 ft/min.)

RMP2/RMP2-S – technical specification

RMP2/RMP2-S mass: The mass of the RMP2/RMP2-S, including the MP3 probe, shank adaptor and 100 mm stylus, is 2.1 kg (4.6 lb.) (*weight does not include taper shank*)

System delays: A delay of 12 ms ± 10 µs occurs following contact of the stylus ball with the workpiece and the ‘trigger’ being reported to the machine CNC controller

Battery specifications:

Number of batteries

UK/Continental Europe: 2x Duracell MN1604 6LR61 9 V
 Japan and USA: 6x Duracell MN1500 LR6 1.5 V

Battery capacity *: 550 mAh

Battery reserve life *: The RMP2/RMP2-S will typically continue to operate for 6 hours continuously (5 days at 5%usage – 72 min/day) after the MI16 ‘PROBE LOW BATTERY’ LED illuminates.

Battery life expectancy					
Standby life		5% usage 72 min./day		Continuous life	
Minimum	Typical	Optical switch on-off	Optical on timer Off	Optical switch on-off	Optical on timer off
1 year		50 days	50 days	60 hours	60 hours

* Typically, for an RMP2 fitted with six Duracell MN1500 LR6 1.5 V batteries, battery capacity is increased from 550 mAh to 2250 mAh, 5% usage (72 min./day) is increased from 50 days to 110 days, continuous life is increased from 60 hrs to 135 hrs and standby life is increased from 1 year to 2 years.

Transmission distance:

Europe and United Kingdom: 15 metres (49.2 ft)
 USA: 3 metres (9.8 ft)
 Japan: 8 metres (29.5 ft)

Sealing: IEC 529 (DIN 40050, BS 5490) IP68

Transmission frequencies – Europe

The radio transmission system applicable to European versions of the RMP/RMP2-S operates on frequencies of between 433.075 MHz and 434.775 MHz. It is designed to provide a total of 69 user-selectable channels, each channel having a spacing of 25 kHz as specified below:

Channel No	Frequency / MHz	Channel No	Frequency / MHz
1	433.075	36	433.950
2	433.100	37	433.975
3	433.125	38	434.000
4	433.150	39	434.025
5	433.175	40	434.050
6	433.200	41	434.075
7	433.225	42	434.100
8	433.250	43	434.125
9	433.275	44	434.150
10	433.300	45	434.175
11	433.325	46	434.200
12	433.350	47	434.225
13	433.375	48	434.250
14	433.400	49	434.275
15	433.425	50	434.300
16	433.450	51	434.325
17	433.475	52	434.350
18	433.500	53	434.375
19	433.525	54	434.400
20	433.550	55	434.425
21	433.575	56	434.450
22	433.600	57	434.475
23	433.625	58	434.500
24	433.650	59	434.525
25	433.675	60	434.550
26	433.700	61	434.575
27	433.725	62	434.600
28	433.750	63	434.625
29	433.775	64	434.650
30	433.800	65	434.675
31	433.825	66	434.700
32	433.850	67	434.725
33	433.875	68	434.750
34	433.900	69	434.775
35	433.925		

Continued on Page 1-28

Transmission frequencies – USA and Japan

Note...

In compliance with the governing regulations of both countries, the USA and Japanese versions of the RMP2/RMP2-S operate on much lower transmission power than either the European or UK versions. As a result, the transmission ranges of these products are limited to 3 metres (9.8 feet) and 8 metres (29.5 feet) respectively.

The radio transmission system applicable to both USA and Japanese versions of the RMP/RMP2-S operates on frequencies of between 224.5 MHz and 225.475 MHz. It is designed to provide a total of 40 user-selectable channels, each channel having a spacing of 25 kHz as specified below:

Channel No	Frequency / MHz	Channel No	Frequency / MHz
1	224.500	21	225.000
2	224.525	22	225.025
3	224.550	23	225.050
4	224.575	24	225.075
5	224.600	25	225.100
6	224.625	26	225.125
7	224.650	27	225.150
8	224.675	28	225.175
9	224.700	29	225.200
10	224.725	30	225.225
11	224.750	31	225.250
12	224.775	32	225.275
13	224.800	33	225.300
14	224.825	34	225.325
15	224.850	35	225.350
16	224.875	36	225.375
17	224.900	37	225.400
18	224.925	38	225.425
19	224.950	39	225.450
20	224.975	40	225.475

Transmission frequencies – United Kingdom

The radio transmission system applicable to United Kingdom versions of the RMP/RMP2-S operates on frequencies of between 433.075 MHz and 434.775 MHz. For further information, please refer to 'Transmission frequencies - Europe'.

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CHAPTER 2

System installation

This chapter provides you with detailed, step-by-step instructions on how to install the Renishaw MP16 touch-trigger probe system to your machine tool.

Contained in this chapter

- | | |
|---|--|
| <ul style="list-style-type: none"> ■ Mounting the RMP2 on a shank..... 2-3 ■ Mounting the RMP2-S on a shank 2-12 ■ Programming the transmission channel and activation method of the RMP2/RMP2-S 2-20 ■ Positioning the RMM2..... 2-31 ■ Mounting the RMM2 on the machine tool..... 2-35 ■ Mounting the MI16 on the machine tool 2-38 ■ Connecting the RMM2 on the MI16..... 2-42 ■ Mounting the optional OM16 on the machine tool 2-46 ■ Connecting the OM16 to the MI16 2-54 | <ul style="list-style-type: none"> ■ Connecting the MI16 to the machine tool's CNC controller and 24V power supply2-56 ■ Mounting the optional PSU3 on the machine tool.....2-63 ■ Connecting the optional PSU3 on the mains power supply2-64 ■ Mounting the RMP2/RMP2-S on the machine tool.....2-65 ■ System verification2-68 ■ Verifying the correct activation and de-activation of the probe2-68 ■ Verifying the correct transmission of the probe signals2-70 ■ Verifying the system diagnostics2-72 |
|---|--|

Installing the MP16 touch-trigger probe system on your machine tool

WARNING

INSTALLATION OF THE MP16 TOUCH-TRIGGER PROBE SYSTEM MUST ONLY BE UNDERTAKEN BY FULLY QUALIFIED PERSONNEL WHO ARE FULLY CONVERSANT WITH ALL SAFETY PROCEDURES AND LEGISLATION IN FORCE IN THE COUNTRY OF USE.

CAUTIONS

IT IS IMPORTANT, PRIOR TO INSTALLING THE MP16 TOUCH-TRIGGER PROBE SYSTEM ON A MACHINE TOOL, TO ENSURE THAT THE ENVIRONMENT IS FREE OF INTERFERENCE ON THE RADIO FREQUENCY AT WHICH YOU WISH TO TRANSMIT SIGNALS. DEVICES WHICH COULD INTERFERE WITH SIGNAL TRANSMISSION INCLUDE, BUT ARE NOT LIMITED TO, ARC WELDERS, RADIO PAGERS, REMOTE CONTROL ALARM KEYS AND MOBILE TELEPHONES.

TO AVOID CROSS INTERFERENCE, A MINIMUM DISTANCE OF 100 METRES (328 FEET) MUST BE ALLOWED BETWEEN EACH TOUCH-TRIGGER PROBE SYSTEM IF OPERATING ON THE SAME RADIO FREQUENCY AND CHANNEL.

THE MP16 TOUCH-TRIGGER PROBE SYSTEM IS DESIGNED TO OPERATE IN AMBIENT TEMPERATURES OF BETWEEN 0 °C AND 60 °C (32 °F TO 104 °F). OPERATION OF THE MP16 TOUCH-TRIGGER PROBE SYSTEM OUTSIDE THIS TEMPERATURE RANGE WILL RESULT IN A REDUCTION IN THE SYSTEM'S TRANSMISSION RANGE.

Notes..

Before installing the MP16 touch-trigger probe system on your machine tool, ensure that you have access to all literature supplied by the machine tool manufacturer. Ensure that you read, and fully understand, all instructions and safety information contained within this literature before attempting the following installation procedures.

The following information relates to MK2 radio module probes fitted with two 9 V batteries. In instances where your RMP2 is fitted with six 1.5 V batteries, please refer to Addendum A of this publication.

Mounting the RMP2 on a shank

Notes...

Two types of shank adaptor are available for mounting the RMP2 on a shank. These are:

- Shank adaptor (part no. A-2056-0979) – used for mounting shanks incorporating two M8 grubscrews which are tightened against the conical seat of the shank adaptor to retain the shank in position.
- Shank adaptor (part no. M-2056-0293) – used for mounting shanks incorporating two M4 threaded mounting holes within their front mounting face.

For further information on shank/shank adaptor compatibility, refer to Renishaw's "Taper shanks for machine tool probe data sheet – Part No. H-2000-2011". Where necessary, this document may be obtained from your supplier or nearest Renishaw Group company; refer to the last page of this publication for a list of the countries where Renishaw companies are located.

Continued on Page 2-4

Mounting shank adaptor (part no. A-2056-0979) on the RMP2

CAUTION

THE PROBE MOUNTING KIT SUPPLIED WITH THE MP16 TOUCH-TRIGGER PROBE SYSTEM INCLUDES ANTI-VIBRATION WASHERS WHICH MUST BE FITTED TO THE SOCKET HEAD CAPSCREWS USED TO SECURE THE SHANK ADAPTOR TO THE RMP2. FAILURE TO FIT THESE WASHERS COULD RESULT IN LOOSENING OF THE SOCKET HEAD CAPSCREWS DURING PROBE OPERATION.

Note...

Shank adaptor (Part No. A-2056-0979) is mounted on the RMP2 using one of following two methods:

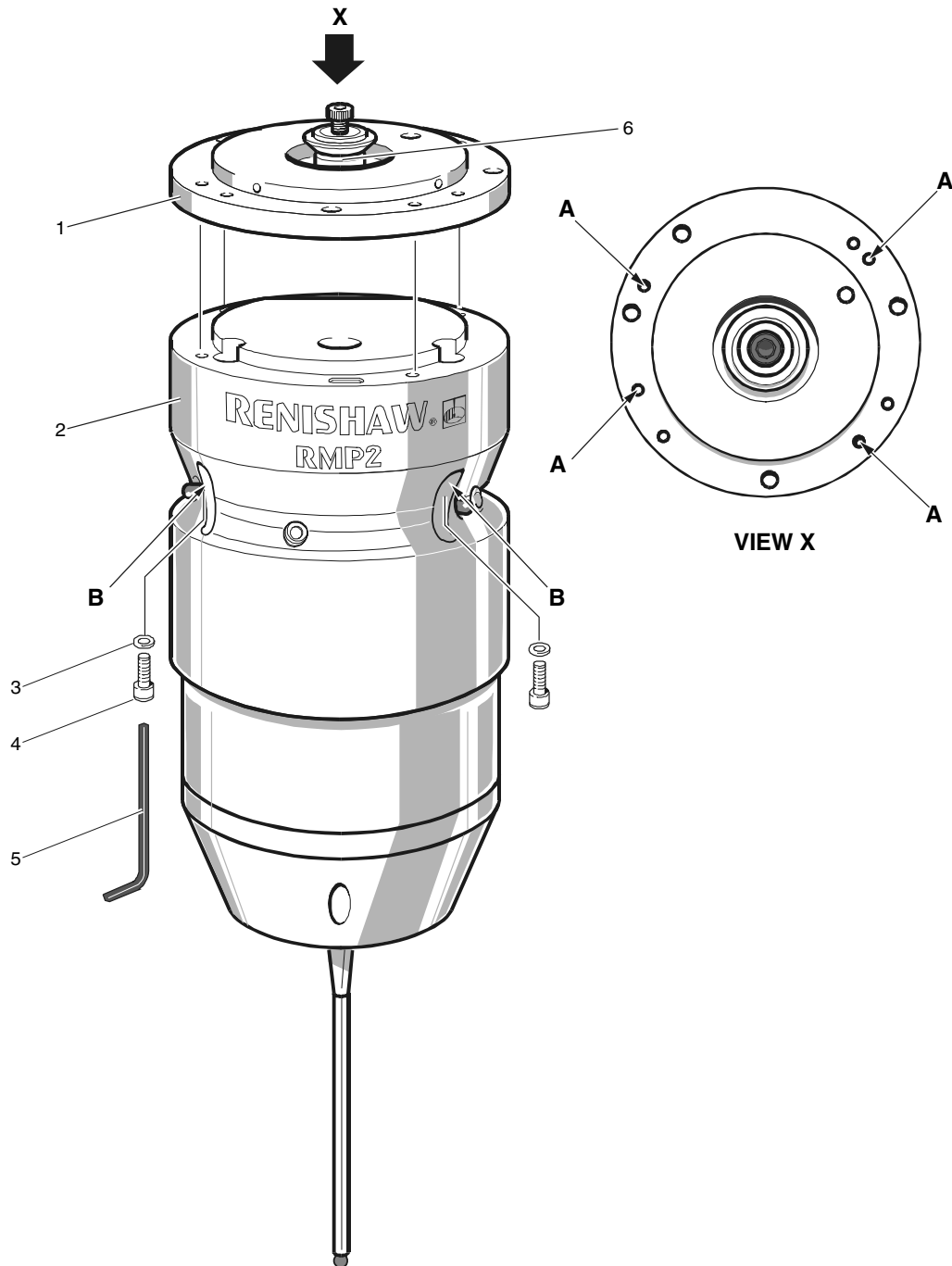
- Using four M4x25 mm socket head capscrews, located through accommodation bores within the RMP2, and secured in M4 tapped holes within the shank adaptor.
- Using four M5x20 mm socket head capscrews, located through accommodation bores within the shank adaptor, and secured in M5 tapped holes within the RMP2.

Mounting shank adaptor (part no. A-2056-0979) on the RMP2 using four M4x25 mm socket head capscrews

To mount shank adaptor (part no. A-2056-0979) on the RMP2 using four M4x25 mm socket head capscrews, carry out the following (see Figure 2.1):

1. Referring to Figure 2.1, align the four M4 tapped holes (**A**) of the shank adaptor [1] with the four accommodation bores (**B**) of the RMP2 [2].
2. Fit one M4 anti-vibration washer [3] to each of the four M4x25 mm socket head capscrews [4].
3. Insert the four M4x25 mm socket head capscrews [4] through accommodation bores (**B**) of the RMP2 [2] to engage the tapped holes (**A**) of the shank adaptor [1]. Using the 3 mm AF allen key [5] supplied, systematically tighten the four socket head capscrews to achieve a final torque of 3 Nm (2.2 lbf.ft.).

Continued on Page 2-6



1. Shank adaptor (part no. A-2056-0979)
2. RMP2
3. Anti-vibration washer (4 off)
4. M4x25 mm socket head capscrew (4 off)
5. 3 mm AF allen key
6. Conical seat

Figure 2.1 – Mounting the shank adaptor (A-2056-0979) on the RMP2 using four M4 socket head capscrews

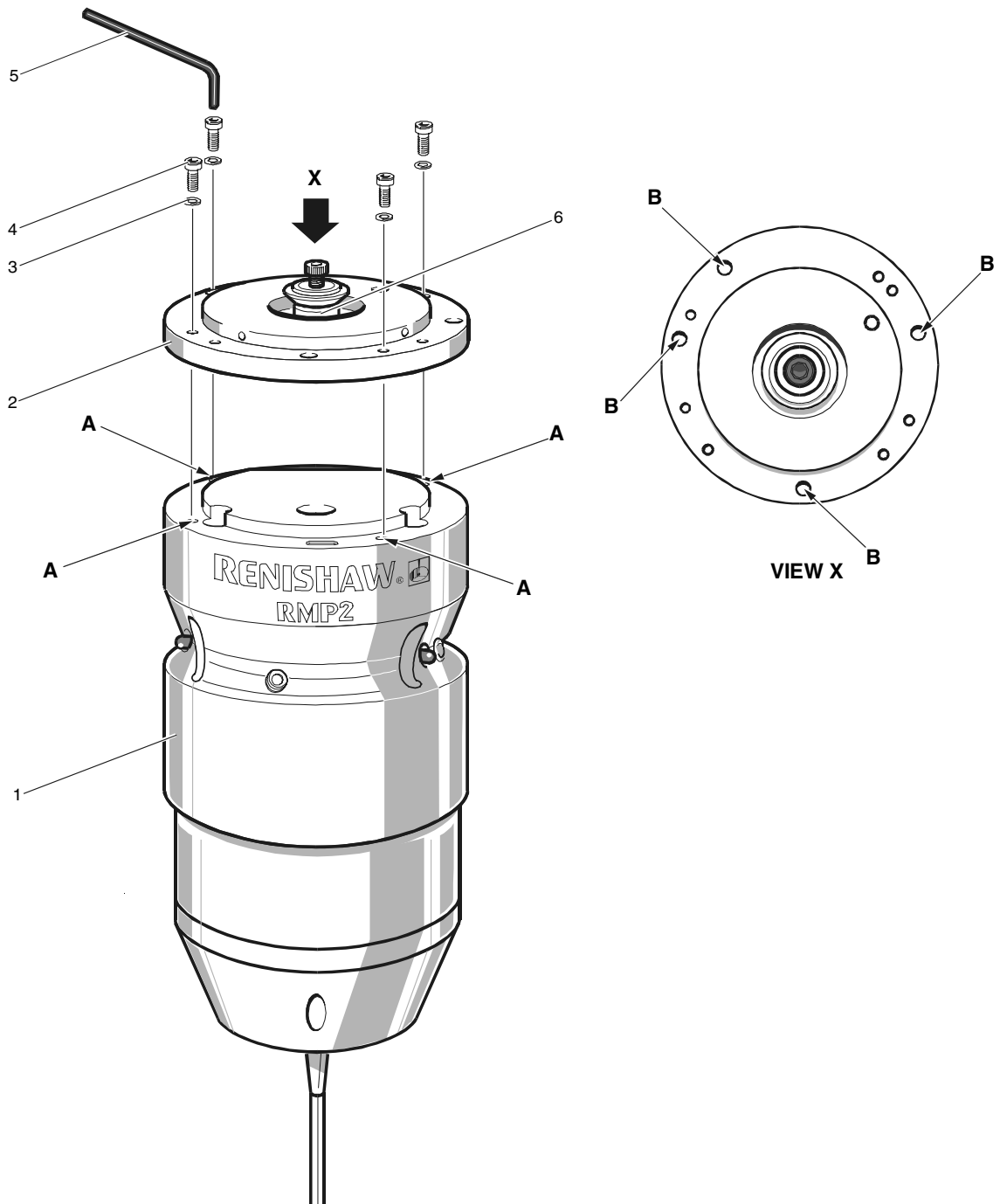
Mounting shank adaptor (part no. A-2056-0979) on the RMP2 using four M5x20 mm socket head capscrews

To mount the shank adaptor (Part No. A-2056-0979) on the RMP2 using four M5x20 mm socket head capscrews, carry out the following (see Figure 2.2):

1. Referring to Figure 2.2, align the four M5 tapped holes (**A**) of the RMP2 [1] with the four accommodation bores (**B**) of the shank adaptor [2].
2. Fit one M5 anti-vibration washer [3] to each of the four M5x20 mm socket head capscrews [4].
3. Insert the four M5x20 mm socket head capscrews [4] through accommodation bores (**B**) of the shank adaptor [2] to engage the tapped holes (**A**) of the RMP2 [1]. Using the 4 mm AF allen key [5] supplied, systematically tighten the four socket head capscrews to achieve a final torque of 5.1 Nm (3.76 lbf.ft).

Mounting shank adaptor (part no. A-2056-0979) to the shank

1. Locate the conical seat [item 6, Figure 2.2] of the shank adaptor [1] within the bore of the shank. Push the shank adaptor and shank together such that their mounting faces abut.
2. Holding the shank adaptor [1] and shank in position, tighten the two M8 grubscrews (located within the shank) sufficiently to retain the conical seat [1] within the bore of the shank. Ensure that the shank adaptor/RMP2 [2] can still be rotated relative to the shank.
3. Insert the shank and attached RMP2 [2] within the machine tool spindle and rotate the RMP2 such that the probe status LED is visible to the Operator.
4. Using the 4 mm AF allen key supplied, tighten the two M8 grubscrews to 8.3 Nm (5.9 lbf.ft).
5. Remove shank and attached RMP2 [2] from the machine tool spindle.



1. RMP2
2. Shank adaptor (part no. A-2056-0979)
3. Anti-vibration washer (4 off)
4. M5 x 20 mm socket head capscrew (4 off)
5. 4 mm AF allen key
6. Conical seat

Figure 2.2 – Mounting the shank adaptor (A-2056-0979) on the RMP2 using four M5 socket head capscrews

Mounting shank adaptor (part no. M-2056-0293) on the RMP2

CAUTION

THE PROBE MOUNTING KIT SUPPLIED WITH THE MP16 TOUCH-TRIGGER PROBE SYSTEM INCLUDES ANTI-VIBRATION WASHERS WHICH MUST BE FITTED TO THE SOCKET HEAD CAPSCREWS USED TO SECURE THE SHANK ADAPTOR TO THE RMP2. FAILURE TO FIT THESE WASHERS COULD RESULT IN LOOSENING OF THE SOCKET HEAD CAPSCREWS DURING PROBE OPERATION.

Note...

Shank adaptor (part no. M-2056-0293) is mounted on the RMP2 using one of the following two methods:

- Using four M4 x 25 mm socket head capscrews, located through accommodation bores within the RMP2, and secured in M4 tapped holes within the shank adaptor.
- Using four M5 x 20 mm socket head capscrews, located through accommodation bores within the shank adaptor, and secured in M5 tapped holes within the RMP2.

Mounting shank adaptor (part no. M-2056-0293) to the RMP2 using four M4 x 25 mm socket head capscrews

To mount the shank adaptor (part no. M-2056-0293) on the RMP2 using four M4 x 25 mm socket head capscrews, carry out the following (see Figure 2.3):

1. Referring to Figure 2.3, align the two M4 tapped holes (**A**) within the mounting face of the shank [1] with the two accommodation bores (**B**) within the flange of the shank adaptor [2].
2. Fit one M4 anti-vibration washer [3] to each of the two M4x16 mm socket head capscrews [4].
3. Insert the two M4x16 mm socket head capscrews [4] through accommodation bores (**B**) of shank adaptor [2] to engage the tapped holes (**A**) of the shank [1]. Using the 3 mm AF allen key [5] supplied, tighten the two socket head capscrews to achieve a final torque of 3 Nm (2.2 lbf.ft).
4. Using the 2 mm AF allen key [9] supplied, tighten the four M4x12 mm grubscrews [6] located within the flange of the shank [1] to 2 Nm (1.7 lbf.ft).

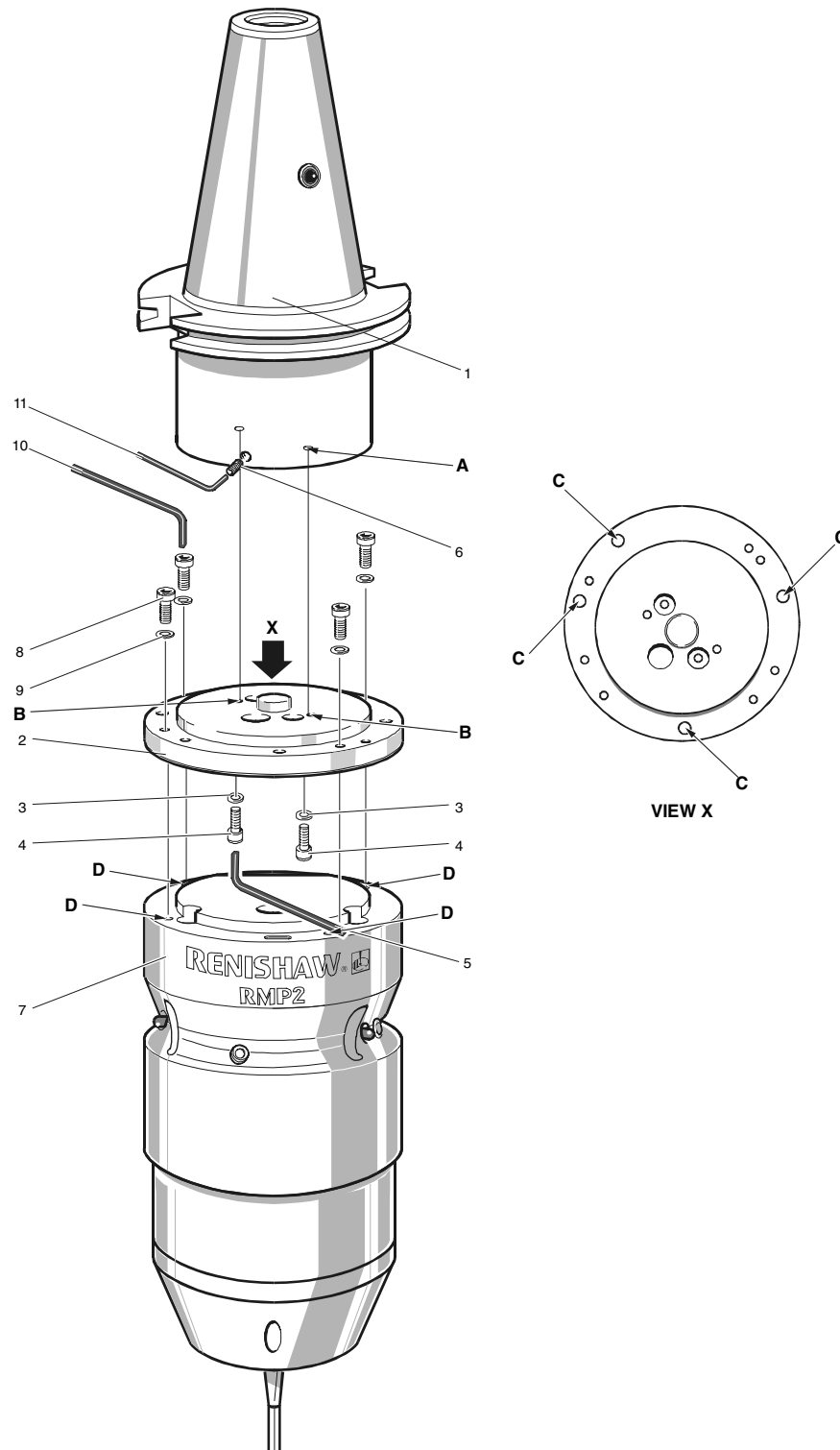
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5. Referring to Figure 2.3, align the four M4 threaded bores (**C**) of the shank adaptor [2] with the four accommodation bores (**D**) of the RMP2 [7].
6. Fit one M4 anti-vibration washer [3] on each of the four M4x25 mm socket head capscrews [8].
7. Insert the four M4x25 mm socket head capscrews [8] through accommodation bores (**D**) of the RMP2 [7] to engage the threaded bores (**C**) of the shank adaptor [2]. Using the 3 mm AF allen key [5] supplied, systematically tighten the four socket head capscrews to achieve a final torque of 3 Nm (2.2 lbf.ft).

Mounting shank adaptor (part no. M-2056-0293) on the RMP2 using four M5x20 mm socket head capscrews

To mount the shank adaptor (part no. M-2056-0293) on the RMP2, using four M5x25 mm socket head capscrews, carry out the following (see Figure 2.4):

1. Referring to Figure 2.4, align the two M4 tapped holes (**A**) within the mounting face of the shank [1] with the two accommodation bores (**B**) within the flange of the shank adaptor [2].
2. Fit one M4 anti-vibration washer [3] on each of the two M4x16 mm socket head capscrews [4].
3. Insert the two M4x16 mm socket head capscrews [4] through accommodation bores (**B**) of shank adaptor [2] to engage the tapped holes (**A**) of the shank [1]. Using the 3 mm AF allen key [5] supplied, tighten the two socket head capscrews to achieve a final torque of 3 Nm (2.2 lbf.ft).
4. Using the 2 mm AF allen key [11], tighten the four M4x12 mm grubscrews [6] located within the flange of the shank [1] to 2 Nm (1.7 lbf.ft)
5. Referring to Figure 2.4, align the four accommodation bores (**C**) of the shank adaptor [2] with the four M5 threaded bores (**D**) of the RMP2 [7].
6. Fit one M5 anti-vibration washer [9] to each of the four M5x20 mm socket head capcrews [8].
7. Insert the four M5x20 mm socket head capscrews [8] through accommodation bores (**C**) of the shank adaptor [2] to engage the M5 tapped holes (**D**) of the RMP2 [7]. Using the 4 mm AF allen key [10] supplied, systematically tighten the four socket head capscrews to achieve a final torque of 5.1 Nm (3.76 lbf.ft).



- | | |
|--|--|
| 1. Shank (typical) | 7. RMP2 |
| 2. Shank adaptor (part no. M-2056-0293) | 8. M5x20 mm socket head capscrew (4 off) |
| 3. M4 anti-vibration washer (2 off) | 9. M5 anti-vibration washer (4 off) |
| 4. M4x16 mm socket head capscrew (2 off) | 10. 4 mm AF allen key |
| 5. 3 mm AF allen key | 11. 2 mm AF allen key |
| 6. M4x12 mm grubscrew (4 off) | |

Figure 2.4 – Mounting the shank adaptor (M-2056-0293) on the RMP2 using four M5 socket head capscrews

Mounting the RMP2-S on a shank

Mounting the shank adaptor (part no. M-2056-0293) on a shank incorporating a shank switch

Notes...

The following procedure need only be performed in instances where the RMP2-S and the shank have been ordered separately.

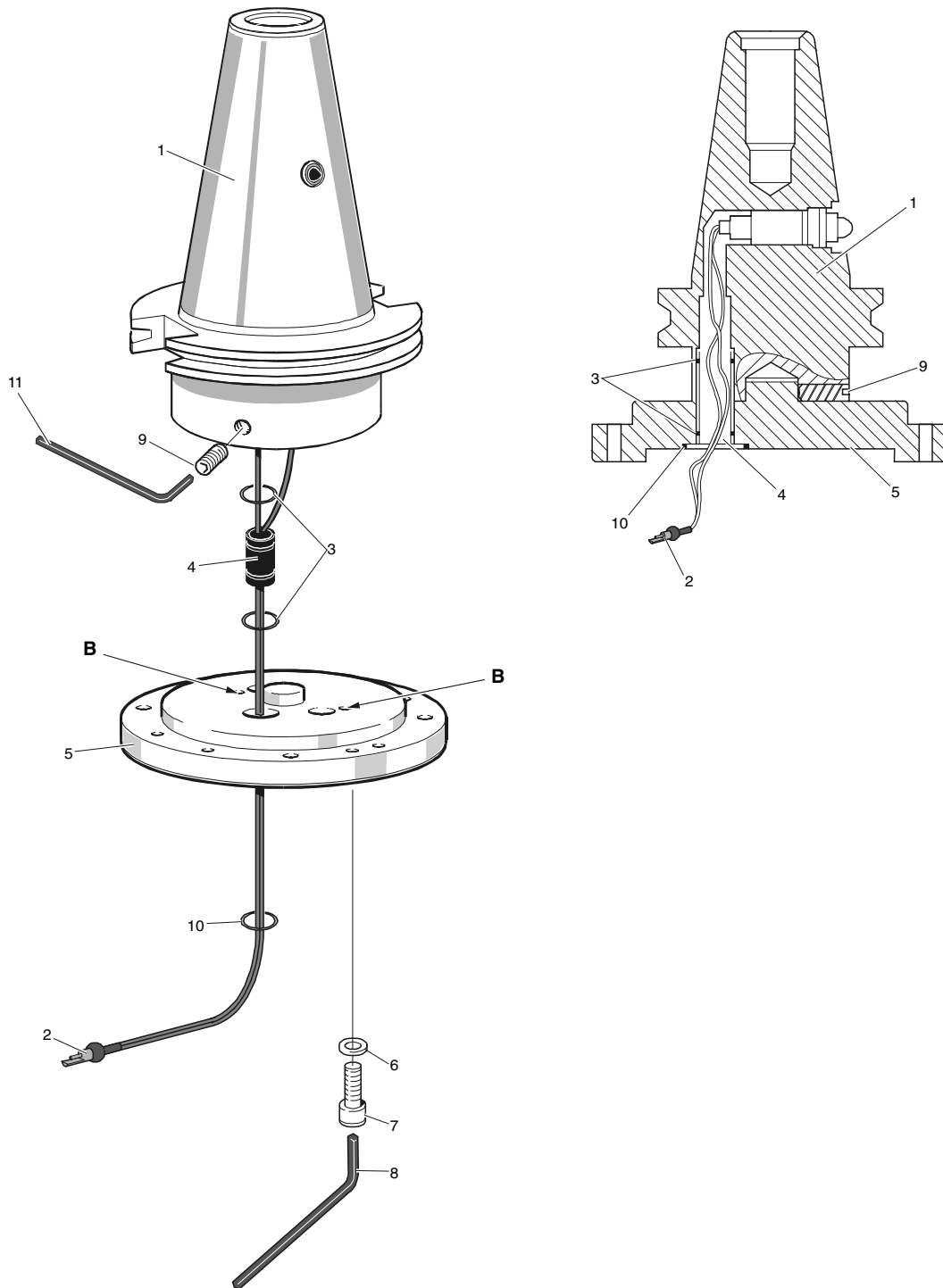
Do not attempt this procedure without first confirming that the following parts are available. Where required, these may be ordered through your supplier or nearest Renishaw company (refer to the last page of this publication for a list of countries where Renishaw companies are located):

- Connector (part no. P-CN23-0504)
- Bobbin (part no. M-2056-0323)
- 'O' ring (part no. P-RS01-0018) (2 off)
- 'O' ring (part no. P-RS02-0022)
- Shank adaptor (part no. M-2056-0293)
- M4x16 mm socket head capscrew (part no. PSCO1-0416) (2 off)
- M4 anti-vibration washer (part no. P-WA07-0040) (2 off)
- 4.8 mm dia x 12 mm long heat shrink sleeving
- 2.4 mm dia x 40 mm long heat shrink sleeving

To mount the RMP2-S on a shank, carry out the following procedure (see Figure 2.5):

1. Cut two 40 mm lengths of 2.4 mm diameter heat shrink sleeving (supplied). Gently slide one length of sleeving over the each of the two wires emerging from the shank [1]. Continue to slide each length of sleeving down each wire until it abuts the bottom face of the shank recess.
2. Carefully solder connector [2] (part no. P-CN23-0504) to the two wires emerging from the shank [1]. Clean each joint and allow to fully cool.
3. Inspect each soldered joint in turn for soundness and, if satisfactory, carefully position heat shrink sleeving over the joint.
4. Ensuring that both the shank wires and the solder joints are well protected, shrink each length of sleeving into position using a suitable heat gun.

Continued on Page 2-14



- | | |
|-------------------------------------|--|
| 1. Shank (typical) | 7. M4x16 mm socket head capscrew (2 off) |
| 2. Connector (P-CN23-0504) | 8. 3 mm AF allen key |
| 3. 'O' ring (P-RS01-0018) (2 off) | 9. M4x12 mm grub screw (4 off) |
| 4. Bobbin | 10. 'O' ring (P-RS05-0022) |
| 5. Shank adaptor (M-2056-0293) | 11. 2 mm AF allen key |
| 6. M4 anti-vibration washer (2 off) | |

Figure 2.5 – Mounting shank adaptor M-2056-0293 on a shank incorporating a shank switch

5. Assemble the two 'O' rings [3] (part no. P-RS01-0018) on the bobbin [4]. Lightly smear the two 'O' rings with mineral oil.
6. Carefully pass connector [2], and attached shank wires, through the internal bore of the bobbin [4].
7. Align the bobbin [4] with the location bore within the base of the shank [1] and gently press the bobbin down into position.
8. Position the bobbin location bore of the shank adaptor [5] over the top face of the bobbin [4]. Ensuring that the two M4 tapped holes (**A**) within the mounting face of the shank [1] align with the two accommodation bores (**B**) within the flange of the shank adaptor, carefully press the shank adaptor over the bobbin to abut the shank.
9. Fit one M4 anti-vibration washer [6] to each of the two M4x16 mm socket head capscrews [7].
10. Insert the two M4x16 mm socket head capscrews [7] through accommodation bores (**B**) of shank adaptor [5] to engage the tapped holes (**A**) of the shank [1]. Using the 3 mm AF allen key [8] supplied, tighten the two socket head capscrews to achieve a final torque of 3 Nm (2.2 lbf.ft).
11. Using the 2 mm AF allen key [11] supplied, tighten the four M4x12 mm grub screws [9] located within the flange of the shank [1] to 2 Nm (1.7 lbf.ft).
12. Fit 'O' ring [10] (part no. P-RS02-0022) within the 'O' ring location recess of the shank adaptor [5].

Mounting the shank adaptor and attached shank on the RMP2-S

CAUTION

THE PROBE MOUNTING KIT SUPPLIED WITH THE MP16 TOUCH-TRIGGER PROBE SYSTEM INCLUDES ANTI-VIBRATION WASHERS WHICH MUST BE FITTED TO THE SOCKET HEAD CAPSCREWS USED TO SECURE THE SHANK ADAPTOR TO THE RMP2-S. FAILURE TO FIT THESE WASHERS COULD RESULT IN LOOSENING OF THE SOCKET HEAD CAPSCREWS DURING PROBE OPERATION.

Note...

Shank adaptor (part no. M-2056-0293) is mounted on the RMP2-S using one of following two methods:

- Using four M4x25 mm socket head capscrews, located through accommodation bores within the RMP2-S, and secured in M4 tapped holes within the shank adaptor.
- Using four M5x20 mm socket head capscrews, located through accommodation bores within the shank adaptor, and secured in M5 tapped holes within the RMP2-S.

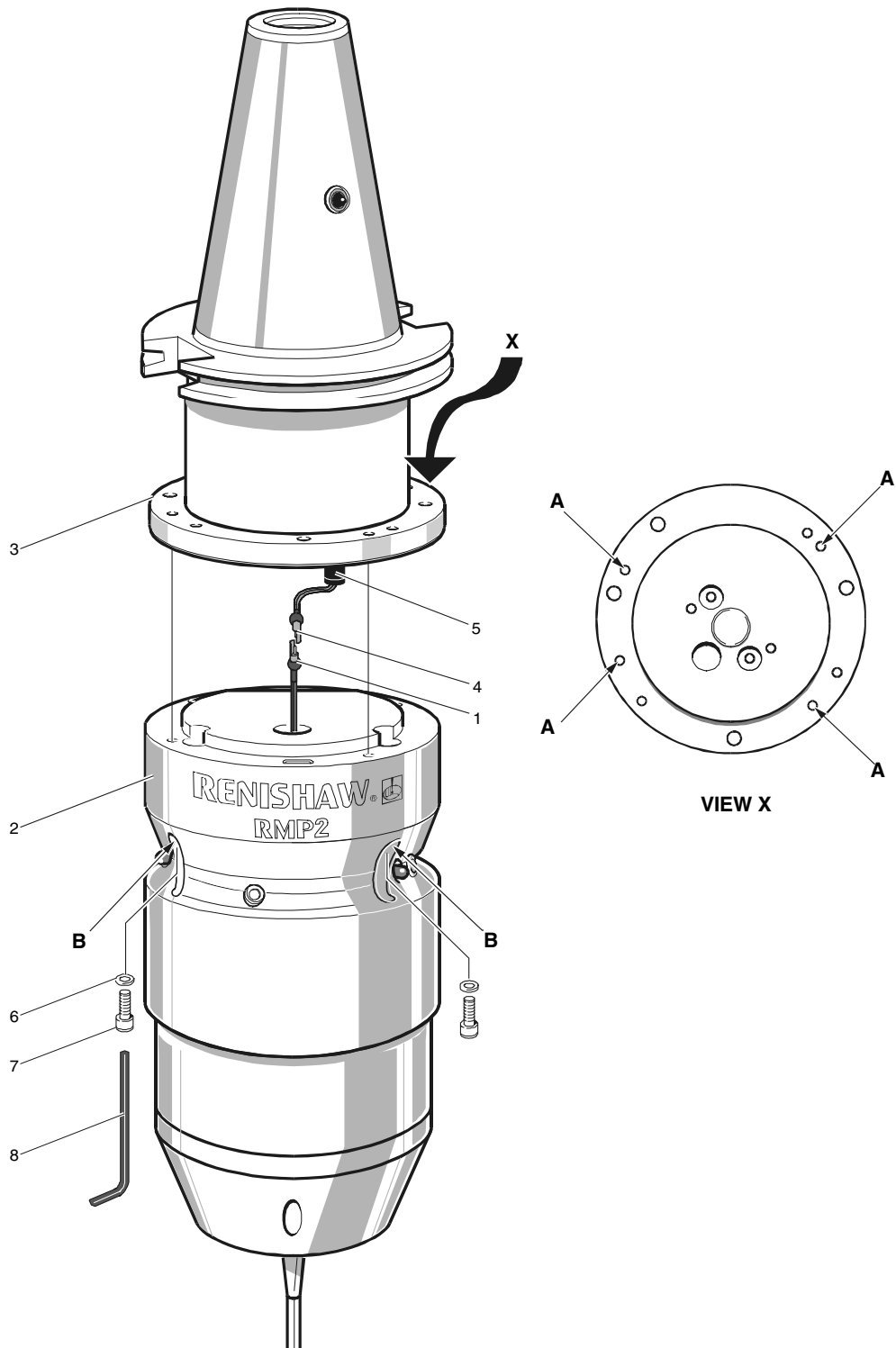
Mounting shank adaptor (part no. M-2056-0293) on the RMP2-S using four M4x25 mm socket head capscrews

To mount the shank adaptor (part no. M-2056-0293) on the RMP2-S using four M4x25 mm socket head capscrews, carry out the following (see Figure 2.6):

1. Cut a 12 mm length of 4.8 mm diameter heat shrink sleeving (supplied) and carefully slide over connector [1], and attached wires, of the RMP2-S [2].
2. Offer up the RMP2-S [2] to the shank adaptor [3], such that connector [1] can be connected to connector [4].
3. Fit connectors [1] and [4] together.
4. Position the 12 mm length of 4.8 mm diameter heat shrink sleeving over connectors [1] and [4] and, using a suitable heat gun, shrink the sleeving into position. Once secured and protected, push the joined connectors into the bobbin [5].

Continued on page 2-16

5. Referring to Figure 2.6, align the four M4 threaded bores (**A**) of the shank adaptor [3] with the four tapped holes (**B**) of the RMP2-S [2].
6. Fit one M4 anti-vibration washer [6] on each of the four M4x25 mm socket head capscrews [7].
7. Insert the four M4x25 mm socket head capscrews [7] through accommodation bores (**B**) of the RMP2-S [2] to engage the tapped holes (**A**) of the shank adaptor [3]. Using the 3 mm AF allen key [8] supplied, systematically tighten the four socket head capscrews to achieve a final torque of 3 Nm (2.2 lbf.ft).



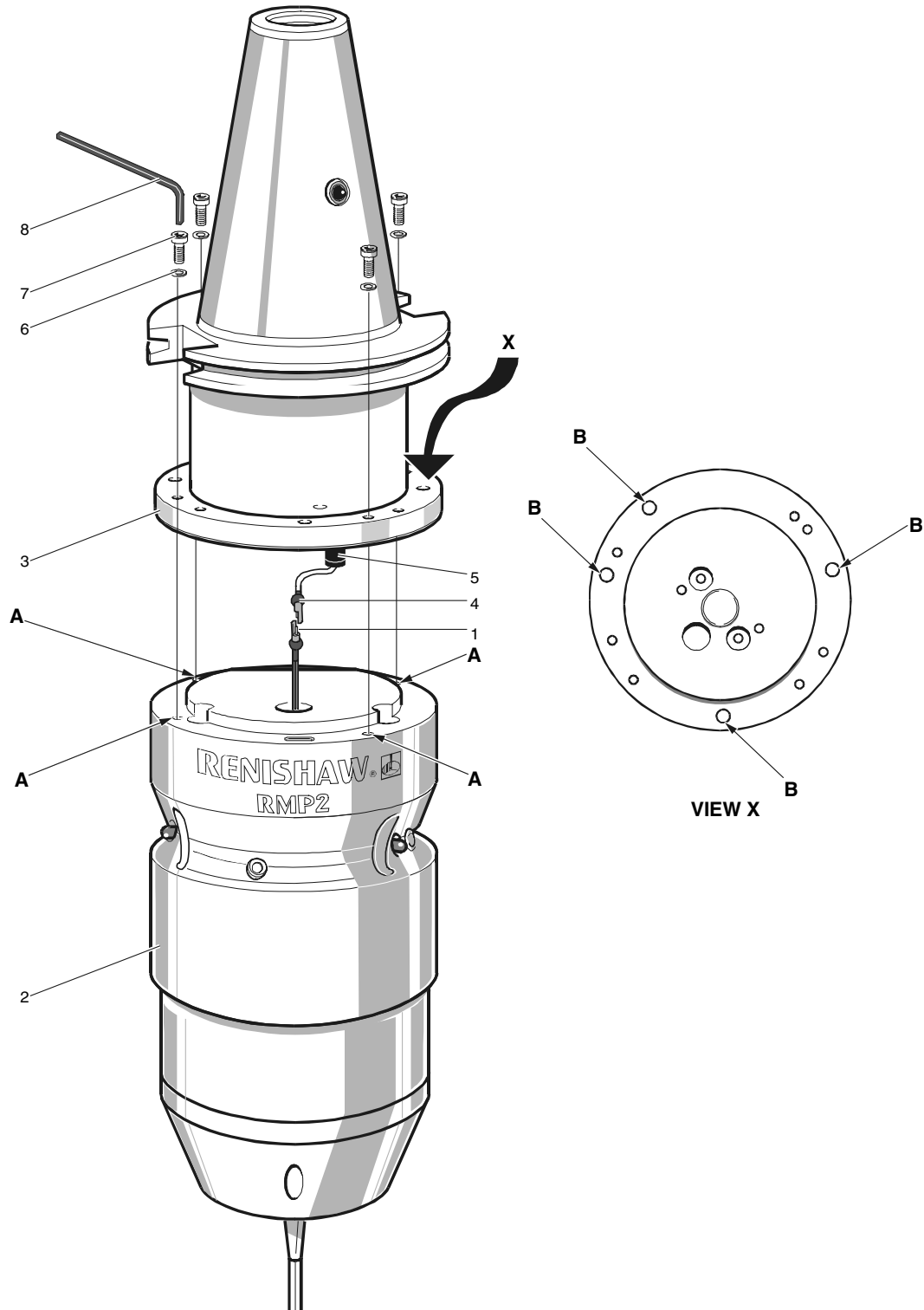
- | | |
|--------------------------------|--|
| 1. Connector (RMP2-S) | 5. Bobbin |
| 2. RMP2-S | 6. M4 anti-vibration washer (4 off) |
| 3. Shank adaptor (M-2056-0293) | 7. M4x25 mm socket head capscrew (4 off) |
| 4. Connector (shank) | 8. 3 mm AF allen key |

Figure 2.6 – Mounting the shank adaptor (M-2056-0293) on the RMP2-S using four M4 socket head capscrews

Mounting shank adaptor (part no. M-2056-0293) on the RMP2-S using four M5x20 mm socket head capscrews

To mount the shank adaptor (part no. M-2056-0293) on the RMP2-S using four M5x20 mm socket head capscrews, carry out the following (see Figure 2.7):

1. Cut a 12 mm length of 4.8 mm diameter heat shrink sleeving (supplied) and carefully slide over connector [1], and attached wires, of the RMP2-S [2].
2. Offer up the RMP2-S [2] to the shank adaptor [3], such that connector [1] can be connected to connector [4].
3. Fit connectors [1] and [4] together.
4. Position the 12 mm length of 4.8 mm diameter heat shrink sleeving over connectors [1] and [4] and, using a suitable heat gun, shrink the sleeving into position. Once secured and protected, push the joined connectors into the bobbin [5].
5. Referring to Figure 2.7, align the four accommodation bores (**A**) of the shank adaptor [3] with the four M5 tapped holes (**B**) of the RMP2-S [2].
6. Fit one M5 anti-vibration washer [6] to each of the four M5x20 mm socket head capscrews [7].
7. Insert the four M5x20 mm socket head capscrews [7] through accommodation bores (**A**) of the shank adaptor [3] to engage the M5 tapped holes (**B**) of the RMP2-S [2]. Using the 4 mm AF allen key [8] supplied, systematically tighten the four socket head capscrews to achieve a final torque of 5.1 Nm (3.76 lbf.ft).



- | | |
|--------------------------------|--|
| 1. Connector (RMP2-S) | 5. Bobbin |
| 2. RMP2-S | 6. M5 anti-vibration washer (4 off) |
| 3. Shank adaptor (M-2056-0293) | 7. M5x20 mm socket head capscrew (4 off) |
| 4. Connector (shank) | 8. 4 mm AF allen key |

Figure 2.7 – Mounting the shank adaptor (M-2056-0293) on the RMP2-S using four M5 socket head capscrews

Programming the transmission channel and activation method of the RMP2/RMP2-S

Notes...

To program the RMP2/RMP2-S, it is necessary to temporarily connect the MI16 to a 24 V ($\pm 10\%$) DC SELV power source that conforms to the essential requirements of BS EN 61010 or similar specification.

In instances where a 24 V power supply is not available, a Renishaw PSU3 (part no. A-2019-0018) may be obtained from your supplier or nearest Renishaw company (refer to the last page of this publication). For instructions on how to connect the PSU3 to the MI16, refer to “Connecting the MI16 to the PSU3” later in this chapter.

Connecting the MI16 to a temporary 24 V dc power supply

To connect the MI16 to a temporary 24 V power supply, carry out the following (see Figure 2.8):

Notes...

It is recommended that the wires used to connect the MI16 to a 24 V power supply conform to DEF 61-12 part 6 type 2, BS4808, or equivalent specification.

The output voltage from the 24 V power supply must be a nominal 24 Vdc, unregulated 0.5 A.

1. Obtain three suitable lengths of 1.55 mm nominal diameter PVC or PTFE insulated wires. Each wire should contain sixteen 0.2 mm diameter strands. It is recommended that the following colours are used:

Connection	Colour of wire
+24 V	Red
0 V	Black
Earth	Green

2. Fit terminal block [1] to the panel connector block [2] on the rear panel of the MI16 [3].
3. Connect a length of wire to each of the following connectors located within terminal block [1] and retain with terminal screws. If you are using the recommended colour-coding, connect the wires as follows:

Colour of wire	Terminal block connection
Green	Terminal 1 (ground)
Red	Terminal 2 (24 V)
Black	Terminal 3 (0 V)

WARNINGS

ISOLATE THE 24 V POWER SUPPLY PRIOR TO CONNECTING THE MI16 MACHINE INTERFACE UNIT.

TO ENSURE THE SAFETY OF ALL PERSONNEL, IT IS IMPORTANT THAT THE GROUNDING OF THE MI16 MACHINE INTERFACE UNIT CASE AND 0 V SUPPLY FULLY CONFORMS TO ALL SAFETY REGULATIONS IN FORCE IN COUNTRY OF USE.

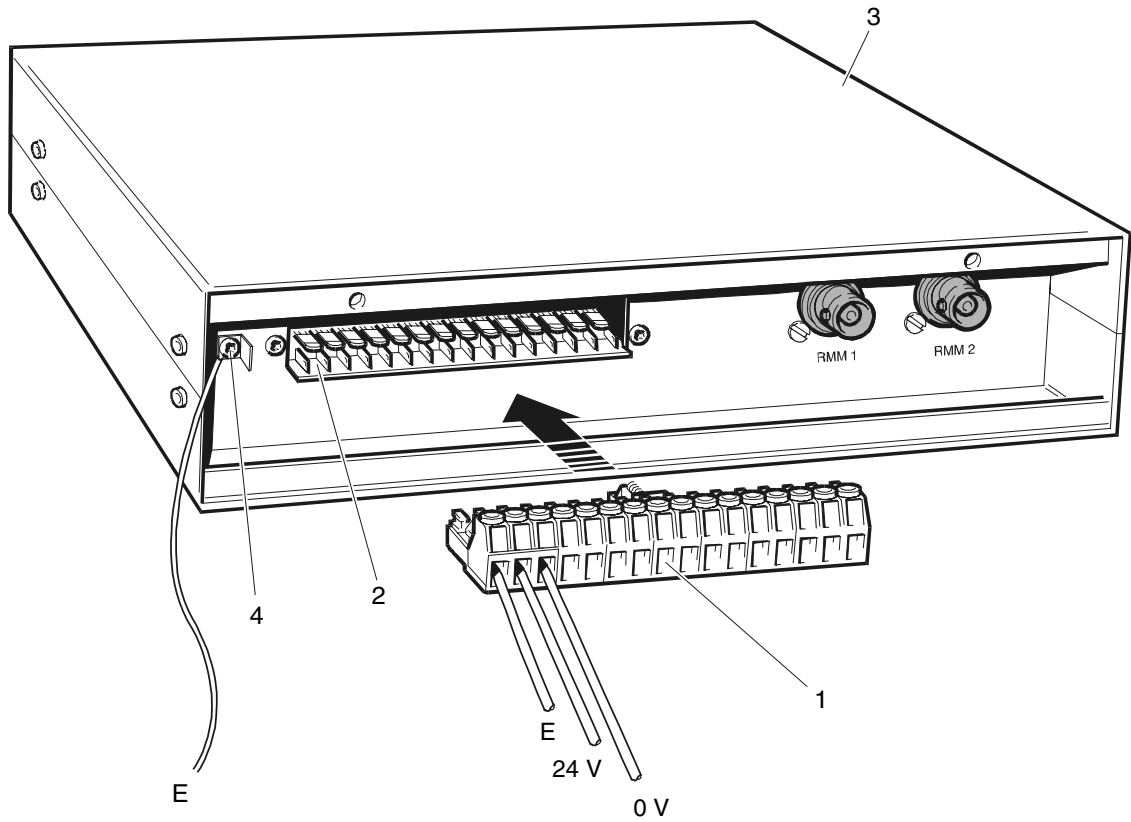
THE MI16 MACHINE INTERFACE IS EQUIPPED WITH AN INTERNAL POWER TRANSFORMER WHICH ENSURES THAT ITS CASING IS FULLY ISOLATED FROM ANY EXTERNAL POWER SUPPLY. TO MAINTAIN THIS LEVEL OF ISOLATION, IT IS IMPORTANT TO ENSURE THAT THE 24 V AND 0 V SUPPLY WIRES ARE FULLY ISOLATED FROM THE CASE OF THE MI16 MACHINE INTERFACE UNIT.

THE MI16 MACHINE INTERFACE UNIT IS EQUIPPED WITH A CHASSIS GROUND CONNECTOR . IT IS IMPORTANT THAT THIS CONNECTOR IS CONNECTED TO THE NEAREST AVAILABLE EARTH TERMINAL.

4. Connect the (red) wire from the 24 V terminal of the MI16 [3] to the 24 V terminal of the 24 V dc power supply.
5. Connect the (black) wire from the 0V terminal of the MI16 [3] to the 0 V terminal of the 24 V dc power supply.

Continued on Page 2-22

6. Connect the (green) wire from the 'Ground' terminal of the MI16 [3] to the earth (E) terminal of the 24 V dc power supply.
7. Using a suitable length of 16/0.2 cable, connect the chassis ground connector [4] of the MI16 [3] to the nearest available earth (E) terminal.
8. Switch on the 24 V dc power supply to the MI16.



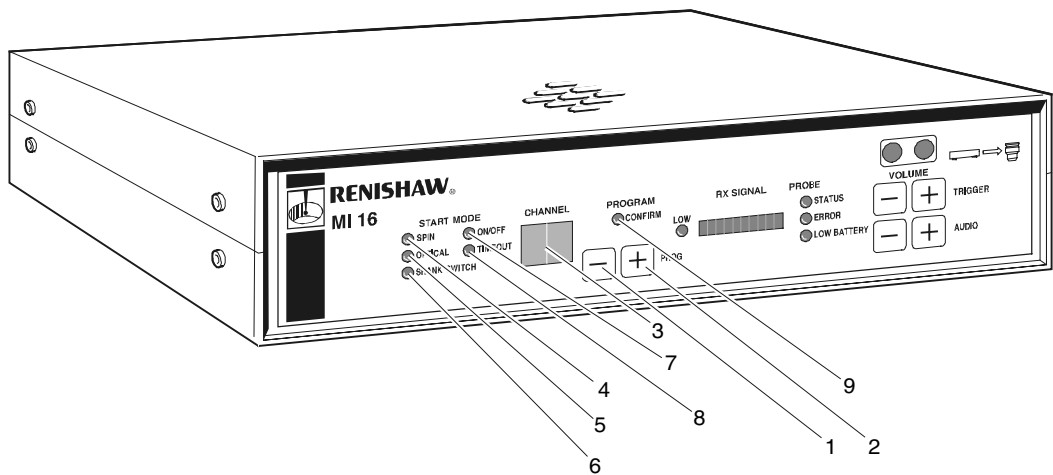
1. Terminal block
2. Panel connector block
3. MI16
4. Chassis ground connector

Figure 2.8 – Connecting the MI16 to a 24 V dc power supply

Programming the MI16

To program the MI16, carry out the following (see Figure 2.9):

1. Press the (-) 'PROG' button [1] and (+) 'PROG' button [2] simultaneously and hold for 5 seconds until the 'CHANNEL' display window [3] and 'START MODE' LEDs [items 4 through 8] begin to flash.
2. Select the radio transmission channel you require by either:
 - Pressing the (-) 'PROG' button [1] to move down through the available channels.
 - Pressing the (+) 'PROG' button [2] to move up through the available channels.
3. When the required transmission channel number appears in the 'CHANNEL' display window [3], release the 'PROG' button. Wait for a period of 5 seconds (taking care that the two 'PROG' buttons are not inadvertently pressed) and ensure that the following occurs during programming:
 - The 'CHANNEL' display window [3] of the MI16 ceases to flash and displays the selected channel.
 - The MI16 emits a double audible bleep.
 - The 'PROGRAM CONFIRM' LED [9], located on the front panel of the MI16 illuminates for a period of 5 seconds.
4. Observe the 'START MODE' LEDs [items 4 through 8]. If the two 'START MODE' LEDs relating to the mode of operation you require are illuminated, no further action is necessary. If the two 'START MODE' LEDs relating to the mode of operation you require are not illuminated, press and release the (-) 'PROG' button [1] and (+) 'PROG' button [2] simultaneously to illuminate each pair of 'START MODE' LEDs [items 4 through 8] in sequence. Select the two 'START MODE' LEDs relating to the mode of operation you require then immediately remove your fingers from the two buttons. Wait for a period of 5 seconds (taking care that the two 'PROG' buttons are not inadvertently pressed) and ensure the following occurs during programming:
 - The 'CHANNEL' display window [3] of the MI16 ceases to flash.
 - The MI16 emits a double audible bleep.
 - The 'PROGRAM CONFIRM' LED [9], located on the front panel of the MI16 illuminates for a period of 5 seconds.



1. (-) 'PROG' button.
2. (+) 'PROG' button
3. 'CHANNEL' display window
4. 'SPIN' LED
5. 'OPTICAL' LED
6. 'SHANK SWITCH' LED
7. 'ON/OFF' LED
8. 'TIMEOUT' LED
9. 'PROGRAM CONFIRM' LED

Figure 2.9 – Programming the MI16

Fitting batteries into the RMP2/RMP2-S

Note...

Prior to programming the RMP2/RMP2-S, it is necessary to fit two batteries (supplied) in the RMP2/RMP2-S body.

To fit the two PP3 type 9 V batteries (supplied) into the RMP2/RMP2-S, carry out the following (see Figure 2.10):

CAUTIONS

CARE MUST BE TAKEN NOT TO DAMAGE THE BATTERY COVER SEAL WHEN REMOVING THE BATTERY COVER.

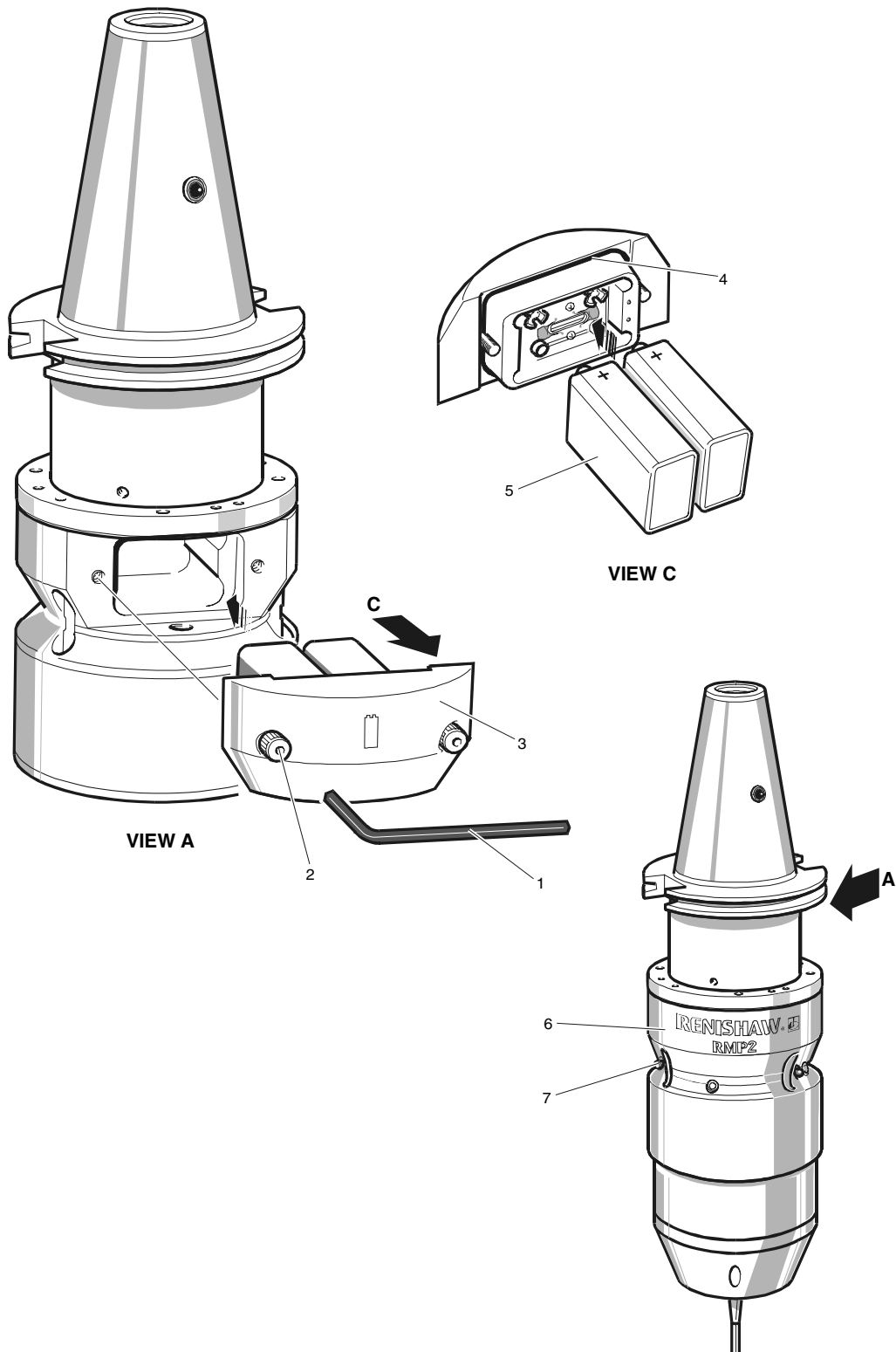
HANDLE BATTERIES IN ACCORDANCE WITH THE MANUFACTURER'S INSTRUCTIONS. USE ONLY THE RECOMMENDED BATTERY TYPE. DO NOT ALLOW THE BATTERY TERMINALS TO CONTACT OTHER METALLIC SURFACES.

1. Using the 3 mm AF allen key [1] supplied, release the two battery cover retaining screws [2] and carefully remove the battery cover [3] from the RMP2/RMP2-S [6].
2. Ensuring the correct polarity, connect the two batteries [5] to the terminals within the battery cover [3].
3. Lightly smear the battery cover seal [4] with mineral oil or grease.

Note...

After fitting the batteries [5] and battery cover [3] to the RMP2/RMP2-S, the probe status LED [7] will show a double flashing green condition and remain active in the programming mode for one minute.

4. Ensuring the correct orientation, insert the batteries [5] into the battery compartment of the RMP2/RMP2-S until the battery cover [3] abuts the cover mounting flange on the RMP2/RMP2-S body. Hand-tighten the two battery cover retaining screws [2] to retain the cover in position.
5. Using the 3 mm AF allen key [1], tighten the two battery cover retaining screws [2] to 3 Nm (2.2 lbf.ft).



1. 3 mm AF allen key
2. Battery cover retaining screw (2 off)
3. Battery cover
4. Battery cover seal
5. Battery (2 off)
6. RMP2/RMP2-S
7. Probe status LED

Figure 2.10 – Fitting the batteries to the RMP2/RMP2-S

Programming the RMP2/RMP2-S

Notes...

The following procedure must be performed within one minute of the batteries being inserted into the RMP2/RMP2-S. If a period of 1 minute has elapsed since the batteries were fitted, and the RMP2/RMP2-S has subsequently switched to its standby mode, it will be necessary to:

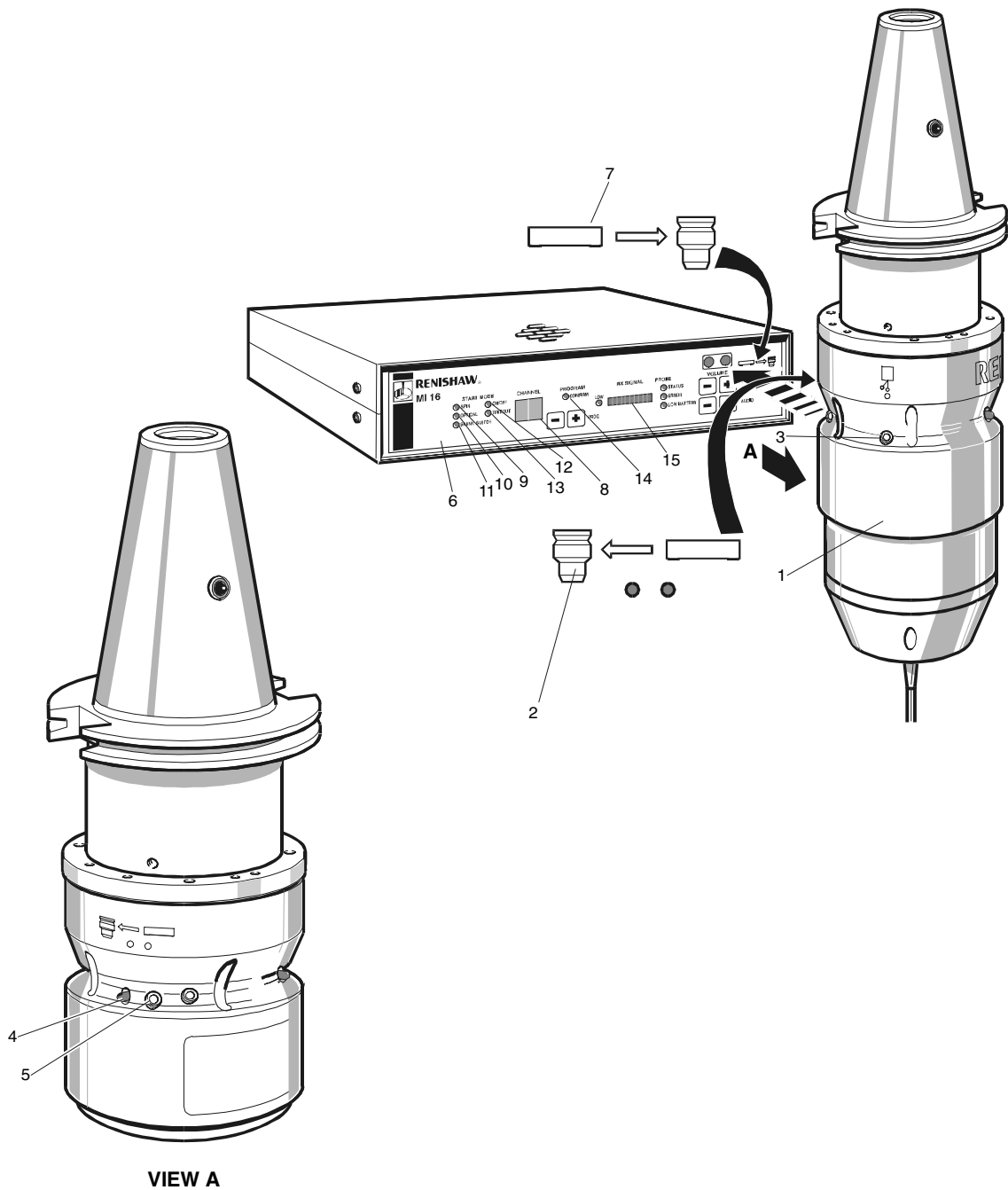
- Remove the battery cover and batteries from the RMP2/RMP2-S for a period of not less than 10 seconds.
- Refit the battery cover and attached batteries. Following correct fitting of the battery cover and attached batteries to the RMP2/RMP2-S, the probe status LED [3] will show a double flashing green condition to indicate that the RMP2/RMP2-S is in its programming mode.

Alignment diagrams [2] and [7] are provided on the body of the RMP2/RMP2-S [1] and the front panel of the MI16 [6]. These diagrams provide a means of aligning the transmitting LEDs [4] and receiving diodes [5] of both units during programming of the RMP2/RMP2-S.

To program the RMP2/RMP2-S, carry out the following (see Figure 2.11):

1. Position the RMP2/RMP2-S [1] within 100 mm (maximum) of the front panel of the MI16 [6] and, maintaining this maximum distance, align the alignment diagram [2] on the body of the RMP2/RMP2-S with the alignment diagram [7] on the front panel of the MI16. If alignment is satisfactory, and the optical link between the RMP2/RMP2-S and the MI16 established, the following will occur:
 - The MI16 will emit an audible beep once every ½ second for a period of 5 seconds.
 - The 'START MODE' LEDs [items 9 through 13] corresponding to the currently programmed mode of operation of the RMP2/RMP2-S will illuminate.
 - The number corresponding to the currently programmed radio transmission channel of the RMP2/RMP2-S will appear in the 'CHANNEL' display window [8] of the MI16.

Continued on Page 2-30



- | | |
|------------------------------------|---------------------------|
| 1. RMP2/RMP2-S | 8. 'CHANNEL' LCD Window |
| 2. Alignment diagram (RMP2/RMP2-S) | 9. 'SPIN' LED |
| 3. 'PROBE STATUS' LED | 10. 'OPTICAL' LED |
| 4. Transmitting LED | 11. 'SHANK SWITCH' LED |
| 5. Receiving diode | 12. 'ON/OFF' LED |
| 6. MI16 | 13. 'TIMEOUT' LED |
| 7. Alignment diagram (MI16) | 14. 'PROGRAM CONFIRM' LED |
| | 15. 'RX SIGNAL' display |

Figure 2.11 – Programming the RMP2/RMP2-S

2. Continue to hold the RMP2/RMP2-S [1] in its aligned position until the MI16 [6] emits a continuous beep for a period of 5 seconds. Following this 5 second period, successful programming of the RMP2/RMP2-S is confirmed by:
 - A double audible beep from the MI16 [6].
 - Illumination of the 'PROGRAM CONFIRM' LED [14], located on the front panel of the MI16 [6], for a period of 5 seconds.
 - Illumination of the 'RX SIGNAL' display [15].

Note...

Incorrect programming of the RMP2/RMP2-S will be indicated by the following:

- **The MI16 [6] emitting continuous audible bleeps.**
- **Continuous flashing of the 'CHANNEL' display window [8].**
- **Failure of the 'PROGRAM CONFIRM' LED [14] to illuminate.**

Where this occurs, the programming procedure must be repeated.

Positioning the RMM2s

WARNINGS

THE FOLLOWING PROCEDURE REQUIRES THAT THE MACHINE TOOL SPINDLE IS MOVED THROUGH THE FULL WORKING ENVELOPE OF THE MACHINE TOOL. TO AVOID INJURY, ENSURE THAT YOU REMAIN OUTSIDE THIS WORKING ENVELOPE WHEN THE MACHINE TOOL IS ACTIVE.

BEWARE OF UNEXPECTED MOVEMENT OF THE MACHINE TOOL.

REFER TO THE MACHINE TOOL MANUFACTURER'S OPERATING INSTRUCTIONS.

CAUTION

A FUNDAMENTAL CHARACTERISTIC OF RADIO TRANSMISSION SYSTEMS IS THAT REFLECTED SIGNALS CAN CANCEL EACH OTHER, RESULTING IN AREAS OF THE MACHINE TOOL WHERE NO SIGNAL IS PRESENT AT THE ANTENNA. SUCH AREAS ARE REFERRED TO AS 'BLIND SPOTS' AND CAN BE EASILY ELIMINATED BY FITTING A PAIR OF RADIO ANTENNAE, RATHER THAN USING A SINGLE ANTENNA IN ISOLATION. RENISHAW'S RADIO TRANSMISSION SYSTEMS ARE SUPPLIED WITH TWO RADIO ANTENNAE AS STANDARD.

Notes...

Prior to permanently mounting the two RMM2 radio module machines to your machine tool, it is important to determine the best possible position for each antenna. Correct positioning of each antenna is essential to achieve a strong, reliable signal between the RMP2/RMP2-S and the two RMM2 units.

Each RMM2 unit incorporates five permanent magnets within its mounting face which allow temporary fixing of the RMM2 to any flat, ferrous surface on the machine tool.

The distance between the RMP2/RMP2-S and either of the two RMM2 units must not exceed 15 metres (49.2 ft).

Continued on Page 2-32

To determine the best possible position for each RMM2 on your machine tool, carry out the following (see Figure 2.12):

1. Install the RMP2/RMP2-S in the spindle of the machine tool.
2. Mount one of the two RMM2 units [1] on a flat, ferrous surface on the machine tool. Ensure the RMM2 is positioned as close as possible to the working envelope of the machine tool, and within 15 metres (49.2 ft) of the RMP2/RMP2-S.

CAUTION

WHEN ROUTING THE RMM2 CABLE TO THE MI16 MACHINE INTERFACE, IT IS ESSENTIAL THAT THE CABLE IS KEPT WELL AWAY FROM MOVING PARTS WHICH MAY SNAG, ENTANGLE, TRAP OR SEVER IT WHEN THE MACHINE TOOL IS IN MOTION.

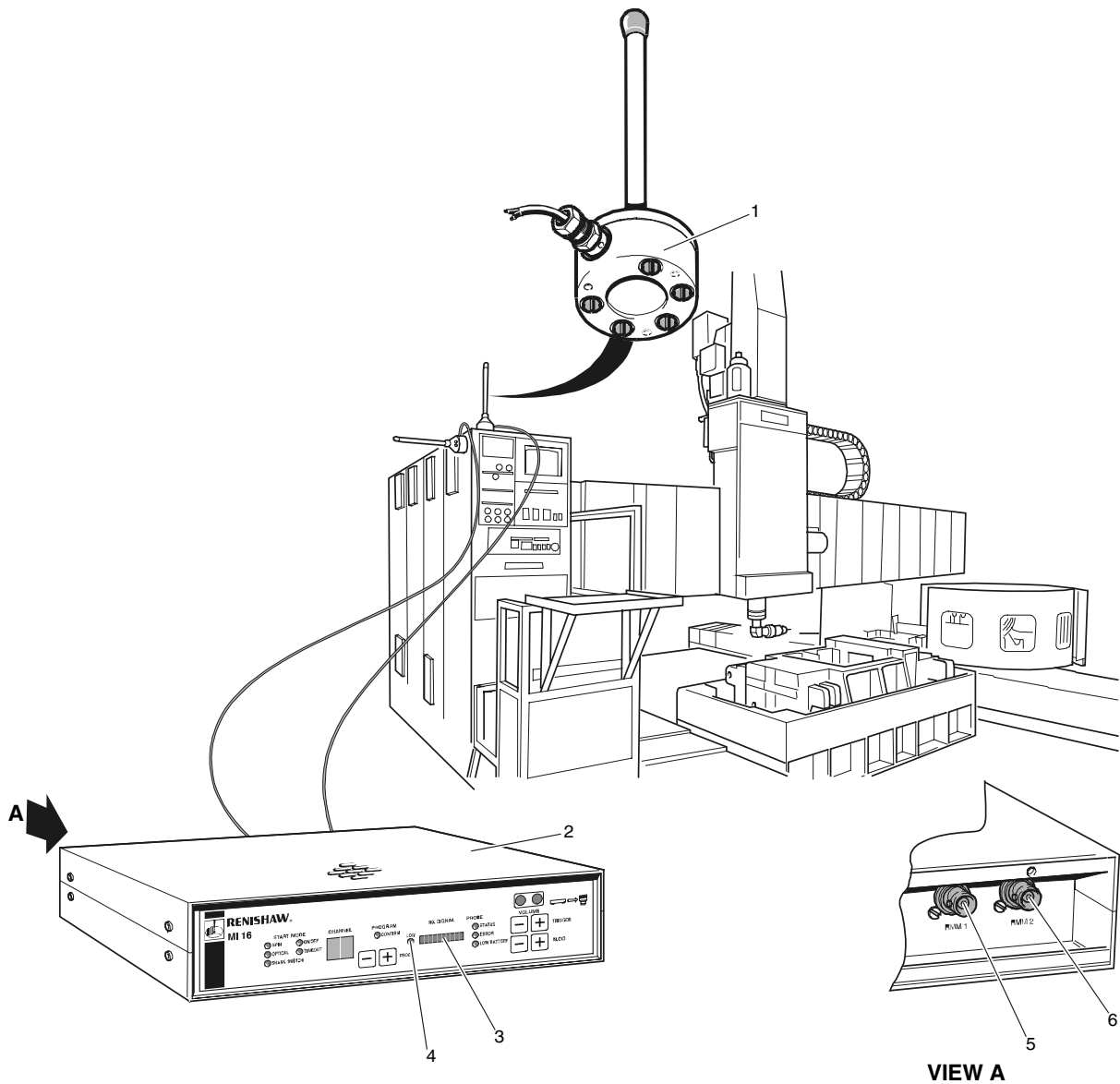
3. Push the cable of the RMM2 [1] into the 'RMM1' connector [5] within the rear panel of the MI16 [2] and twist clockwise to secure.

Note...

If the RMP2 radio module probe has been programmed to 'switch on' using an optical signal (this signal being generated by the optional OM16 optical module in response to a machine M code), it will be necessary to install the OM16 on your machine tool. Refer to "Installing the OM16 to a machine tool" later in this chapter.

4. Activate the RMP2/RMP2-S using the selected method.
5. Operate the machine tool, either in manual mode or by use of a purpose-written macro program, to move the RMP2/RMP2-S about the full working envelope. During movement of the RMP2/RMP2-S about the full working envelope of the machine tool, continually observe the 'RX SIGNAL' display [3] and 'RX SIGNAL LOW' LED [4] on the front panel of the MI16 [2] to identify any 'weak spots' in signal transmission. Weak spots in signal transmission can be identified in one of two ways:
 - Illumination of the 'RX SIGNAL LOW' LED [4] (indicating that three or less LEDs on the 'RX SIGNAL' display [3] are lit).
 - Three or less red LEDs on the 'RX SIGNAL' display [3] lit in isolation.

Continued on Page 2-34



1. RMM2 (2 off)
2. MI16
3. 'RX SIGNAL' display
4. 'RX SIGNAL LOW' LED
5. 'RMM1' connector
6. 'RMM2' connector

NOTE ...

The rear panel of the MI16 MK3 version is fitted with a switch that is used to select the radio reception sensitivity level. Refer to Addendum B, 'Selection of MI16 radio reception sensitivity' for information describing use of this switch.

Figure 2.12 – Setting the positions of RMM2 units on the machine tool

6. Successively move the RMM2 about the working envelope of the machine tool, repeating step 5 above after each move, until the best position is found.
7. Disconnect the RMM2 cable from the MI16 [2].

CAUTION

WHEN ROUTING THE CABLE OF THE SECOND RMM2 TO THE MI16 MACHINE INTERFACE, IT IS ESSENTIAL THAT THE CABLE IS KEPT WELL AWAY FROM MOVING PARTS WHICH MAY SNAG, ENTANGLE, TRAP OR SEVER IT WHEN THE MACHINE TOOL IS IN MOTION.

8. Mount the second RMM2 to the machine tool and connect to the 'RMM2' connector [6] on the MI16 [2].

Note...

It is recommended that the second RMM2 unit is mounted at 90° to the first. This will reduce the possibility of coincident 'blind spots' occurring between both antennae.

9. Repeat steps 5 and 6 above for the second antenna, ensuring that any 'blind spots' observed do not coincide with those observed with the first antenna.
10. Disconnect the second RMM2 cable from the MI16 [2].
11. Remove the RMP2/RMP2-S from the machine tool spindle.

Mounting the RMM2 units on the machine tool

To permanently mount the RMM2 units on the machine tool, carry out the following (refer to Figures 2.13 and 2.14):

1. Using a pencil, draw around the base [item 1, figure 2.14] of each RMM2 [2] to mark their positions on the machine tool. Also mark a line to represent the centre-line of the cable gland [3]
2. Remove each RMM2 [2] from the machine tool and, using a centre-punch, mark the centre of each marked circle.
3. Referring to Figure 2.13, use a pair of dividers to scribe a 68 mm pitch centre diameter (PCD) circle within each of the two marked circles. Employing the two lines drawn to represent the centre-line of the RMM2 cable glands [item 3, Figure 2.14], scribe a centre-line through each scribed circle. Erase all pencil marks.
4. Referring to Figure 2.13, use a protractor to scribe a line which intersects one of the scribed circles at 30° from its centre-line in the clockwise direction. Mark the point at which the line intersects the circle with a centre-punch. Using this mark as your first hole position, mark two further positions 120° apart (producing three marks equally spaced about the circle). Centre-punch each hole position, then drill and tap all three holes to produce an M4x0.7 thread. Repeat the procedure for the second circle.

Continued on Page 2-36

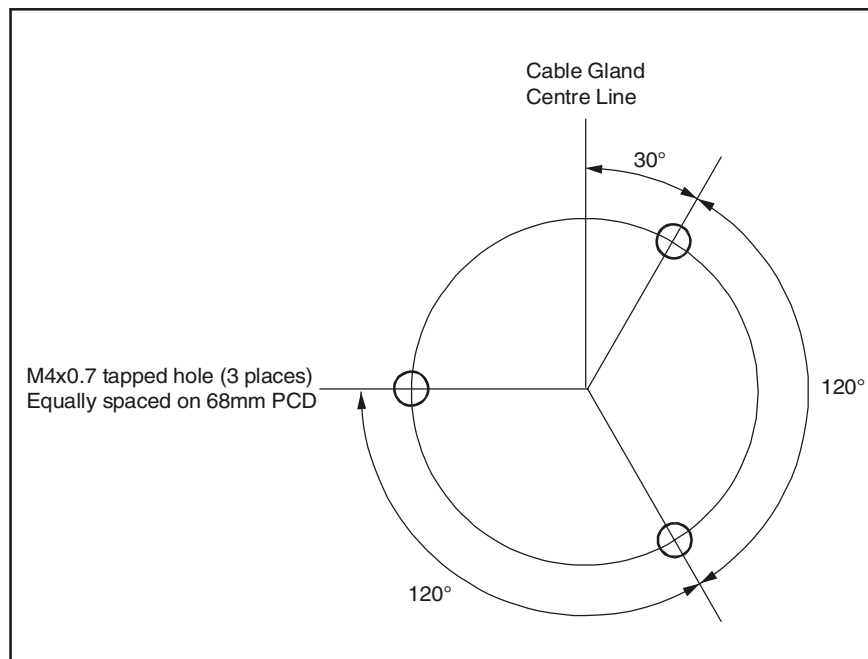
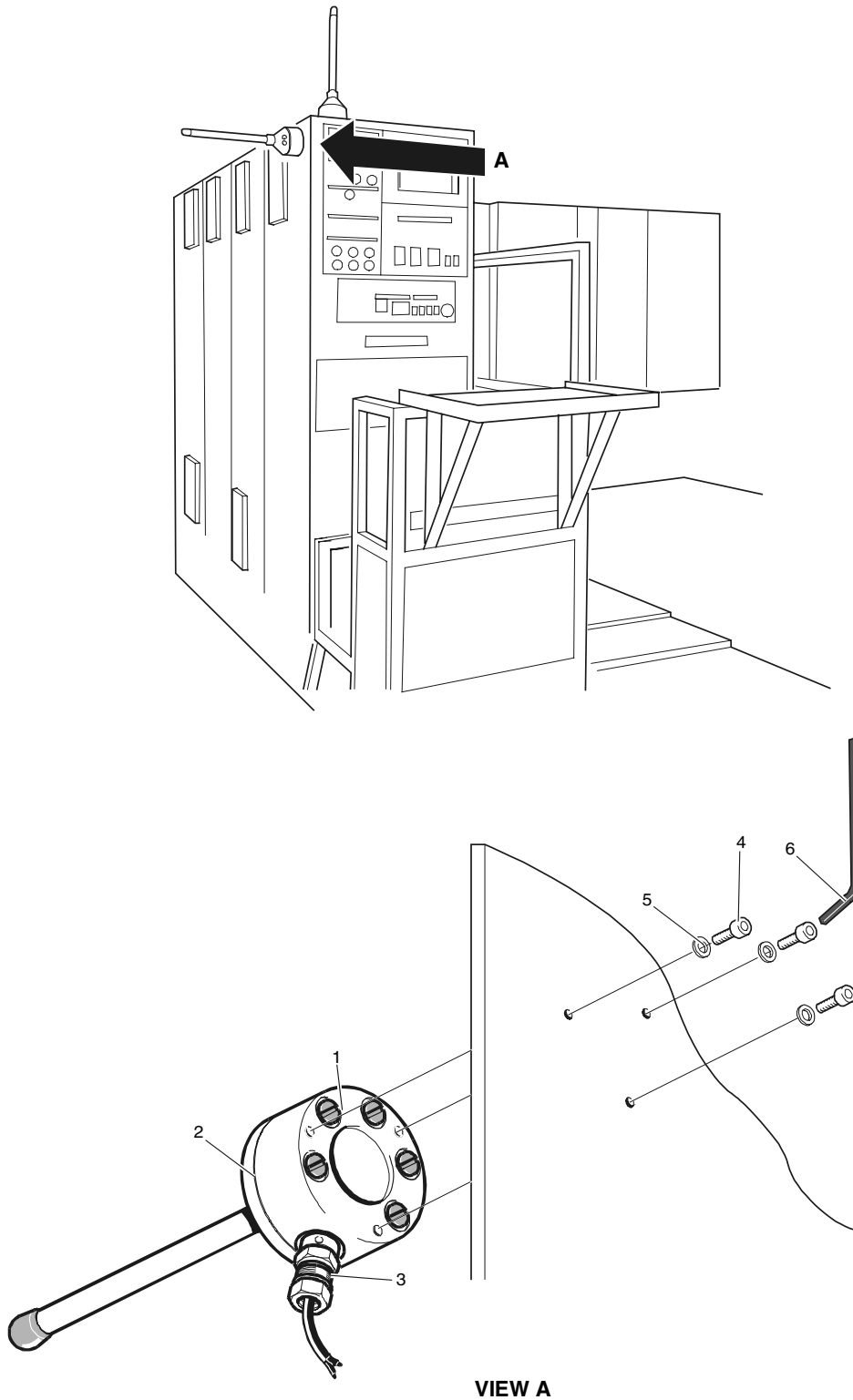


Figure 2.13 – Drilling details for mounting the RMM2

5. In turn, mount each RMM2 [item 2, Figure 2.14] on the machine tool ensuring that the three holes within its base [1] align with the tapped holes within the mounting surface of the machine tool.
6. Secure each RMM2 [2] to its mounting surface on the machine tool using three M4x25 mm socket head capscrews [4] and three M4 anti-vibration washers [5] provided.
7. Using the 3 mm AF allen key [6] supplied, torque all six M4x25 mm socket head capscrews to 3 Nm (2.21 lbf.ft).



1. Base
2. RMM2 (2 off)
3. Cable gland
4. M4x25 mm socket head capscrew (6 off)
5. M4 anti-vibration washer (6 off)
6. 3 mm AF allen key

Figure 2.14 – Fixing the RMM2 units to the machine tool

Mounting the MI16 to the machine tool

WARNING

ENSURE THAT ALL POWER SOURCES ARE SWITCHED OFF PRIOR TO REMOVING ANY PANEL OR GUARD FROM THE MACHINE TOOL. IF ISOLATING POWER AT THE MAINS SWITCH, ENSURE A SIGN TO THIS EFFECT IS PLACED ON THE SWITCH TO PREVENT THE POWER BEING INADVERTENTLY SWITCHED ON.

Notes...

In order that personnel operating the MP16 touch-trigger probe system can monitor system status, it is important that the MI16 machine interface is mounted on the machine tool such that the front panel is visible at all times.

When deciding on the best location for the MI16 machine interface on the machine tool, it is important to ensure that both the front and rear panels of the machine interface will be easily accessible. It is particularly important to ensure that sufficient clearance is provided to allow the RMP2/RMP2-S to be correctly aligned with the front panel of the MI16 during subsequent programming.

The MI16 may be mounted on the machine tool as follows:

- Within the front panel of the CNC controller.
- Within one of the machine tool's side panels.
- On the top face of the CNC controller if panel mounting is not possible.

Cutting a hole in the mounting panel

Note...

Before cutting a hole in any panel, make sure that you have access to the MI16 panel mounting kit (part no. A-2056-0005). Where necessary, this may be obtained from your supplier or nearest Renishaw company; refer to the last page of this publication for a list of countries where Renishaw companies are located.

1. Release and remove the panel into which you wish to mount the MI16.
2. Cut, drill and countersink the panel, to which you wish to mount the MI16, to the dimensions shown in Figure 2.15.

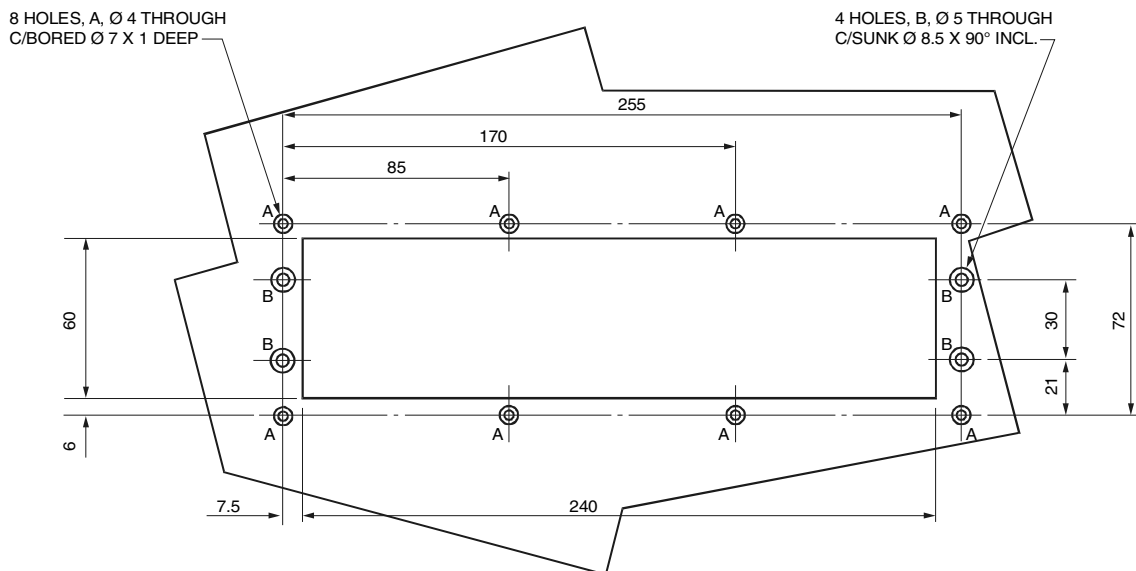
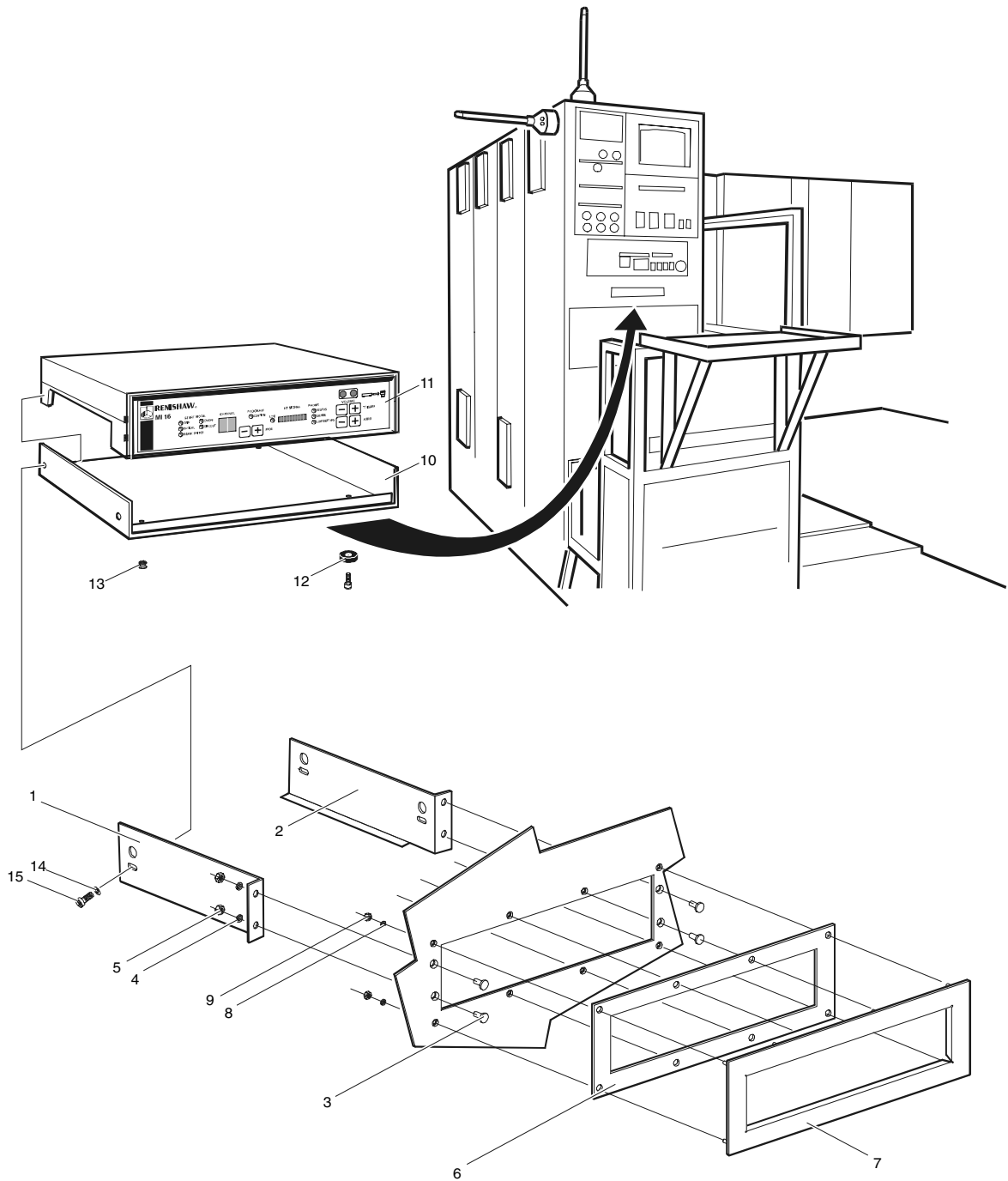


Figure 2.15 – MI16 panel mounting dimensions

Panel mounting the MI16

1. Obtain an MI16 panel mounting kit (part number A-2056-0005). Where necessary, this may be ordered through your nearest Renishaw company or distributor. Refer to the last page of this publication for a list of countries where Renishaw companies are located.
2. Assemble the panel mounting kit to the MI16 as follows (refer to Figure 2.16):
 - a. Assemble the left-hand bracket [1] and right-hand bracket [2] with the pre-cut panel and secure with the four M4 countersunk head screws [3], the four M4 washers [4] and the four M4 nuts [5].
 - b. Remove the protective paper from the gasket [6] and fit the gasket on the bezel [7].
 - c. Fit the bezel [7] on the pre-cut panel and secure with the four M3 washers [8] and the four M3 nuts [9].
 - d. Check that the MI16 [11] has been disconnected from the 24 V power supply, then release and remove the base plate [10].
 - e. Release and remove the four footpads [12] from the base plate [10].
 - f. Insert the four grommets [13] into the four footpad location holes within the base plate [10].
 - g. Mount the base plate [10] between the two brackets [1] and [2].
 - h. Mount the MI16 [11] on the base plate [10].
 - i. Slide the MI16 forward to abut the bezel [7].
 - j. Secure the MI16 [11] in position with the four washers [14] and four screws [15].
 - k. Mount the pre-cut panel, together with the assembled mounting kit and MI16 [11], on the machine tool.



- | | |
|---------------------------------------|---------------------|
| 1. Left-hand bracket | 9. M3 nut (4 off) |
| 2. Right-hand bracket | 10. Base plate |
| 3. M4 countersunk head screws (4 off) | 11. MI16 |
| 4. M4 washer (4 off) | 12. Footpad (4 off) |
| 5. M4 nut (4 off) | 13. Grommet (4 off) |
| 6. Gasket | 14. Washer (4 off) |
| 7. Bezel | 15. Screw (4 off) |
| 8. M3 washer (4 off) | |

Figure 2.16 – Panel mounting the MI16

Connecting the RMM2 units to the MI16

Extending the RMM2 cables

Where necessary, the RMM2 cable(s) may be extended by an additional 10 metres (32.8 ft), to achieve a total length of 20 metres (65.6 ft), by fitting a Renishaw extension cable (see Figure 2.17). Where required, this extension cable (part no. A-2056-0322) may be ordered through your supplier or nearest Renishaw company; refer to the last page of this publication for a list of countries where Renishaw companies are located.

Note...

When connecting the RMM2 cable(s) and extension cable(s) together, it is important to ensure that all screens are maintained throughout the joint(s).

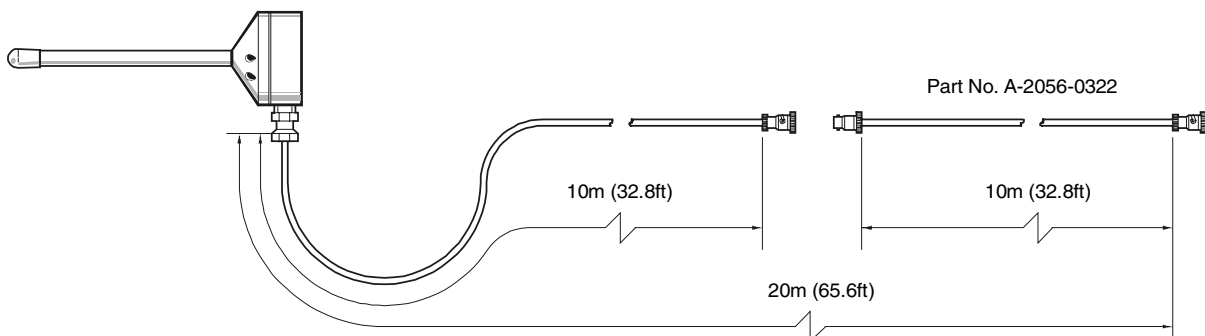


Figure 2.17 – Extending the RMM2 cable

Fitting flexible conduit to the RMM2 cables

CAUTION

FAILURE TO ADEQUATELY PROTECT THE RMM2 CABLES CAN RESULT IN SYSTEM FAILURE DUE TO CABLE DAMAGE OR THE INGRESS OF COOLANT.

Notes...

It is recommended that Thomas and Bretts ¼ inch (11 mm) diameter SHURESEAL (Part No. TBEF 0250-50), or equivalent, is used to protect the RMM2 cables.

Use plastic olive [5] when fitting flexible conduit to the conduit adaptor.

When loosening gland nut [6], it is important to ensure that gland nut [1] is not inadvertently loosened.

Whilst coolant and dirt are prevented from entering the RMM2 by a cable sealing gland, it is important that the cable itself is protected from physical damage by the fitment of flexible conduit. To allow fitment of flexible conduit to the cable, each RMM2 is fitted with a Renishaw conduit adaptor.

To fit flexible conduit to the RMM2, carry out the following (see Figure 2.18):

1. Route the cable of each RMM2 [7] to connect with the 'RMM1' connector and 'RMM2' connector on the rear of the MI16.
2. Remove the BNC connector from each of the two RMM2 cables and, if required, cut both cables to length.
3. Cut two lengths of flexible conduit [7] as required.
4. Release and remove the two gland nuts [6] from the two screwed adaptors [2]. Take care not to slacken the two gland nuts [1].
5. Remove the gland nuts [6] from the RMM2 cables [3].
6. Carefully thread the lengths of flexible conduit [7] over the two RMM2 cables [3].
7. Screw the conduit termination pieces [4] into the ends of the flexible conduit.

Continued on Page 2-44

8. Push the lengths of flexible conduit [7] upwards until the conduit termination pieces [4] locate within the screwed adaptors [2].
9. Ensuring that the lengths of flexible conduit [7] are fully located through the plastic olives [5], assemble the gland nuts [6] to the screwed adaptors [2]. Hand-tighten the two gland nuts to retain the lengths of flexible conduit in place.

Note...

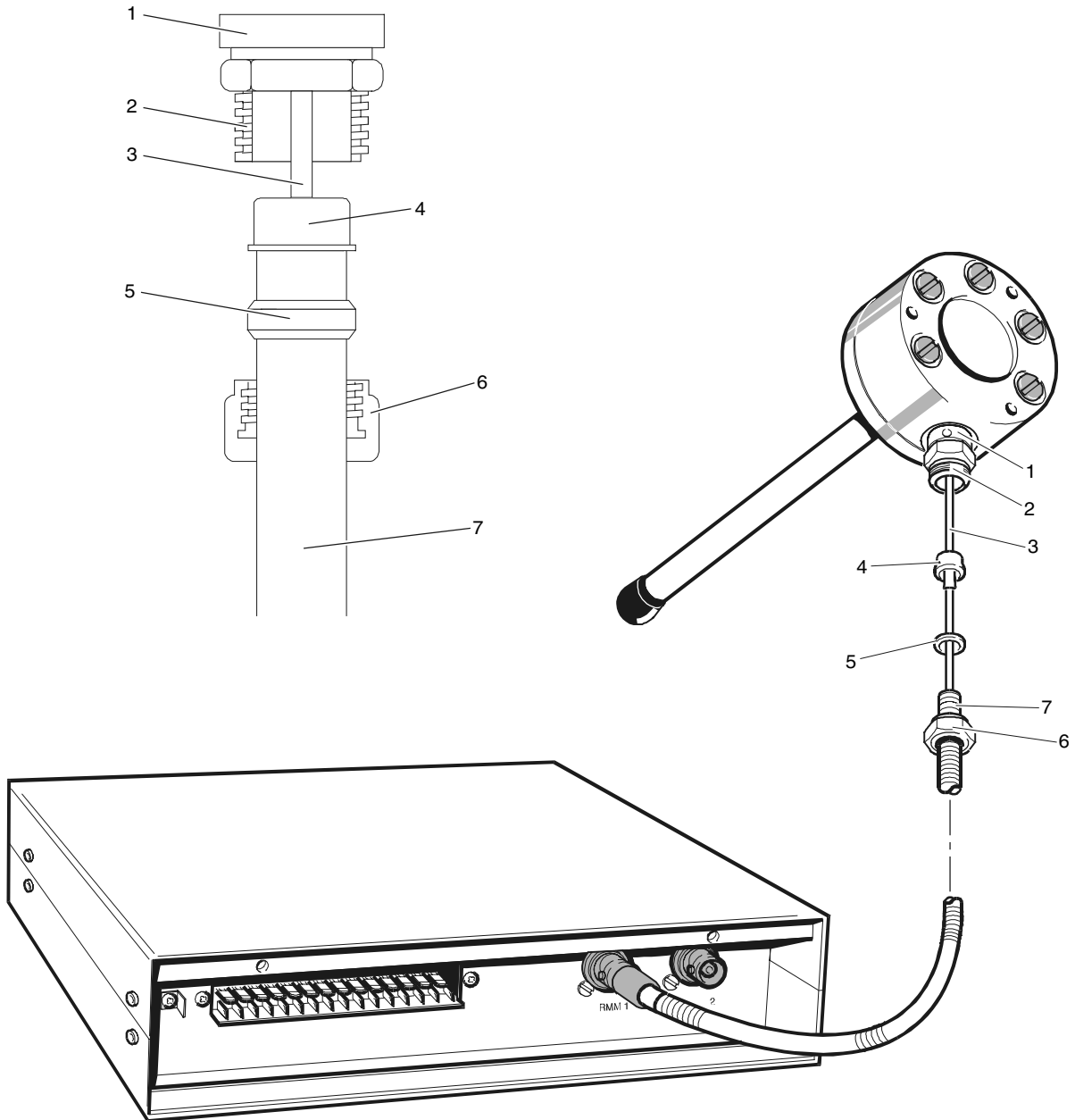
When tightening the two gland nuts [6], ensure that the two gland nuts [1] are not inadvertently loosened.

10. Ensuring that the two gland nuts [1] are not inadvertently slackened, tighten the two gland nuts [6] an additional 1½ to 2½ turns. This action will form a seal between the flexible conduit [7] and the screwed adaptor [2] that conforms to BS 5490 (IEC 529) IP67.

CAUTION

FITTING THE BNC CONNECTORS TO THE RMM2 CABLES MUST ONLY BE PERFORMED BY SUITABLY QUALIFIED PERSONNEL WHO ARE FULLY CONVERSANT WITH THIS TYPE OF PROCEDURE.

11. Prepare the open ends of both RMM2 cables [3] and fit suitable BNC connectors (50 ohms) to each cable.
12. Connect the two RMM2 cables [3] to the 'RMM1' and 'RMM2' connectors on the rear of the MI16 as applicable.



1. Gland nut
2. Screwed adaptor
3. RMM2 cable
4. Conduit termination piece
5. Plastic olive
6. Gland nut
7. Flexible conduit

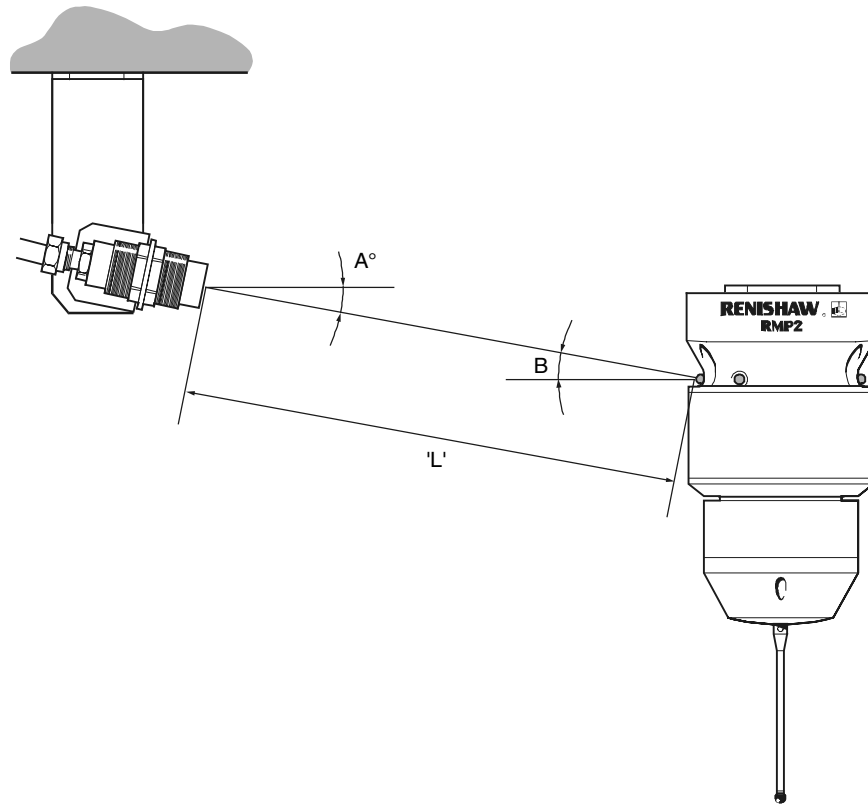
Figure 2.18 – Fitting flexible conduit to the RMM2 cables

Mounting the optional OM16 on the machine tool

The optional OM16 is mounted on the machine tool using either of the following methods:

- Directly to the machine tool guarding using the two M32x1.5 mm locknuts provided.
- To the machine tool guarding or bulkhead using the mounting bracket supplied.

The operational range of the optical transmission system, when using the optional OM16 to activate the RMP2 is as shown in Figure 2.19



Distance 'L' (metres)	OM16 angle A
1	± 40°
2	± 30°
3	± 25°
4	± 20°

Figure 2.19 – Operating envelope of the OM16 and RMP2

Mounting the OM16 directly on the machine tool guarding

To mount the optional OM16 directly on the machine tool guarding, carry out the following (see Figures 2.19 and 2.20):

CAUTION

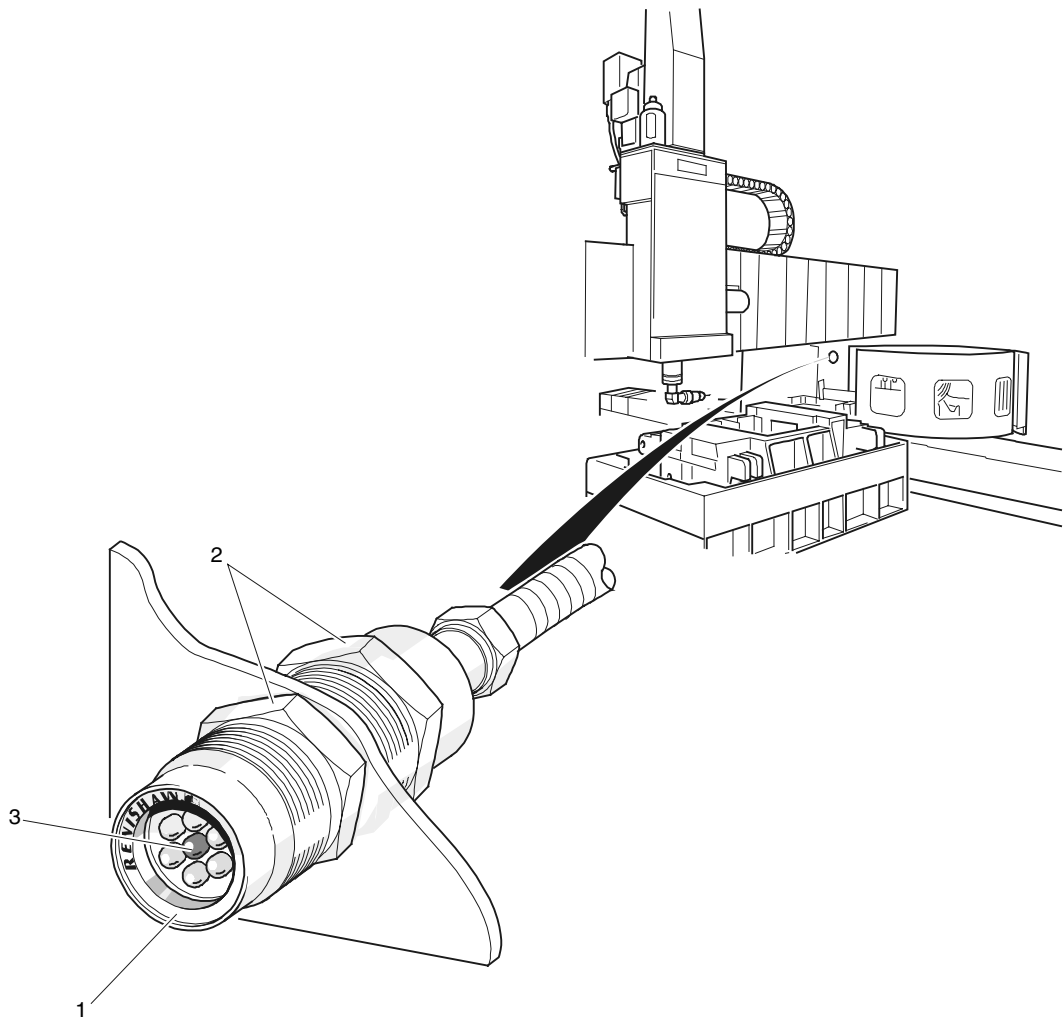
THE OM16 OPTICAL MODULE SHOULD NOT BE POSITIONED WHERE MACHINING SWarf COULD DIRECTLY IMPACT AGAINST ITS WINDOW. LONG-TERM EROSION OF THE GLASS WILL EVENTUALLY RESULT IN A LOSS OF OPTICAL SIGNAL STRENGTH.

Notes...

The maximum recommended distance between the OM16 and the RMP2 is 4 metres (13 ft).

It is recommended that the OM16 [1] is mounted on the machine tool so that the orange LED [3] is visible to the machine tool operator. This will enable the operator to monitor system status.

1. Ensuring that the requirements detailed in Figure 2.19 are met, decide on the most suitable position in which to mount the OM16 [item 1, figure 2.20] to the machine tool.
2. Drill an M32 clearance hole within the machine tool guarding in the required position.
3. Fit one M32x1.5 mm locknut [2] to the M32 thread on the body of the OM16 [1] and locate the body through the M32 clearance hole.
4. Fit the second M32x1.5 mm locknut [2] to the M32 thread on the body of the OM16 [1] and hand tighten to secure the OM16 in position.
5. Tighten the two locknuts [2] to 5 – 7 Nm (3.68 – 5.2 lbf.ft).



1. OM16
2. M32x1.5 mm locknut (2 off)
3. Orange LED

Figure 2.20 – Mounting the OM16 directly on the machine tool

Mounting the OM16 on the machine tool guarding/bulkhead using the mounting bracket

To mount the optional OM16 on the machine tool guarding/bulkhead using the mounting bracket provided, carry out the following (see Figures 2.19 and 2.21):

CAUTION

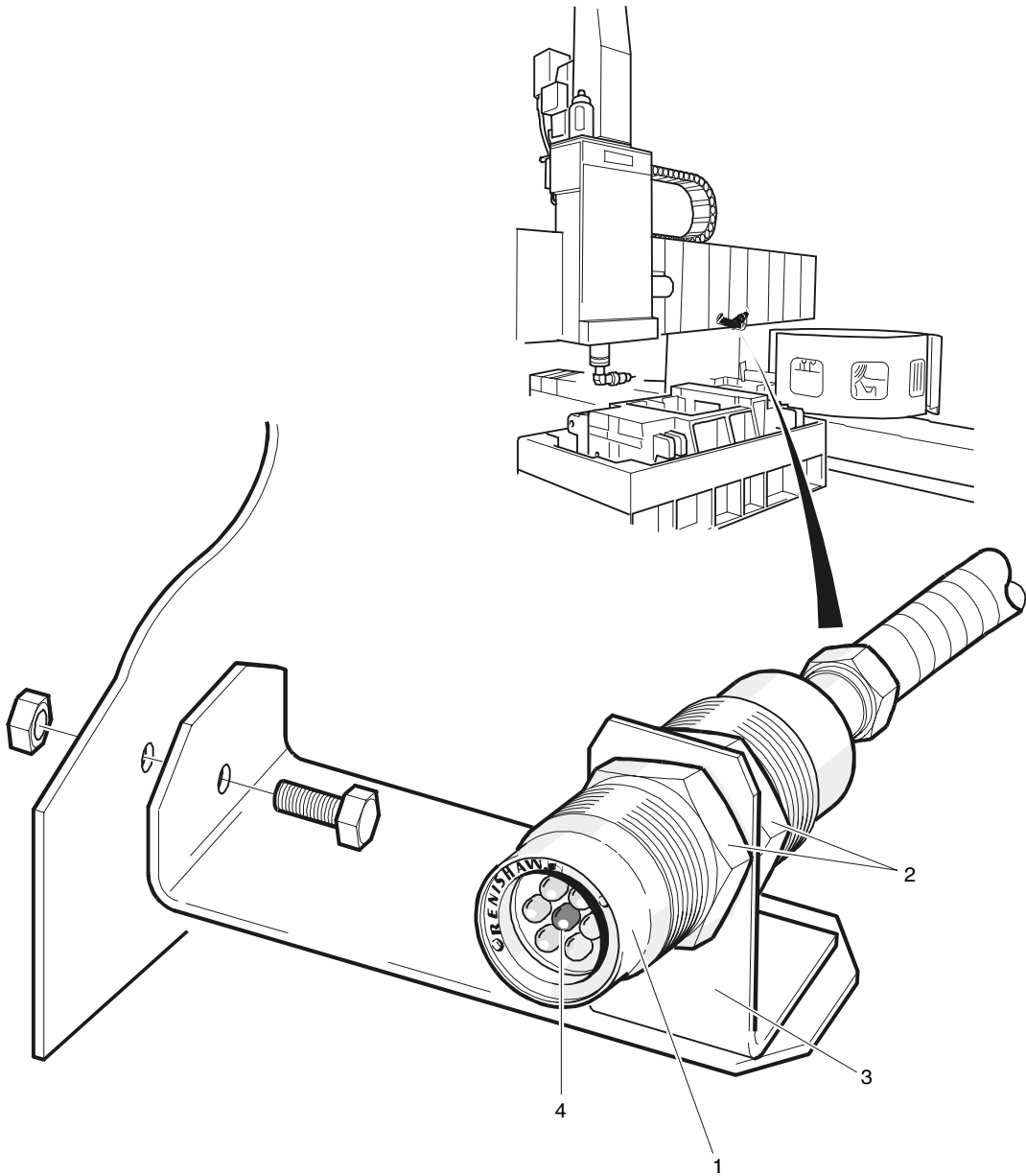
THE OM16 OPTICAL MODULE SHOULD NOT BE POSITIONED WHERE MACHINING SWARF COULD DIRECTLY IMPACT AGAINST ITS WINDOW. LONG-TERM EROSION OF THE GLASS WILL EVENTUALLY RESULT IN A LOSS OF OPTICAL SIGNAL STRENGTH.

Notes...

The maximum recommended distance between the OM16 and the RMP2 is 4 metres (13 ft).

It is recommended that the OM16 [1] is mounted on the machine tool so that the orange LED [4] is visible to the machine tool operator. This will enable the operator to monitor system status.

1. Fit one M32x1.5 mm locknut [item 2, Figure 2.21] to the M32 thread on the body of the OM16 [1] and locate the body through the M32 clearance hole within the mounting bracket [3].
2. Fit the second M32x1.5 mm locknut [2] to the M32 thread on the body of the OM16 [1] and hand tighten to secure the OM16 to the mounting bracket [3].
3. Tighten the two locknuts [2] to 5 – 7 Nm (3.68 – 5.2 lbf.ft).
4. Ensuring that the requirements detailed in Figure 2.19 are met, decide on the most suitable position in which to mount the OM16 [item 1, Figure 2.21] to the machine tool. Holding the OM16 and bracket [3] in the required position, mark the position of the bracket's M10 clearance hole onto the mounting surface of the machine tool.
5. Depending on the fixing method you wish to employ, either:
 - Drill and tap the mounting on the machine tool to produce an M10 threaded hole, then fix the bracket [3] to the machine tool using an M10 screw of sufficient length (local supply) *or*
 - Drill an M10 clearance hole through the mounting, then fix the bracket [3] to the machine tool using an M10 nut and bolt (local supply).



1. OM16
2. M32x1.5 mm locknut (2 off)
3. Mounting bracket
4. Orange LED

Figure 2.21 – Mounting the OM16 on the machine tool using the mounting bracket

Fitting flexible conduit to the OM16 cable

CAUTION

FAILURE TO ADEQUATELY PROTECT THE OM16 CABLES CAN RESULT IN SYSTEM FAILURE DUE TO CABLE DAMAGE OR THE INGRESS OF COOLANT.

Note...

It is recommended that Thomas and Bretts ¼ inch (11 mm) diameter SHURESEAL (Part No. TBEF 0250-50), or equivalent, is used to protect the RMM2 cables.

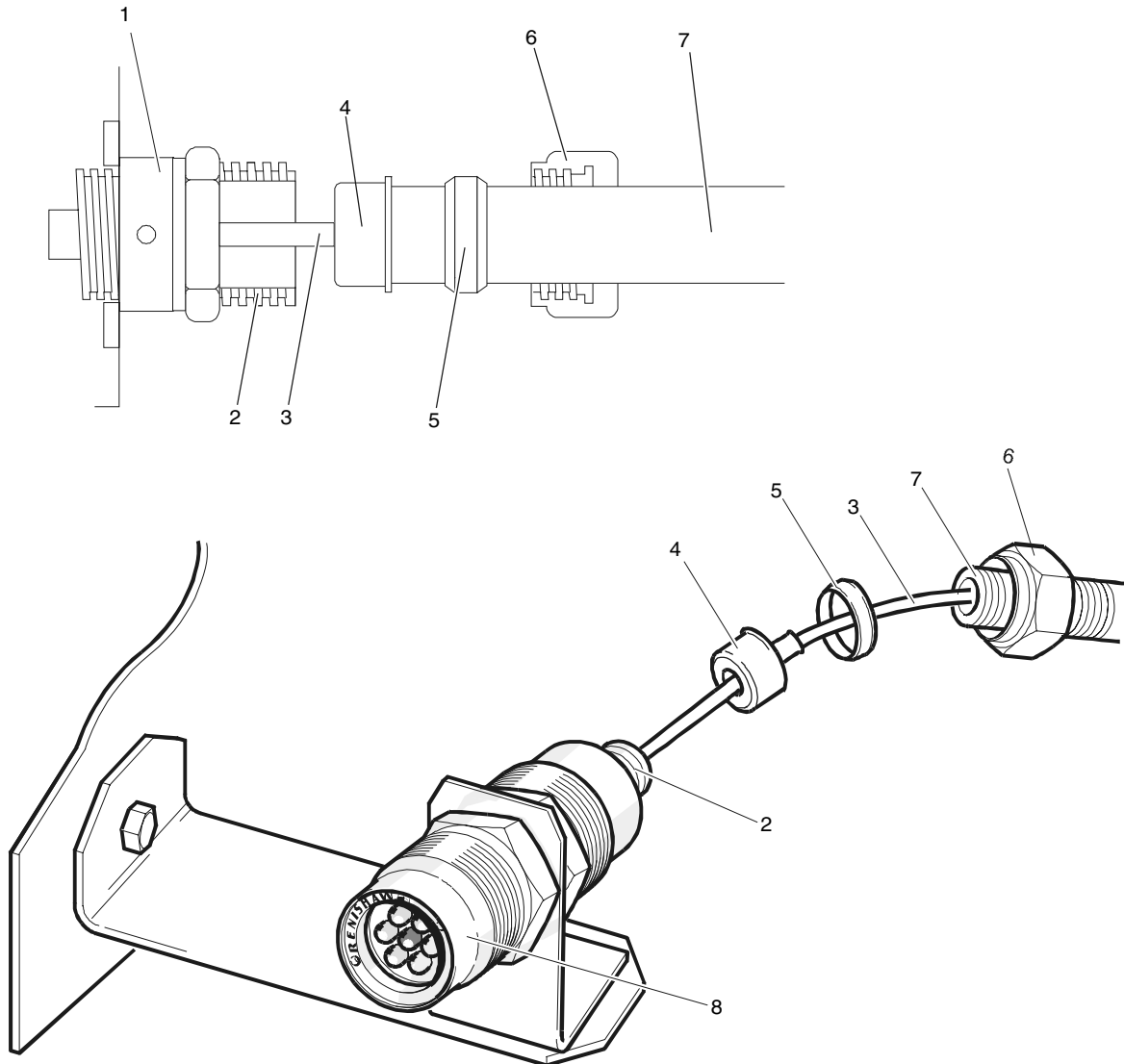
When tightening or loosening gland nut [6], it is important to ensure that gland nut [1] is not inadvertently loosened.

Whilst coolant and dirt are prevented from entering the OM16 by a cable sealing gland, it is important that the cable itself is protected from physical damage by the fitting of flexible conduit. To allow fitting, the OM16 is fitted with a Renishaw conduit adaptor.

To fit flexible conduit to the OM16, carry out the following (see Figure 2.22):

1. Route the cable of OM16 [8] to connect with the terminal connector on the rear of the MI16.
2. Cut flexible conduit [7] to the required length.
3. Release and remove gland nut [6] from the screwed adaptor [2]. Take care not to slacken gland nut [1].
4. Remove gland nut [6] from the OM16 cable [3].
5. Carefully thread the OMI cable [3] through the flexible conduit [7].
6. Screw the conduit termination piece [4] into the end of the flexible conduit [7].
7. Push the flexible conduit [7] upwards until the conduit termination piece [4] locates within the screwed adaptor [2].
8. Ensuring the conduit is fully located through the plastic olive [5], Fit gland nut [6] to the screwed adaptor [2]. Hand tighten the gland nut to retain the conduit in place.

9. Ensuring gland nut [1] is not inadvertently slackened, tighten gland nut [6] an additional 1½ to 2½ turns; this action will form a seal between the flexible conduit [7] and the screwed adaptor [2] that conforms to BS5490 (IEC 529) IP67.



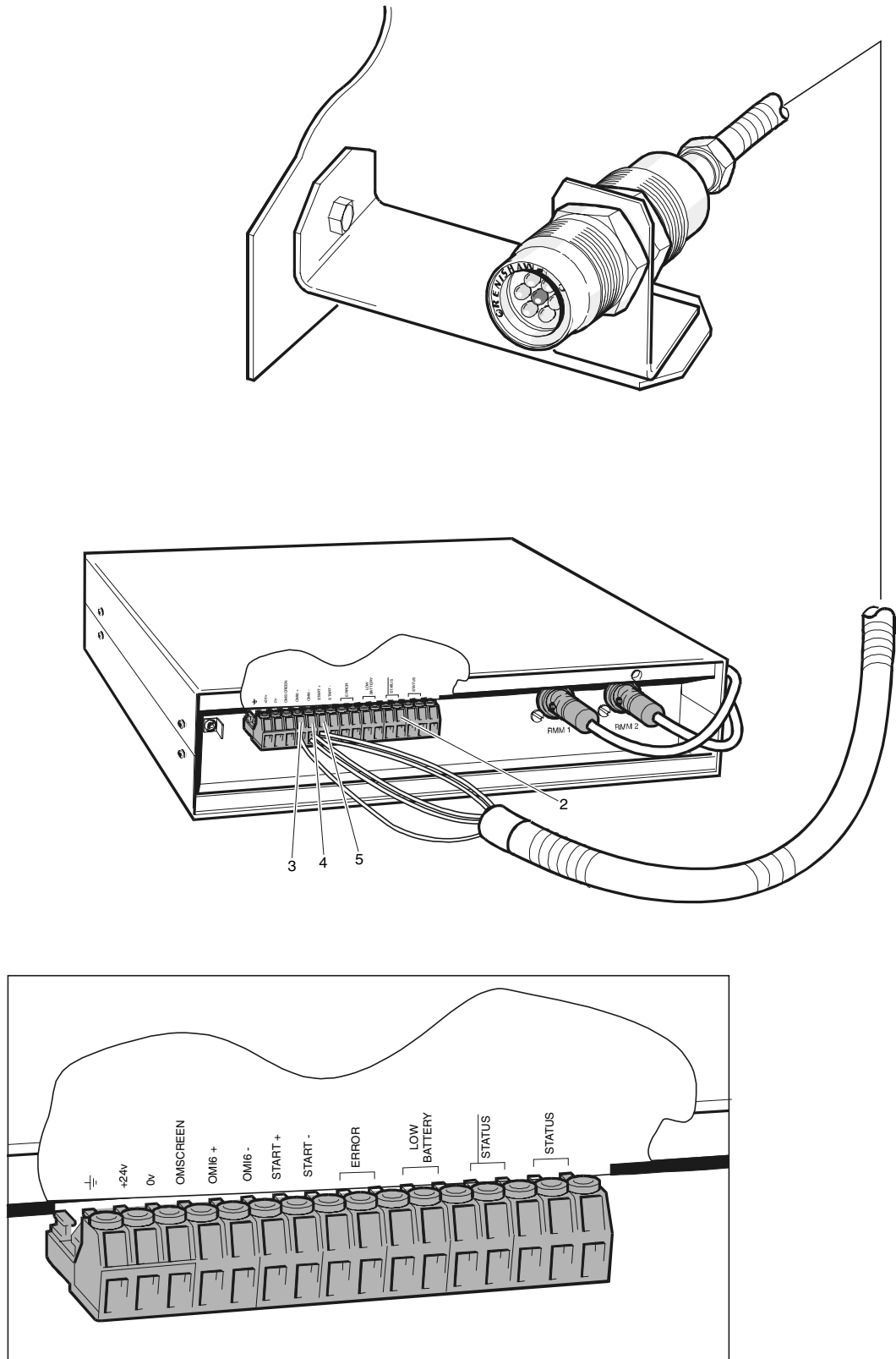
1. Gland nut
2. Screwed adaptor
3. OM16 cable
4. Conduit termination piece
5. Plastic olive
6. Gland nut
7. Flexible conduit
8. OM16

Figure 2.22 – Fitting flexible conduit to the OM16 cable

Connecting the OM16 to the MI16

To connect the OM16 to the MI16, carry out the following (see Figure 2.23):

1. Connect the cable screen of the OM16 cable to the 'OM SCREEN' terminal [3] on terminal block [2] (located on the rear panel of the MI16 [1]). Secure OM16 cable screen within the ground connector using the terminal screw.
2. Connect both the red wire and the yellow wire of the OM16 cable to the 'OM16+' terminal [4] on terminal block [2]. Secure both wires within the terminal using the terminal screw.
3. Connect both the blue wire and the green wire of the OM16 cable to the 'OM16 -' terminal [5] on terminal block [2]. Secure both wires within the terminal using the terminal screw.



1. MI16
2. Terminal block
3. 'OMM SCREEN' terminal
4. 'OM16+' terminal
5. 'OM16-' terminal

Figure 2.23 – Connecting the OM16 to the MI16

Connecting the MI16 to the machine tool CNC controller and 24 V power supply

MI16 outputs

There are four solid state relay (SSR) outputs, comprising two probe complimentary outputs, an error output and a low battery output. Each output has a maximum current of ± 40 mA and a maximum voltage of ± 50 V peak. The output waveforms are as shown in Figure 2.24 below.

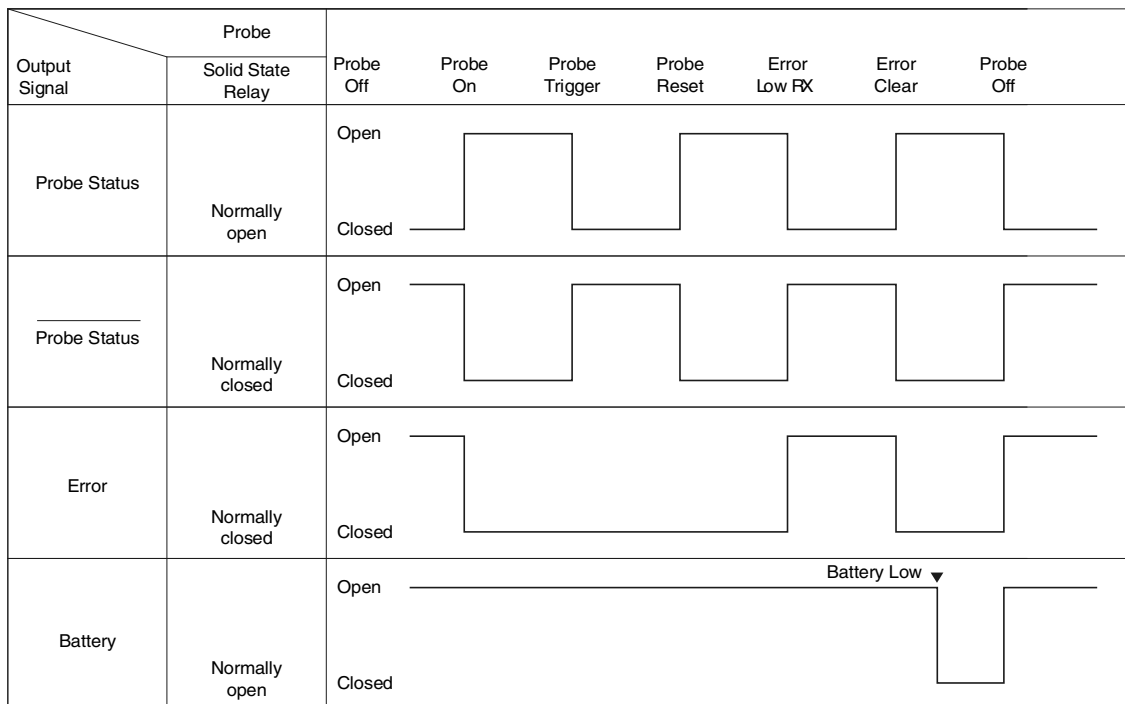


Figure 2.24 – MI16 output waveforms

Connecting the MI16 to the machine tool CNC controller

To connect the MI16 to the machine tool CNC controller, carry out the following (see Figure 2.25):

WARNING

THE MI16 MACHINE INTERFACE MUST BE SUPPLIED FROM A 24 V DC SELV POWER SUPPLY WHICH CONFORMS FULLY TO THE ESSENTIAL REQUIREMENTS OF BS EN 61010 OR SIMILAR SPECIFICATION.

Notes...

The way in which the MI16 is required to be connected to the machine tool CNC controller will determine the number of cores needed. However, it is recommended that a single twelve core cable (conforming to DEF STAN 61-12 (Part 4) or equivalent) is used.

For specific information on how to connect the MI16 to your machine tool CNC controller, refer to Renishaw publication – “Probe systems installation manual for machine tools” (Part No. H-2000-6040). Where necessary, this may be obtained from your supplier or nearest Renishaw company; refer to the last page of this publication for a list of countries where Renishaw companies are located.

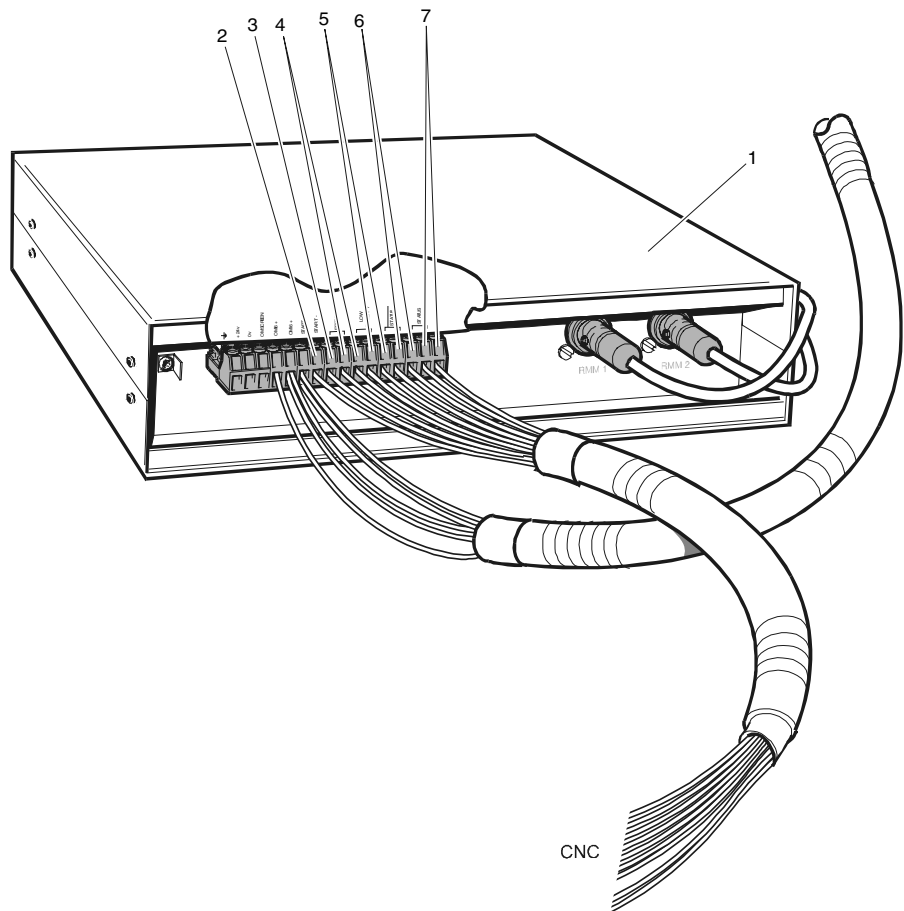
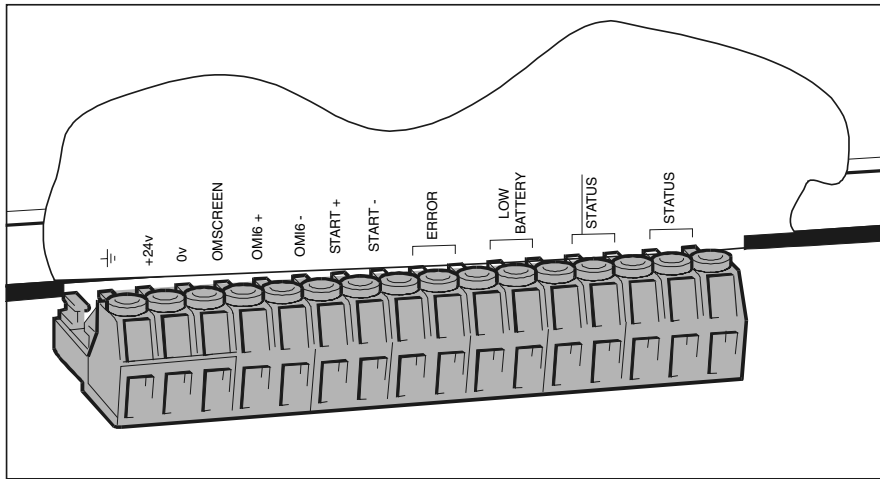
For specific information on your machine’s CNC controller, contact the manufacturer or supplier of the machine tool to which you are installing the MP16 touch-trigger probe system.

Obtain a suitable length of screened multicore cable offering twelve PVC insulated, PVC-sheathed, cores. Each core must contain seven 0.2 mm diameter wires.

1. If you wish to activate and deactivate the RMP2 using M code, connect the machine tool’s CNC controller to the ‘START+’ terminal [2] and ‘START-’ terminal [3] on the MI16 [1] as required.
2. If you wish the MI16 to indicate system errors, connect the machine tool’s CNC controller to the ‘ERROR’ terminals [4] on the MI16 [1] as required.

Continued on Page 2-58

3. If you require the MI16 to indicate when the batteries within RMP2 should be renewed, connect the CNC controller to the 'LOW BATTERY' terminals [5] on the MI16 [1] as required.
4. Connect the CNC controller to either:
 - A. The 'STATUS' terminals [6] on the MI16 [1], if you require the probe status solid state relay to be normally closed when the probe is seated, and open when the probe 'triggers'.
 - B. The 'STATUS' terminals [7] on the MI16 [1], if you require the probe status solid state relay to be normally open when the probe is seated, and closed when the probe 'triggers'.



1. MI16
2. 'START+' terminal
3. 'START-' terminal
4. 'ERROR' terminal (2 off)
5. 'LOW BATTERY' terminal (2 off)
6. 'STATUS' terminal (2 off)
7. 'STATUS' terminal (2 off)

Figure 2.25 – Connecting the MI16 to the machine tool CNC controller

Connecting the MI16 to the machine tool 24 V power supply

Where applicable, connect the MI16 to your machine tool's 24 V power supply as follows (see Figure 2.26). If your machine tool does not have a 24 V power supply, obtain a Renishaw PSU3 power supply unit (Part No. A-2019-0018) and connect to the MI16 in accordance with “**Connecting the PSU3 to the MI16**” later in this chapter:

Notes...

It is recommended that the wires used to connect the machine tool's power supply to the MI16 conform to DEF 61-12 part 6 type 2, BS4808, or equivalent specification.

The output voltage from the machine tool must be a nominal 24 V dc unregulated 0.5 A.

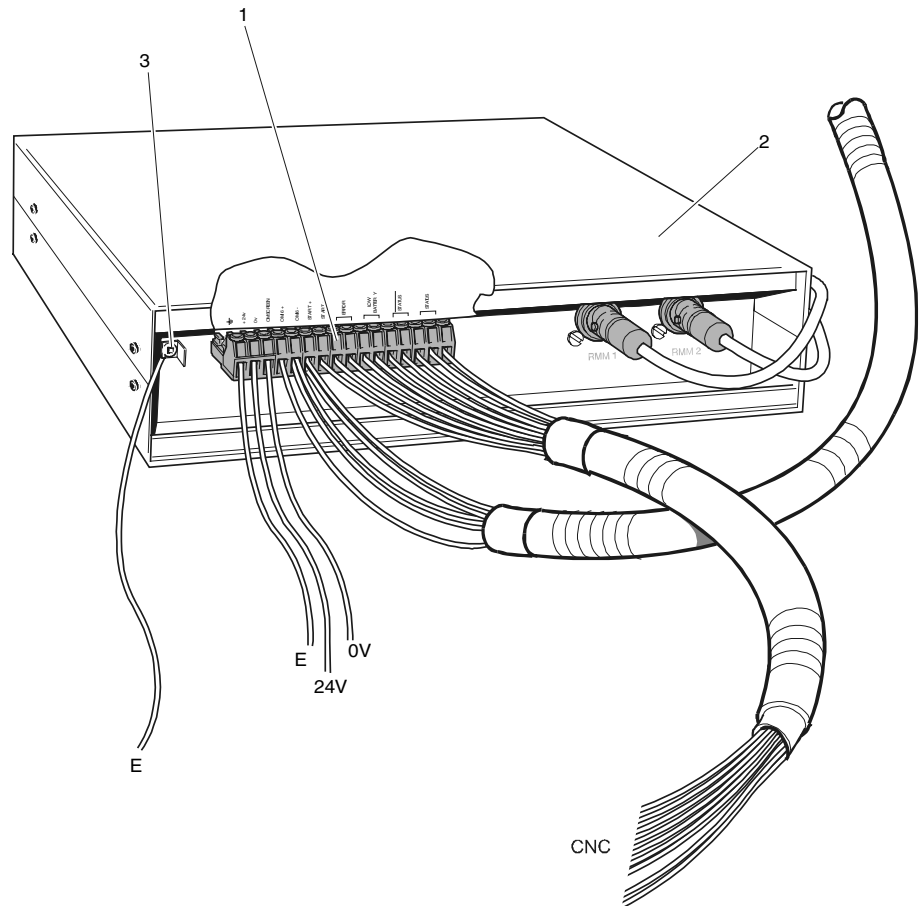
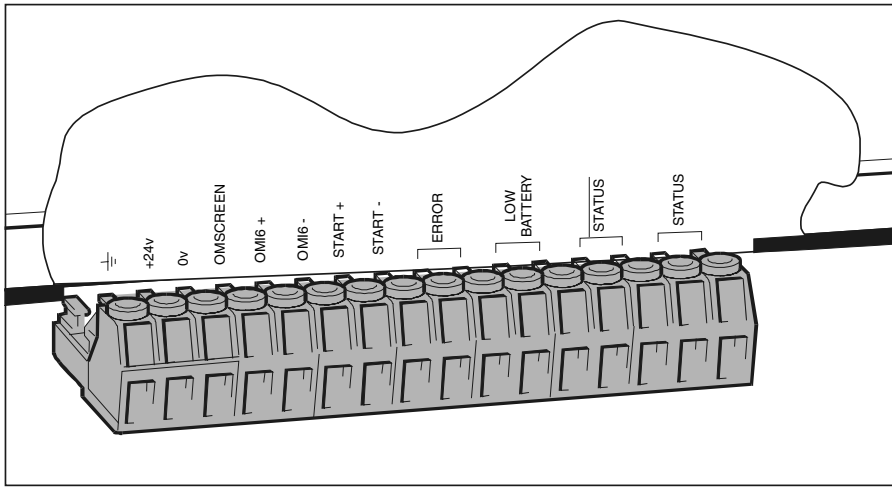
1. Obtain three suitable lengths of 1.55 mm nominal diameter PVC or PTFE insulated wires. Each wire should contain sixteen 0.2 mm diameter strands. It is recommended that the following colours are used:

Connection	Colour of wire
+24 V	Red
0 V	Black
Earth	Green

2. Connect a length of wire to each of the following connectors located within terminal block [1] and retain with terminal screws. If you are using the recommended colour-coding, connect the wires as follows:

Colour of wire	Terminal block connection
Green	Terminal 1 (Ground)
Red	Terminal 2 (24 V)
Black	Terminal 3 (0 V)

Continued on Page 2-62



1. Terminal block
2. MI16
3. Chassis ground connector

Figure 2.26 – Connecting the MI16 to the machine tool's 24 Vdc supply

WARNINGS

ISOLATE THE 24 V POWER SUPPLY PRIOR TO CONNECTING THE MI16 MACHINE INTERFACE UNIT.

TO ENSURE THE SAFETY OF ALL PERSONNEL, IT IS IMPORTANT THAT THE GROUNDING OF THE MI16 MACHINE INTERFACE UNIT CASE AND 0 V SUPPLY FULLY CONFORMS WITH ALL SAFETY REGULATIONS IN FORCE IN COUNTRY OF USE. .

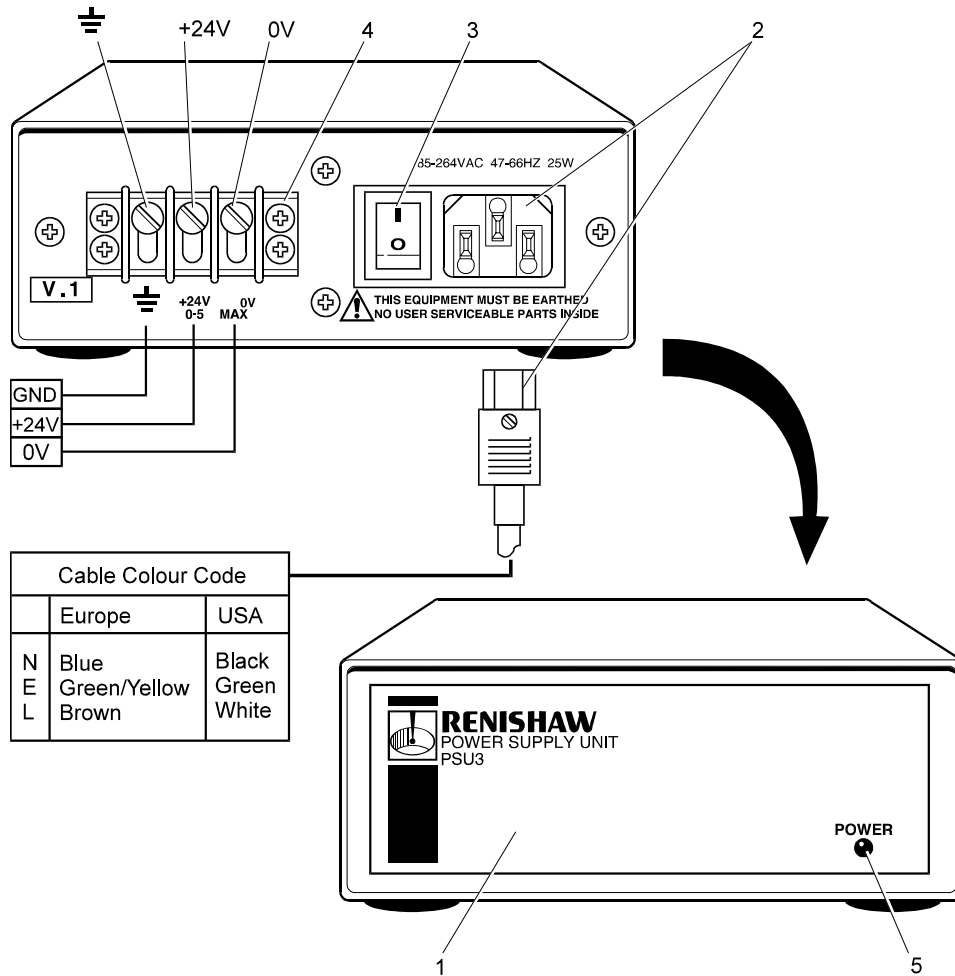
THE MI16 MACHINE INTERFACE IS EQUIPPED WITH AN INTERNAL POWER TRANSFORMER WHICH ENSURES THAT ITS CASING IS FULLY ISOLATED FROM ANY EXTERNAL POWER SUPPLY. TO MAINTAIN THIS LEVEL OF ISOLATION, IT IS IMPORTANT TO ENSURE THAT THE 24 V AND 0 V SUPPLY WIRES ARE FULLY ISOLATED FROM THE CASE OF THE MI16 MACHINE INTERFACE UNIT.

THE MI16 MACHINE INTERFACE UNIT IS EQUIPPED WITH A CHASSIS GROUND CONNECTOR . IT IS IMPORTANT THAT THIS CONNECTOR IS CONNECTED TO THE NEAREST AVAILABLE EARTH TERMINAL.

3. Connect the (red) wire from the 24 V terminal of the MI16 [2] to the 24 V terminal of the machine tool's 24 V dc power supply.
4. Connect the (black) wire from the 0 V terminal of the MI16 [2] to the 0 V terminal of the machine tool's 24 V dc power supply.
5. Connect the (green) wire from the 'Ground' terminal of the MI16 [2] to the earth (E) terminal of the machine tool's 24 V dc power supply.
6. Using a suitable length of 16/0.2 cable, connect the chassis ground connector [3] of the MI16 [2] to the nearest available earth (E) terminal on the machine tool.
7. Switch on the 24 V dc power supply to the MI16.

Mounting the optional PSU3 to the machine tool

It is recommended that the PSU3 (see Figure 2.27) is mounted within the machine tool's electrical cabinet.



1. PSU3
2. Mains plug and socket
3. ON/OFF switch
4. Output terminal block
5. 'POWER' LED

Figure 2.27 – The PSU3 (optional)

Connecting the optional PSU3 to the mains power supply

Note...

The PSU3 power supply unit will operate on 90 – 137 V (100 – 125 V nominal) 45/65 Hz, (LO) or 180 – 275 V (200 – 250 V nominal) 45/65 Hz (HI) mains power supplies.

To connect the PSU3 to the mains power supply, carry out the following (refer to Figure 2.27):

1. Remove plug from the mains plug and socket [2] at the rear of the PSU3 housing [1].
2. Release and remove the screw securing the two halves of the plug together; separate the two halves of the plug.

Note

To ensure the best possible protection from the environment, it is recommended that the mains cable used to connect the PSU3 to the mains power supply is fitted with the appropriate plug moulded to one end.

3. Obtain a suitable length of standard mains cable.
4. Where necessary, fit a European Schuko, American mains, or BS 1363/A standard plug to the cable as applicable.
5. Release the cable clip screws within the plug and insert the free end of cable through the cable clip.
6. Connect the mains cable to mains plug and secure cable in position using the cable clip.
7. Assemble both halves of the mains plug together and secure with screw.
8. Reassemble the mains plug and socket [2] together.
9. Connect the mains cable to mains power supply.

Mounting the RMP2/RMP2-S on the machine tool

CAUTION

BEFORE MOUNTING THE RMP2/RMP2-S ON THE MACHINE TOOL, IT IS IMPORTANT TO CHECK THAT THE RMP2/RMP2-S IS MOUNTED SECURELY ON ITS SHANK.

Mounting of the RMP2/RMP2-S on the machine tool spindle is identical to that used for mounting your cutting tools. When mounting the RMP2/RMP2-S, ensure that:

- The probe status LED is aligned so that it is visible to the operator.
- Stylus on-centre adjustment has been performed in accordance with the instructions contained in “**Stylus on-centre adjustment**” later in this chapter.

Stylus on-centre adjustment

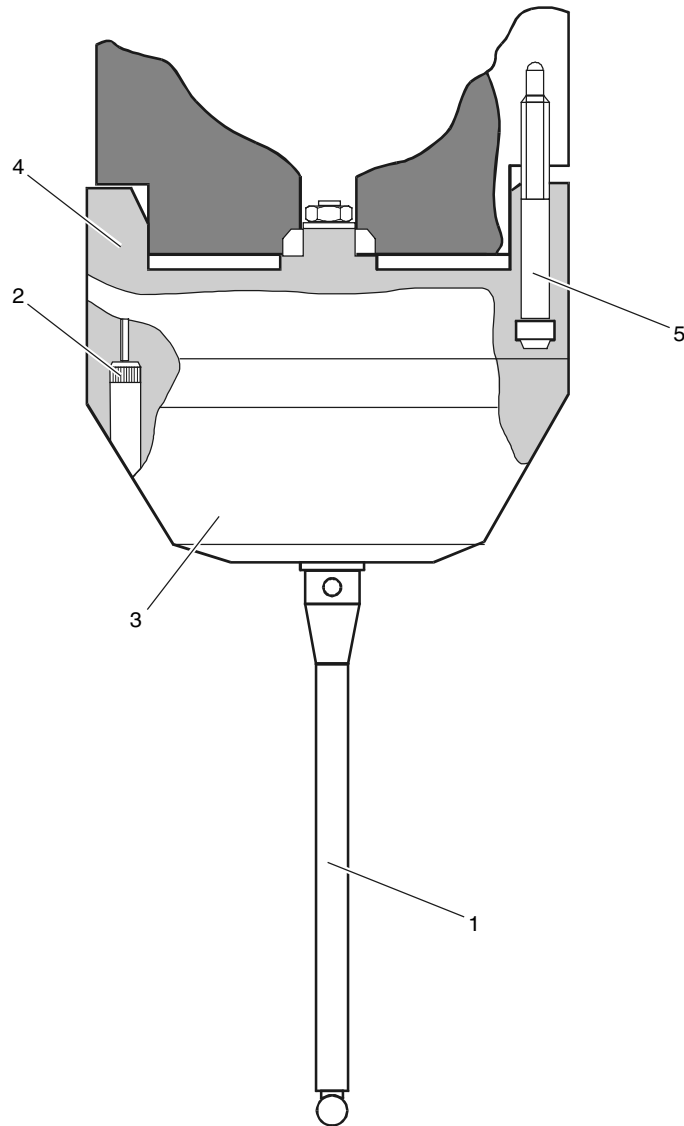
Note...

Stylus alignment need only be approximate, except in the following circumstances:

- Where alignment must be as exact as possible due to the use of probe vector software.
- Where the probe must be parallel to the spindle axis to prevent the stylus stem contacting the workpiece when gauging deep holes.
- Where the machine's control software is unable to compensate for the offset of the stylus.

To perform on-centre adjustment of the probe stylus, carry out the following (see Figure 2.28):

1. Place the tip of a dial test indicator (DTI) against the ball diameter of the stylus [1]. Set DTI clock at zero
2. Rotate the machine spindle and observe the reading on the DTI clock. If the total stylus run out is 5 μm (0.0002 in.) or less, no further action is required. If the run out of the stylus is greater than 5 μm , perform steps 3 through 5 below.
3. Using the 2.5 mm AF allen key provided, release and remove the two M3x8 mm socket head capscrews [2] securing the cover [3] to the MP3 probe [4]. Remove cover from probe.
4. Using the 3 mm AF allen key supplied, gradually and systematically adjust the four M4x35 mm socket head capscrews [5] (rotating and 'clocking' the stylus ball after each adjustment) until the total run out of the stylus is 5 μm (0.0002 in.) or less. Once the final setting is achieved, tighten the four M4x35 mm socket head capscrews to 3 Nm (2.21 lbf.ft).
5. Replace the cover [3] and secure with the two M8x8 mm socket head capscrews [2]. Using the 2.5 mm AF allen key, tighten the two capscrews to 1 Nm (0.8 lbf.ft).



1. Stylus
2. M3x8 mm socket head capscrew (2 off)
3. Cover
4. MP3
5. M4x35 mm socket head capscrew (4 off)

Figure 2.28 – Stylus on-centre adjustment of the MP3 probe stylus

System verification

After installation of the MP16 touch-trigger probe system on your machine tool, it is important to verify that the system operates correctly. The system functions that should be checked are:

- Probe activation and de-activation.
- Probe signal transmission.
- System diagnostics (transmission errors/battery condition).

Should the MP16 touch-trigger probe system fail to meet any of the criteria listed in this section, please refer to “**Chapter 4 – System maintenance and troubleshooting**” for assistance.

Verifying the correct activation and de-activation of the probe

To verify that the probe is activating and de-activating correctly, carry out the following procedure:

1. Activate the power supply to the MI16. Observe the front panel of the MI16 and verify the following:
 - The ‘START MODE’ LEDs corresponding to the selected mode of operation have illuminated.
 - The ‘CHANNEL’ display window shows the correct channel number.
2. Mount the RMP2/RMP2-S on the machine tool spindle. If operating with an RMP2, send the appropriate start command (M code) to activate the probe. Correct activation of the RMP2/RMP2-S is indicated by:
 - Full illumination of the ‘RX SIGNAL’ display of the MI16.
 - The probe status LED of the RMP2/RMP2-S flashing at 1 second intervals.
 - Illumination of the ‘PROBE STATUS’ LED of the MI16, indicating that the probe is ‘seated’.

3. Either, send the appropriate command (M code) to de-activate the RMP2 or remove the RMP2-S from the machine tool spindle (as applicable). With the radio module probe de-activated/removed from the machine spindle, ensure that the following has occurred:
- That the 'RX SIGNAL' display of the MI16 has extinguished.
 - That the probe status LED of the radio module probe has extinguished.
 - That the 'PROBE STATUS' LED of the MI16 has extinguished.
 - That the 'PROBE ERROR' LED of the MI16 has illuminated.
 - That the 'RX SIGNAL LOW' LED of the MI16 has illuminated.
 - That the 'START MODE' LEDs of the MI16 which correspond to the selected mode of operation have remained illuminated.
 - That the 'CHANNEL' display window of the MI16 has continued to display the correct channel number.

Verifying the correct transmission of probe signals

Verifying the correct configuration of the MI16 probe status solid state relay

To verify the correct configuration of the MI16 probe status solid state relay, carry out the following procedure:

1. Mount the RMP2/RMP2-S within the machine tool spindle. If operating with an RMP2, send the appropriate start command (M code) to activate the probe.
2. 'Trigger' the MP3 by hand and verify the correct configuration of the MI16 probe status SSR by observing the probe signal diagnostics of the CNC controller. If your machine controller does not have this level of functionality, carry out step 3 below.

CAUTION

WHEN FIRST RUNNING A PROBING CYCLE, IT IS RECOMMENDED THAT THE PROGRAM IS RUN WITH ALL RAPID AND FEEDRATE MOTION AT A REDUCED RATE TO AVOID DAMAGE OCCURRING TO EITHER THE MACHINE TOOL OR TO THE PROBE.

3. Run a probing cycle under full CNC control and ensure that the machine tool is detecting each probe 'trigger' signal. Also ensure that the machine tool stops on receipt of each probe 'trigger' signal by the CNC controller.

Verifying correct signal transmission throughout the full working envelope of the machine tool

To verify correct signal transmission of the MP16 touch-trigger probe system throughout the full working envelope of the machine tool, carry out the following procedure:

1. Systematically move the probe to several positions about the extreme edges of the machine tool's working envelope. At each chosen position, 'trigger' the probe by hand and ensure that the following occurs:
 - The 'RX SIGNAL' display of the MI16 illuminates fully.
 - The 'PROBE STATUS' LED of the MI16 extinguishes when the probe is 'triggered' and illuminates when the probe is 'seated'.

Verifying the system diagnostics

The MP16 touch-trigger probe system is supplied with the following diagnostic circuits:

- A 'probe error' diagnostic circuit which provides the operator with a visible indication that an error has occurred in signal transmission.
- A 'low battery' diagnostic circuit which provides the operator with a visible indication that the batteries within the RMP2/RMP2-S have too low a voltage (below 7 V).

Verifying the correct operation of the 'probe error' diagnostic circuit

To verify that the 'probe error' diagnostic circuit is functioning correctly, carry out the following procedure:

1. Attempt to carry out a probing cycle with each RMM2 disconnected from the 'RMM1' and 'RMM2' connectors located on the rear of the MI16. The machine's CNC controller should identify this disconnection as an error (as it will be unable to establish radio transmission), and raise an appropriate alarm message on its screen. This event should occur whether the MI16 'error' output SSR is being monitored by the CNC controller or not. However, the alarm displayed will depend on the following:
 - If the 'error' output SSR is being monitored by the CNC controller then the controller, having sufficient information to correctly identify its failure to establish transmission, will display an appropriate alarm message to indicate this.
 - If the 'error' output SSR is not being monitored by the CNC controller then the controller, not having sufficient information to correctly identify its failure to establish transmission, will 'see' the probe as being 'triggered' when it should in fact it be 'seated' at commencement of the probing cycle. Thus, the alarm message displayed by the CNC controller will indicate a probe error rather than a transmission failure.

Verifying the correct operation of the 'low battery' diagnostic circuit

To verify that the 'low battery' diagnostic circuit is functioning correctly, carry out the following procedure:

1. Obtain a suitable pair of batteries (Duracell MN1604 6LR61 or equivalent) which have been partly discharged (each battery, when measured, should produce a voltage across its terminals not exceeding 6.5 V).

Note...

The RMP2/RMP2-S radio module probe will enter its programming mode whenever battery contact is interrupted or the batteries replaced.

2. Substitute the existing batteries within the RMP2/RMP2-S with these partly discharged batteries; refer to “**Installing the batteries into the RMP2/RMP2-S**” earlier in this chapter.
3. Activate the RMP2/RMP2-S; refer to “**Chapter 3 – System operation**”.
4. Observe the 'PROBE LOW BATTERY' LED located on the front panel of the MI16. If the 'low battery' diagnostic circuit is functioning correctly, then this LED will be illuminated. In addition, if the 'low battery' diagnostic circuit SSR output is being monitored by the CNC controller then the controller should also produce an appropriate alarm.
5. Remove the partly discharged batteries from the RMP2/RMP2-S and replace with the original batteries supplied; refer to “**Installing the batteries into the RMP2/RMP2-S**” earlier in this chapter.

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CHAPTER 3

System operation

This chapter provides you with detailed, step-by-step instructions on how to operate the Renishaw MP16 touch-trigger probe system on your machine tool.

Contained in this chapter

■ Switching on the RMP2..... 3-2	■ MP3 touch-trigger probe – performance characteristics3-14
■ Switching on the RMP2-S 3-8	■ System operation3-16
■ Datuming the MP3 touch-trigger probe 3-10	■ Switching off the RMP23-17
■ Selecting the correct stylus..... 3-12	■ Switching off the RMP2-S.....3-23
■ Probing techniques – MP3 touch-trigger probe 3-13	

Operating the MP16 touch-trigger probe system on your machine tool

CAUTION

PRIOR TO PROBE SYSTEM OPERATION, IT IS VITALLY IMPORTANT THAT YOU FULLY UNDERSTAND THE SOFTWARE WITH WHICH YOU WISH TO 'DRIVE' THE PROBE. INCORRECT PROGRAMMING CAN RESULT IN DAMAGE TO BOTH THE MACHINE, WORKPIECE AND TO THE PROBE ITSELF.

Switching on the RMP2

CAUTION

BEFORE SWITCHING ON THE PROBE, ENSURE THAT THE SHANK IS MOUNTED SECURELY IN THE MACHINE TOOL SPINDLE.

Before system operation, the RMP2 must be made active by one of the following 'switch on' methods. Each option is user selectable and will have been programmed into the MI16/RMP2 during installation of the MP16 touch-trigger probe system onto the machine tool (see "**Chapter 2 – System installation**"). The start mode selected will be indicated by illumination of the corresponding 'START MODE' LED located within the front panel of the MI16:

- **Spin:** where the RMP2 is switched on, by way of a centrifugal switch, by rotating it in the machine tool spindle at 500 rpm (± 50 rpm) for a minimum of 1 second.
- **Optical:** where an optical signal, generated by the optional OM16 in response to a machine M code, switches on the RMP2.

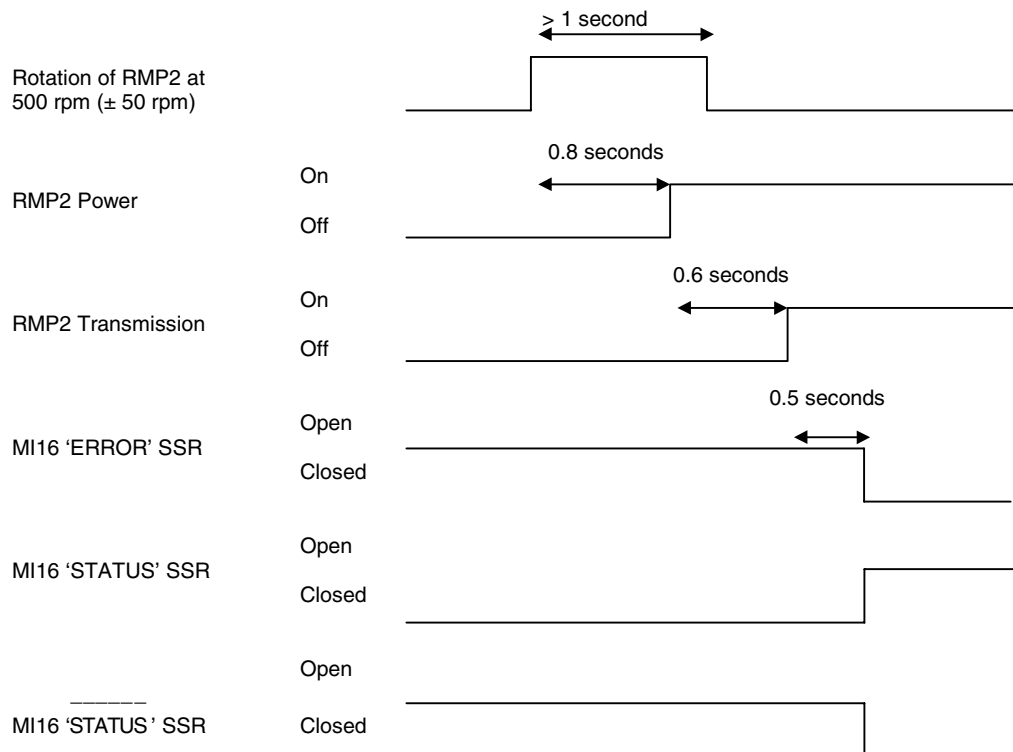
Switching on the RMP2 using the 'spin' option

WARNING

NEVER SPIN THE PROBE WITHIN THE MACHINE TOOL SPINDLE AT SPEEDS EXCEEDING 1000 RPM

To activate the RMP2 using the 'spin' option (this option must have been programmed into the MI16/RMP2 in accordance with “**Chapter 2 – System installation**” if it is to be used), carry out the following (see Figure 3.1):

1. Mount the RMP2 [1] to the machine tool spindle.
2. Activate the power supply to the MI16 [3]. Observe the front panel of the MI16 and verify that the 'SPIN' LED [4] is illuminated. If this LED is not illuminated, it will be necessary to re-program the MI16/RMP2 in accordance with “**Chapter 2 – System installation**”.
3. Rotate the RMP2 at 500 rpm (± 50 rpm) for a minimum of 1 second. During the 'spin-on' cycle, the sequence of events shown below will occur.



Continued on Page 3-4

4. With the RMP2 [1] switched on, verify the following:
 - The 'RX SIGNAL' display [9] of the MI16 [3] has a minimum of three red segments and one yellow segment illuminated.
 - The 'RX SIGNAL LOW' LED [10] of the MI16 [3] is extinguished.
 - The 'PROBE ERROR' LED [11] of the MI16 [3] is extinguished.
 - The 'PROBE STATUS' LED [12] of the MI16 [3] is illuminated.
 - The probe status LED [2] of the RMP2 [1] is flashing green at 1 second intervals.
5. If the above conditions are met, the MP16 touch-trigger probe system is ready for use and the MP3 probe should be datumed in accordance with **"Datuming the MP3 touch-trigger probe"** later in this chapter.

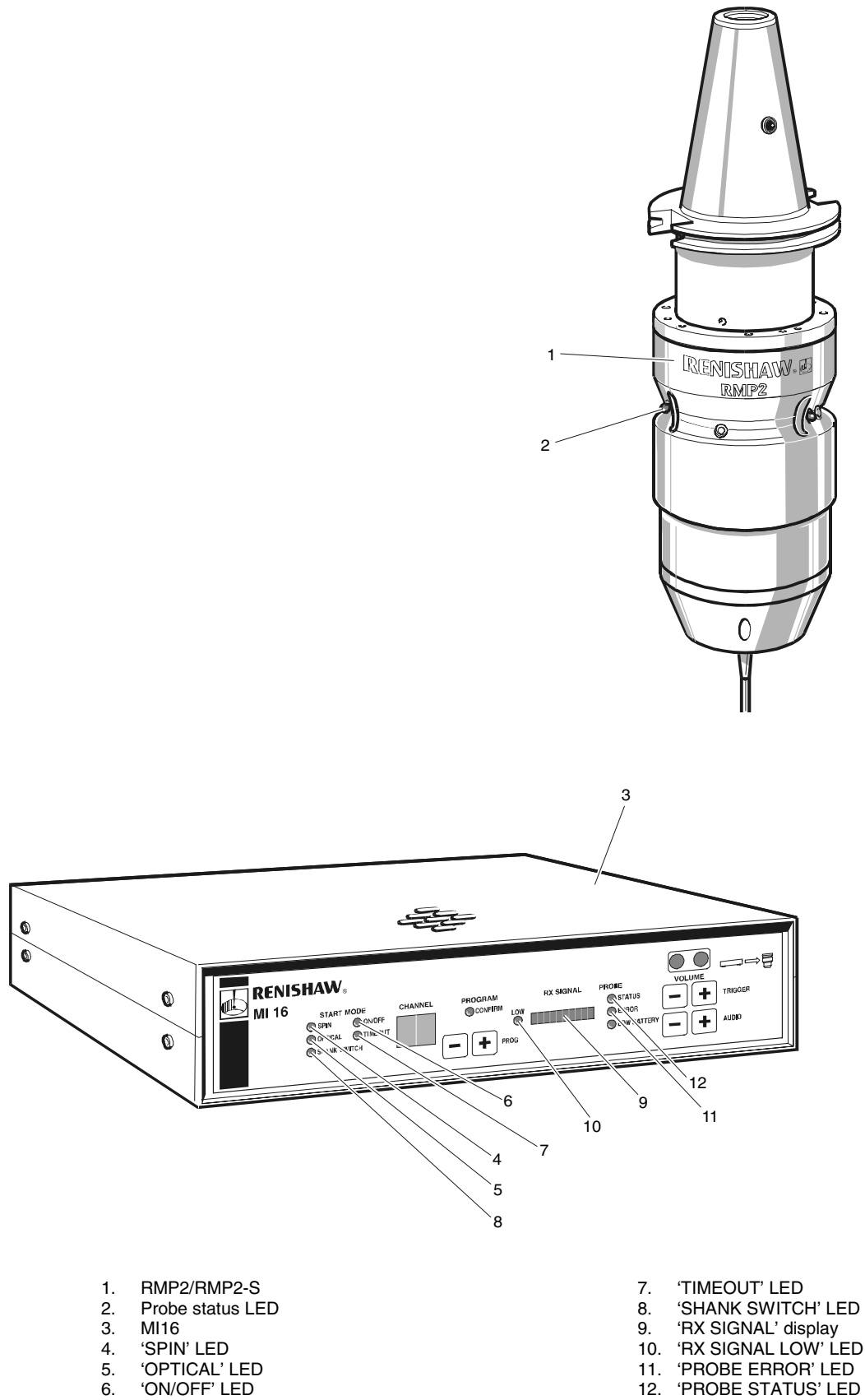
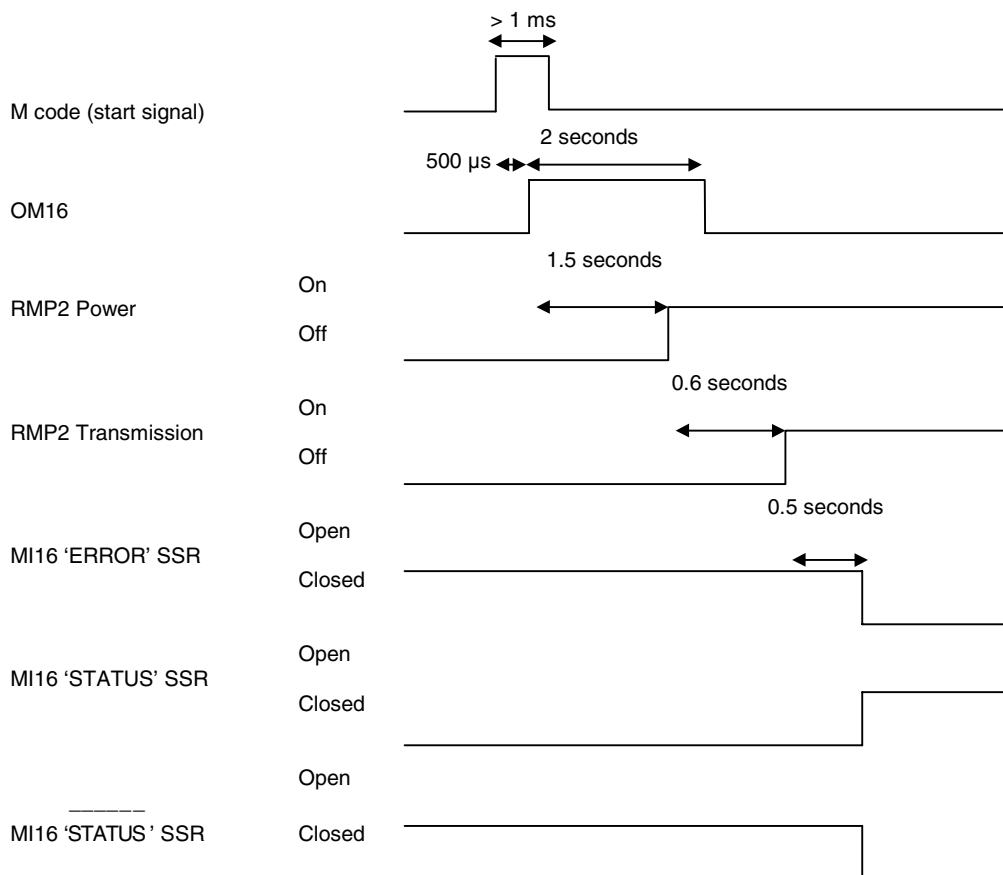


Figure 3.1 – MI16 front panel and RMP2/RMP2-S probe status LED

Switching on the RMP2 using an M code (optical) signal

To activate the RMP2 using the M code (optical) option (this option must have been programmed into the MI16/RMP2 in accordance with “**Chapter 2 – System installation**” if it is to be used), carry out the following (see Figure 3.1). Please note that a Renishaw OM16 will need to be fitted to your machine tool for this method to work:

1. Mount the RMP2 [1] to the machine tool spindle.
2. Activate the power supply to the MI16 [3]. Observe the front panel of the MI16 and verify that the ‘OPTICAL’ LED [5] is illuminated. If this LED is not illuminated, it will be necessary to re-program the MI16/RMP2 in accordance with “**Chapter 2 – System installation**”.
3. Supply the MI16 with a CNC generated M code (start signal) for a minimum duration of 1 ms (maximum duration is 1 second). During the ‘optical’ cycle, the sequence of events shown below will occur.

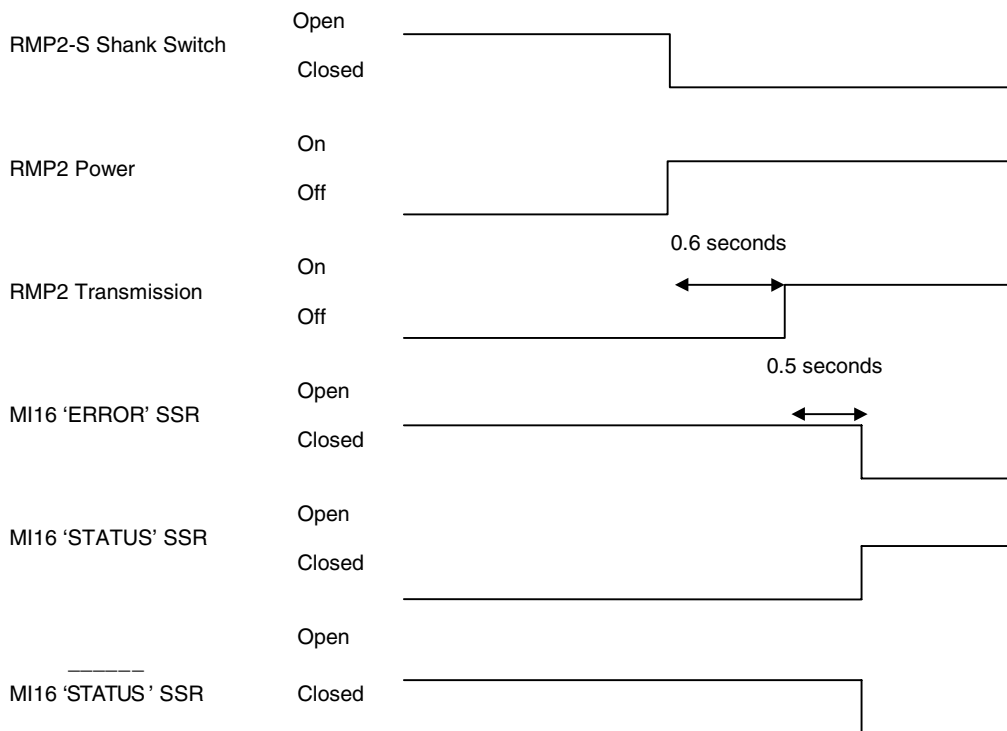


4. With the RMP2 [1] switched on, verify the following:
 - The 'RX SIGNAL' display [9] of the MI16 [3] has a minimum of three red segments and one yellow segment illuminated.
 - The 'RX SIGNAL LOW' LED [10] of the MI16 [3] is extinguished.
 - The 'PROBE ERROR' LED [11] of the MI16 [3] is extinguished.
 - The 'PROBE STATUS' LED [12] of the MI16 [3] is illuminated.
 - The probe status LED [2] of the RMP2 [1] is flashing green at 1 second intervals.
5. If the above conditions are met, the MP16 touch-trigger probe system is ready for use and the MP3 probe should be datumed in accordance with “**Datuming the MP3 touch-trigger probe**” later in this chapter.

Switching on the RMP2-S

To activate the RMP2-S, carry out the following (see Figure 3.1):

1. Activate the power supply to the MI16 [3]. Observe the front panel of the MI16 and verify that the 'SHANK SWITCH' LED [8] is illuminated. If this LED is not illuminated, it will be necessary to re-program the MI16/RMP2 in accordance with "Chapter 2 – System installation".
2. Mount the RMP2-S [1] to the machine tool spindle. As the RMP2-S is automatically activated whenever the shank to which it is attached is inserted into the machine tool spindle (this action causing the shank switch to depress to switch on the RMP2-S), the probe will now be activated. The timings of the shank switch, following insertion of the RMP2-S within the machine tool spindle, are as shown below.



3. With the RMP2-S [1] switched on, verify the following:
 - The 'RX SIGNAL' display [9] of the MI16 [3] has a minimum of three red segments and one yellow segment illuminated.
 - The 'RX SIGNAL LOW' LED [10] of the MI16 [3] is extinguished.
 - The 'PROBE ERROR' LED [11] of the MI16 [3] is extinguished.
 - The 'PROBE STATUS' LED [12] of the MI16 [3] is illuminated.
 - The probe status LED [2] of the RMP2-S [1] is flashing green at 1 second intervals.

4. If the above conditions are met, the MP16 touch-trigger probe system is ready for use and the MP3 probe should be datumed in accordance with "**Datuming the MP3 touch-trigger probe**" later in this chapter.

Datuming the MP3 touch-trigger probe

Probe datuming – general

Often referred to as ‘calibration’ or ‘qualifying’, probe datuming involves the measurement of a calibrated feature, usually a precision ring gauge or reference sphere of precisely known diameter.

Datuming software then compares the size of the ring gauge/sphere as ‘measured’ by the probe system to its calibrated size, thus calculating the ‘effective’ diameter of the stylus tip.

The ‘effective’ diameter of the stylus tip will always appear to be smaller than its actual physical size. This is because it includes compensation for the probe’s performance characteristics as well as the machine’s response time. This ‘effective’ diameter, known as the *electronic ball radius*, is automatically applied to each point taken by the probe (added to internal measurements or subtracted from external measurements to provide the true position of an inspection surface).

Datuming within a bored hole, or precisely positioned ring gauge, is also required in order that the position of the stylus ball centre, in relation to the centreline of the machine spindle, can be determined.

As each touch-trigger probe system is unique, it is imperative that you datum your probe:

- Before it is used for the first time.
- When a new, replacement stylus is fitted.
- If it is suspected that the stylus has become distorted.
- Periodically to allow for any thermal growth of the machine tool.
- If the repeatability of relocation of the probe shank is poor (datuming may be required each time the probe is selected).
- Whenever the probe is moved from one machine tool to another.
- Whenever a new shank is fitted to the probe.

Probe datuming – MP3 touch-trigger probe

Notes...

Greatest accuracy will be achieved by minimising stylus on-centre errors during probe installation. This is necessary to allow for poor probe location in the spindle following a tool change, spindle orientation repeatability and ‘*hunting*’ of the spindle orientation if not mechanically clamped.

Stylus ball centre to spindle centre-line relationship can be compensated for by suitable calibration of a known feature.

To relate the actual location of the workpiece surface to the machine tool’s reference frame, it is necessary to datum your MP3 probe. This will allow you to:

- Determine the position of the stylus ball centre-line relative to the machine spindle centre-line.
- Determine the effective size of the stylus ball (electronic ball radius).

Prior to datuming, you will need to establish the optimum length and diameter of the stylus to be used. Refer to “**Selecting the correct stylus**” later in this chapter.

To datum your MP3 probe:

Note

The following instructions assume that the probe is located within the machine spindle, that stylus on- centre adjustment has been performed as detailed in “Chapter 2 – System installation”, and that the probe has been activated.

1. Perform a probe length calibration cycle in accordance with the manufacturer’s instructions supplied with your calibration software.
2. Perform a stylus X, Y offset calibration cycle in accordance with the manufacturer’s instructions supplied with your calibration software.
3. Perform a stylus ball calibration cycle in accordance with the manufacturer’s instructions supplied with your calibration software.

Selecting the correct stylus

Note...

Choosing the best stylus for a given application is critical in order to achieve optimum probe performance. Although cranked styli may be used without a detrimental effect on the measuring performance of the MP3 probe, poor location of the probe shank within the machine spindle, spindle orientation repeatability and/or '*hunting*' of the spindle orientation, may result in a significant degradation in the probe's performance.

The range of styli suitable for use with the MP3 probe include:

- Straight styli with carbon fibre shaft and ruby ball (recommended for straight styli exceeding 100 mm (3.96 in.) in length).
- Straight styli with ceramic shaft and ruby ball (recommended for straight styli up to 100 mm (3.93 in.) in length).
- Straight styli with steel shaft and ruby ball (recommended for straight styli up to 100 mm (3.93 in) in length).
- Disc styli.
- Disc and ball styli.

When selecting a stylus it is important that the stylus length is kept to the minimum required to access all measurable features, and that the stylus type offers the maximum possible stiffness. Factors that effect stiffness are:

- **Joints in the styli:** that tend to reduce rigidity and should therefore be kept to the absolute minimum.
- **Stem diameters:** that are governed by the ball tip diameter of the stylus.
- **Stem material:** that can be of stainless steel, ceramic or carbon fibre.

It is also important to ensure that the stylus ball diameter chosen is as large as is practical. This not only ensures that the stylus will be as stiff as possible, but also reduces the stylus's susceptibility to surface form and surface finish.

Probing techniques – MP3 touch-trigger probe

The way in which a probe is used will have a dramatic effect on its accuracy. Employing the following techniques will ensure that you achieve the best results each and every time you use your MP3 touch-trigger probe:

- To ensure consistent results, always use the same probing speed and velocity during inspection as you used when the probe was datumed.
- It is important to calculate the time that the machine will take before it reaches a constant probing velocity. Thus, when inspecting features that restrict the space within which the stylus can move, always select a ball diameter that will provide an adequate amount of stylus travel prior to the probe triggering.
- Never capture data in the acceleration/deceleration zones.
- Avoid taking probe measurements as the probe reseats.
- Whenever possible, always measure features top and bottom. By doing this you will always identify any taper and distortion that may exist in the feature's form.
- Wherever possible, always measure distances using single points in the same way as you would use a micrometer, depth gauge, height gauge, etc.
- Never assume straightness, squareness or parallelism. Always check each feature to make sure.

MP3 touch-trigger probe – performance characteristics

Probe pre-travel

‘Triggering’ does not only occur when the kinematic location actually breaks, but also when microscopic movement of the contacts is induced by just a few microns of stylus deflection. It is this distance, travelled by the probe between the point at which the stylus touches a surface and a ‘trigger’ actually occurring, that is referred to as ‘pre-travel’.

Probe pre-travel is not generally regarded as a source of error and is typically accommodated and compensated for during probe datuming procedures.

Potential error sources

The potential error sources associated with touch trigger probes fall into two main categories, these are:

- Random errors.
- Systematic errors, which are generally application sensitive and can be eliminated or minimised in practice.

Fixed error sources

There is only one error source associated with touch trigger probes which must be assumed to be present in all measurements taken. It is known as unidirectional repeatability and refers to the ability of the probe to trigger at the same point each and every time.

Quoted statistically as having a 95% confidence level, the unidirectional repeatability error of resistive touch trigger probes is extremely small (typically less than 0.2 μm). Thus, whilst it unlikely to be a major source of error, its presence must always be considered when assessing the measuring performance of a machine tool or probe system. It is also important to remember that the use of very long or complex styli, or high trigger forces, will increase any probe repeatability error.

Systematic error sources

There are two types of systematic error. These are known as:

- **Pre-travel variation:** which results from the three point kinematic location exhibiting a variation in trigger force, dependent on trigger direction and subsequent bending of the stylus prior to a trigger taking place. Although probe pre-travel is typically small ($\pm 1 \mu\text{m}$), if long, non-rigid stylus configurations or high trigger forces are used it can become a major source of measurement error.
- **Probe hysteresis:** that occurs as a direct consequence of previous trigger direction and reseal. Although probe hysteresis is comparative to unidirectional repeatability, it is more greatly affected by stylus length and trigger force.

Whilst in practice an element of these error sources may be present in each measurement taken, the degree of presence is significantly influenced by:

- Any datuming and measuring techniques employed.
- The model and type of probe used.
- The type of feature being probed.

System operation

During an inspection cycle, the RMP2/RMP2-S will continuously transmit its status to the machine tool CNC controller via the RMM2 radio module machines and the MI16. Probe status is indicated by:

- The probe status LED, located on the RMP2/RMP2-S, which will flash green at 1 second intervals when the probe is 'seated'. Each time the probe 'triggers', the probe status LED will flash red.
- The 'PROBE STATUS' LED on the front panel of the MI16 which will illuminate when the probe is 'seated'. Each time the probe 'triggers', the 'PROBE STATUS' LED will extinguish.
- The MI16 which will emit a single, audible bleep each time the probe 'triggers' and 're-seats'. The volume of these audible bleeps may be increased or decreased using the 'VOLUME TRIGGER' buttons located on the front panel of the MI16.

In addition to probe status signals, the system also provides a visible indication of the condition of the batteries located within the RMP2/RMP2-S. Illumination of the 'PROBE LOW BATTERY' LED, located on the front panel of the MI16, indicates that the batteries have approximately 6 hours continuous use remaining.

Probe signal delays

During all inspection cycles, a constant $12\text{ ms} \pm 10\text{ }\mu\text{s}$ delay will always occur between the probe actually 'triggering' and the resultant 'trigger' signal being received by the CNC controller.

Switching off the RMP2

Note...

Following activation, the RMP2 cannot be switched off until a period of 2 seconds has elapsed.

The RMP2 may be switched off using one of the following options. Each option is user selectable and will have been programmed into the MI16/RMP2 during installation of the MP16 touch-trigger probe system onto the machine tool (see “**Chapter 2 – System installation**”). The switch-off mode selected will be indicated by illumination of the corresponding ‘START MODE’ LED(s) located within the front panel of the MI16:

- **Spin:** where the RMP2 is switched off, by way of a centrifugal switch, by rotating it in the machine tool spindle at 500 rpm (± 50 rpm) for a minimum of 1 second.
- **Optical:** where an optical signal, generated by the optional OM16 in response to a machine M code, switches off the RMP2.
- **Timeout:** where a timer automatically switches off the probe if it is not used for a period of 180 seconds.

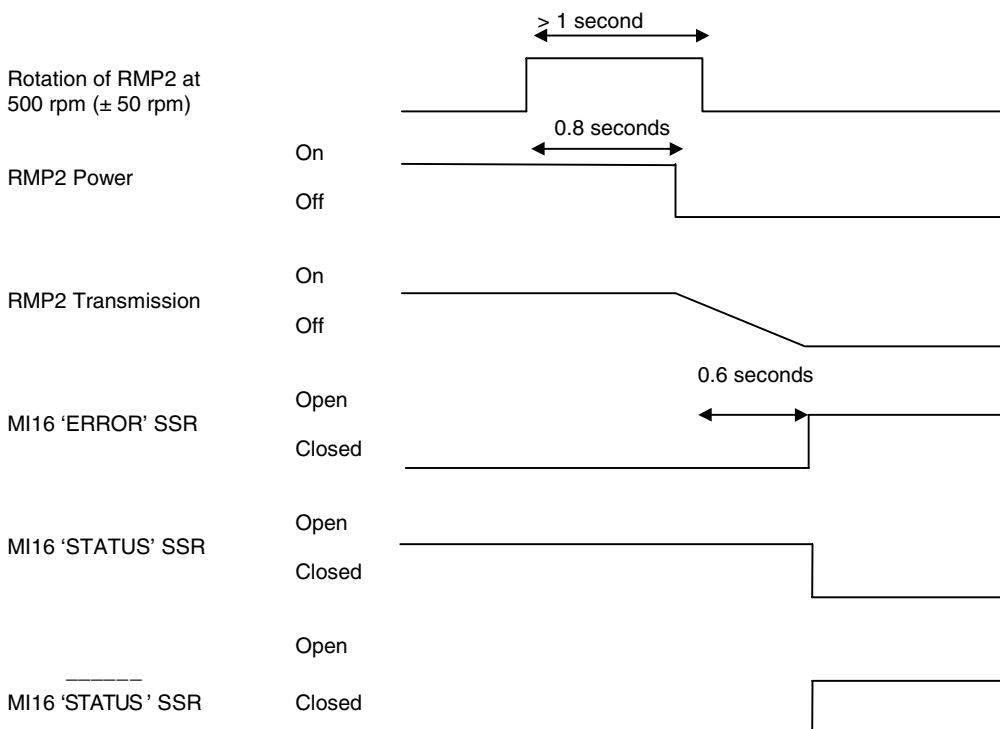
Switching off the RMP2 using the 'spin' option

WARNING

NEVER SPIN THE PROBE WITHIN THE MACHINE TOOL SPINDLE AT SPEEDS EXCEEDING 1000 RPM

To de-activate the RMP2 [1] using the 'spin' option (this option must have been programmed into the MI16/RMP2 in accordance with “**Chapter 2 – System installation**” if it is to be used), carry out the following (see Figure 3.1):

1. Observe the front panel of the MI16 [3] and verify that the 'SPIN' LED [4] is illuminated. If this LED is not illuminated, it will be necessary to re-program the MI16/RMP2 in accordance with “**Chapter 2 – System installation**”.
2. Rotate the RMP2 at 500 rpm (± 50 rpm) for a minimum of 1 second. During the 'spin-off' cycle, the sequence of events shown below will occur.

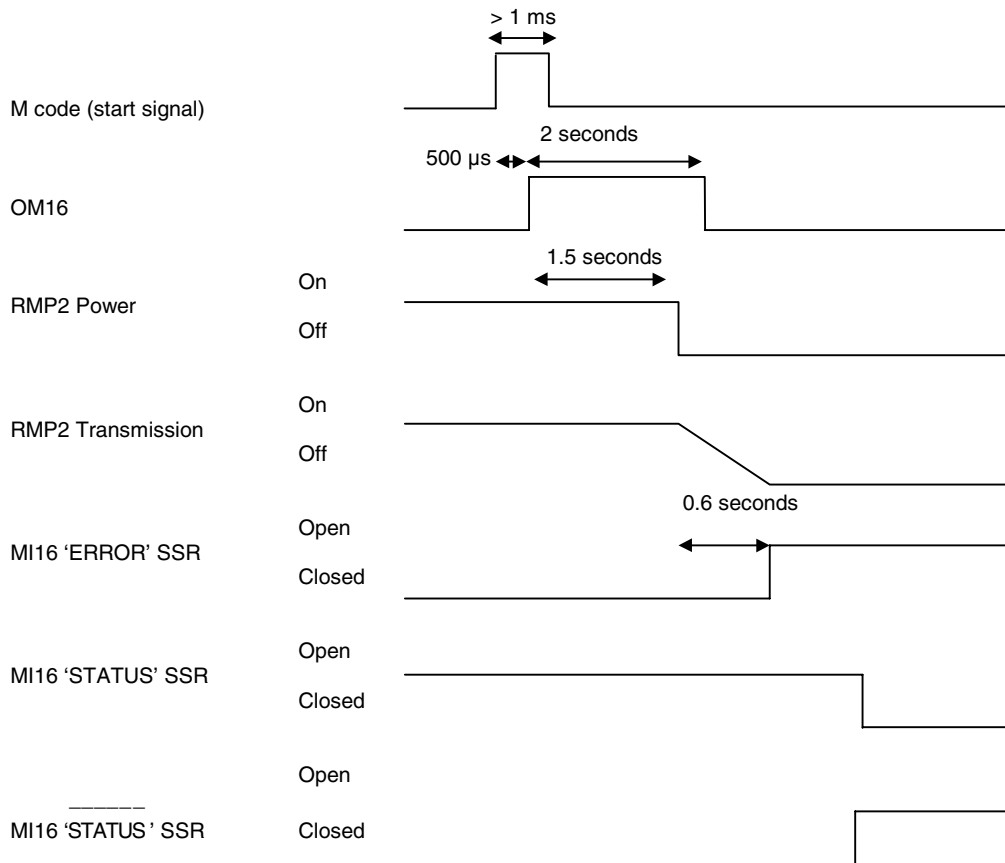


3. With the RMP2-S [1] switched off, verify the following:
 - The 'RX SIGNAL' display [9] of the MI16 [3] is extinguished.
 - The 'PROBE STATUS' LED [10] of the MI16 [3] is extinguished.
 - The 'RX SIGNAL LOW' LED [11] of the MI16 [3] is illuminated.
 - The 'PROBE ERROR' LED [12] of the MI16 [3] is illuminated.
 - The Probe Status LED [2] of the RMP2-S [1] is extinguished.
4. If the above conditions are met, the RMP2 has successfully switched off and may be returned to the machine's tool carousel.

Switching off the RMP2 using an M code (optical) signal

To de-activate the RMP2 using the M code (optical) option (this option must have been programmed into the MI16/RMP2 in accordance with “**Chapter 2 – System installation**” if it is to be used), carry out the following (see Figure 3.1). Please note that a Renishaw OM16 will need to be fitted to your machine tool for this method to work:

1. Observe the front panel of the MI16 machine interface [3] and verify that the ‘OPTICAL’ LED [5] is illuminated. If this LED is not illuminated, it will be necessary to re-program the MI16/RMP2 in accordance with “**Chapter 2 – System installation**”.
2. Supply the MI16 with a CNC generated M code (start signal) for a minimum duration of 1 ms (maximum duration is 1 second). During the ‘optical’ cycle, the sequence of events shown below will occur.



3. With the RMP2 [1] switched off, verify the following:
 - The 'RX SIGNAL' display [9] of the MI16 machine interface [3] is extinguished.
 - The 'RX SIGNAL LOW' LED [10] of the MI16 [3] is illuminated.
 - The 'PROBE ERROR' LED [11] of the MI16 [3] is illuminated.
 - The 'PROBE STATUS' LED [12] of the MI16 [3] is extinguished.
 - The Probe Status LED [2] of the RMP2 [1] is extinguished.
4. If the above conditions are met, the RMP2 has successfully switched off and may be returned to the machine's tool carousel.

Switching off the RMP2 using the 'timeout' method

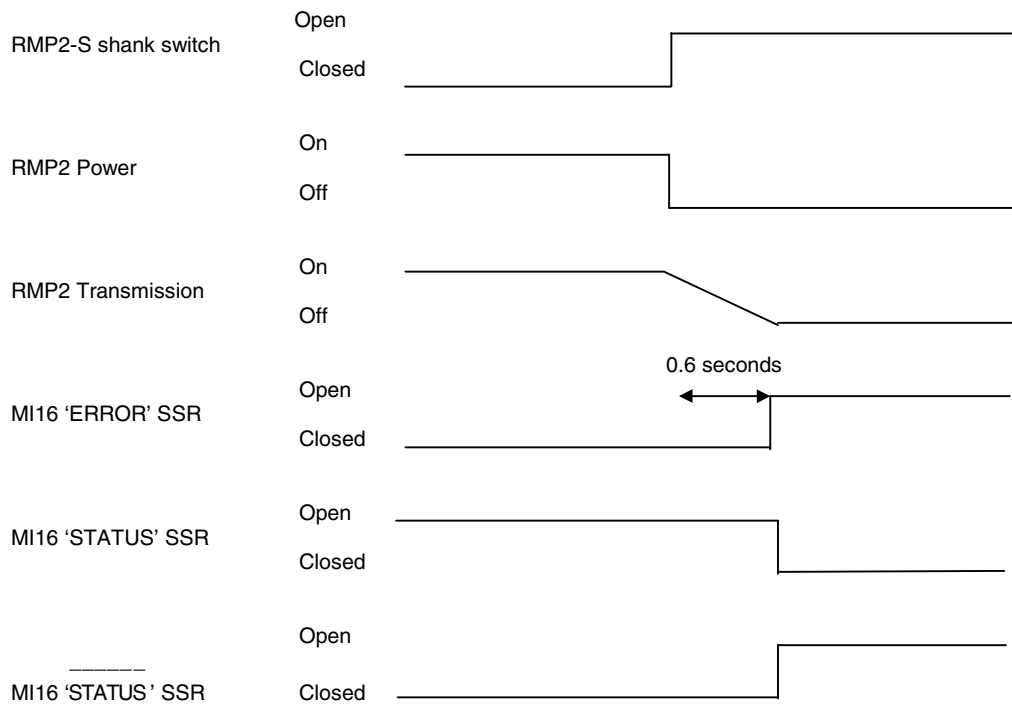
To de-activate the RMP2 using the 'timeout' option (this option must have been programmed into the MI16/RMP2 in accordance with "**Chapter 2 – System installation**" if it is to be used), carry out the following (see Figure 3.1):

1. Observe the front panel of the MI16 [3] and verify that the 'TIMEOUT' LED [7] is illuminated. If this LED is not illuminated, it will be necessary to re-program the MI16/RMP2 in accordance with "**Chapter 2 – System installation**".
2. Allow the RMP2 [1] to remain inactive within the machine spindle. After a period of 180 seconds \pm 1 second, with no probe 'triggers' occurring, the RMP2 should automatically switch itself off.
3. With the RMP2 [1] switched off, verify the following:
 - The 'RX SIGNAL' display [9] of the MI16 [3] is extinguished.
 - The 'RX SIGNAL LOW' LED [10] of the MI16 [3] is illuminated.
 - The 'PROBE ERROR' LED [11] of the MI16 [3] is illuminated.
 - The 'PROBE STATUS' LED [12] of the MI16 [3] is extinguished.
 - The Probe Status LED [2] of the RMP2 [1] is extinguished.
4. If the above conditions are met, the RMP2 has successfully switched off and may be returned to the machine's tool carousel.

Switching off the RMP2-S

To de-activate the RMP2-S, carry out the following (see Figure 3.1):

1. Observe the front panel of the MI16 [3] and verify that the 'SHANK SWITCH' LED [8] is illuminated. If this LED is not illuminated, it will be necessary to re-program the MI16/RMP2 in accordance with "**Chapter 2 – System installation**".
2. Remove the RMP2-S [1] from the machine tool spindle. As the RMP2-S is automatically de-activated whenever the shank to which it is attached is removed from the machine tool spindle (this action causing the shank switch to release to switch off the RMP2-S), the probe will now be de-activated. The timings of the shank switch, following removal of the RMP2-S from the machine tool spindle, are as shown below.



3. With the RMP2-S [1] switched off, verify the following:
 - The 'RX SIGNAL' display [9] of the MI16 [3] has a minimum of 3 red segments and 1 yellow segment illuminated.
 - The 'RX SIGNAL LOW' LED [10] of the MI16 [3] is extinguished.
 - The 'PROBE ERROR' LED [11] of the MI16 [3] is extinguished.
 - The 'PROBE STATUS' LED [12] of the MI16 [3] is illuminated.
 - The Probe Status LED [2] of the RMP2-S [1] is flashing at 1 second intervals.
4. If the above conditions are met, the RMP2-S has successfully switched off and may be returned to the machine's tool carousel.

CHAPTER 4

System maintenance and troubleshooting

This chapter provides you with detailed, step-by-step instructions on how to maintain and adjust the Renishaw MP16 touch-trigger probe system. In addition, the chapter also provides information on faults that can sometimes occur during the life of a touch-trigger probe system; each fault is listed sequentially and offers both the probable cause and the rectification actions that will be required to recover from the fault.

Contained in this chapter

- | | |
|--|----------------------------|
| ■ Diaphragm inspection and renewal 4-2 | ■ Battery renewal.....4-8 |
| ■ Stylus spring force adjustment..... 4-5 | ■ Troubleshooting.....4-10 |

Maintenance and adjustment of the MP16 touch-trigger probe system

Due to the harsh environment in which the MP16 touch-trigger probe system operates, and the specific sealing requirements this demands, all system components have been designed to provide low maintenance capability. System maintenance and adjustment can therefore be limited to:

- Inspection and renewal of the MP3 touch-trigger probe's outer diaphragm.
- Adjustment of the stylus spring force adjustment screw located within the MP3 touch-trigger probe.
- Renewal of the batteries contained within the RMP2/RMP2-S.

Diaphragm inspection and renewal

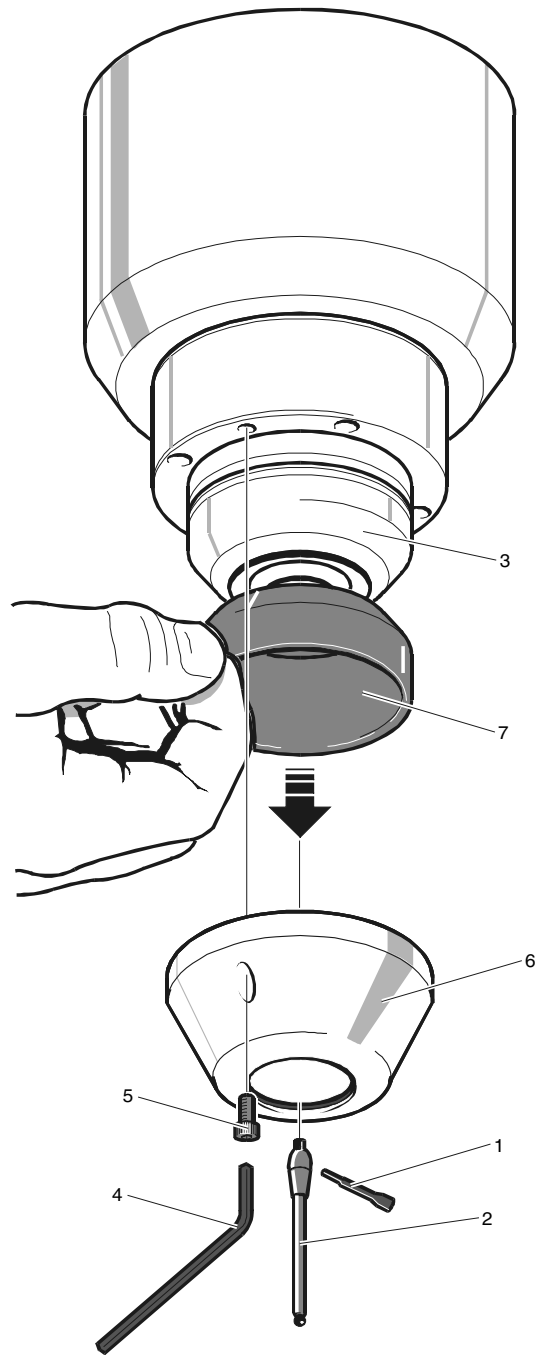
Although Renishaw touch-trigger probes require little maintenance, the performance of the MP3 will be adversely affected if its inner working parts become contaminated with dirt, machining residue and/or coolant. It is therefore important that the probe is maintained in a clean condition, free of grease or oil, and that both the inner and outer diaphragms are periodically inspected.

Inspection of the outer diaphragm

To inspect the outer diaphragm, carry out the following (see Figure 4.1):

1. Using the S7 stylus tool [1] provided, release and remove the stylus [2] from the probe head [3].
2. Using the 2.5 mm AF allen key [4] supplied, release and remove the two M3x8 mm socket head capscrews [5] securing the cover [6] to the probe head [3]. Remove the cover from the probe head.

Continued on Page 4-4



1. S7 stylus tool
2. Stylus
3. Probe head
4. 2.5 mm AF allen key
5. M3x8 mm socket head capscrew (2 off)
6. Cover
7. Outer diaphragm

Figure 4.1 – Removal of the outer diaphragm

3. Visually inspect the outer diaphragm [7] for damage using 10x magnification and bright light and proceed as follows:
 - If the diaphragm is undamaged, replace the cover [6] and secure with the two M3x8 mm socket head capscrews [5]. Using the 2.5 mm AF allen key [4] supplied, tighten the two capscrews to 1 Nm (0.8 lbf.ft). Replace the stylus [2] and, using the S7 stylus tool [1] supplied, tighten the stylus to 2 Nm (1.47 lbf.ft).
 - If damage is found, renew the diaphragm in accordance with “**Renewing the outer diaphragm**” later in this chapter.

Renewing the outer diaphragm

Note...

Prior to attempting renewal of the outer diaphragm, ensure that you have a Renishaw DK3 diaphragm kit (part number A-2053-8156). Where necessary, this may be ordered through your supplier or nearest Renishaw Group company; refer to the last page of this publication for a list of the countries in which Renishaw companies are located.

To renew the outer diaphragm, carry out the instructions detailed in the “**DK3 – Probe outer diaphragm replacement kit instruction sheet - part no. H-2000-4052**” supplied with your DK3 diaphragm kit. The DK3 diaphragm kit comprises the following:

- Diaphragm tool (part no. A-2053-6581-02).
- Outer diaphragm (part no. M-2053-7571-01)
- DK3 – Probe outer diaphragm replacement kit instruction sheet (part no. H-2000-4024).
- 2.5 mm AF allen key (Part No. P-TL01-0250).

Stylus spring force adjustment

CAUTIONS

THE SPRING PRESSURE WITHIN THE MP3 TOUCH-TRIGGER PROBE IS PRECISELY SET. IT MUST ONLY BE ADJUSTED IN EXTREME CIRCUMSTANCES WHERE EXCESSIVE MACHINE VIBRATION, OR THE USE OF EXTREMELY LONG OR HEAVY STYLI, IS CAUSING THE PROBE TO FALSE TRIGGER.

ADJUSTMENT OF STYLUS SPRING PRESSURE, AS WELL AS THE USE OF STYLI OTHER THAN THAT USED TO DATUM THE PROBE, MAY RESULT IN DIFFERENCES IN PROBE REPEATABILITY OVER THOSE QUOTED ON THE CALIBRATION CERTIFICATE SUPPLIED WITH THE PROBE.

To adjust the stylus spring force, carry out the following (see Figure 4.2):

1. Using the 2.5 mm AF allen key [1] supplied, release and remove the two M3x8 mm socket head capscrews [2] securing the cover [3] to the probe head [4]. Remove the cover from the probe head.
2. Using the 3 mm AF allen key [5] provided, release and remove the four M4x35 mm socket head capscrews [6] securing the MP3 touch-trigger probe [7] to the RMP2/RMP2-S [8]. Remove the MP3 touch-trigger probe from the RMP2/RMP2-S.
3. Using a 7 mm AF socket, release the locknut [9].
4. Using the 2 mm AF allen key [10], rotate the stylus spring force adjustment screw [11] one full turn, as follows:

CAUTION

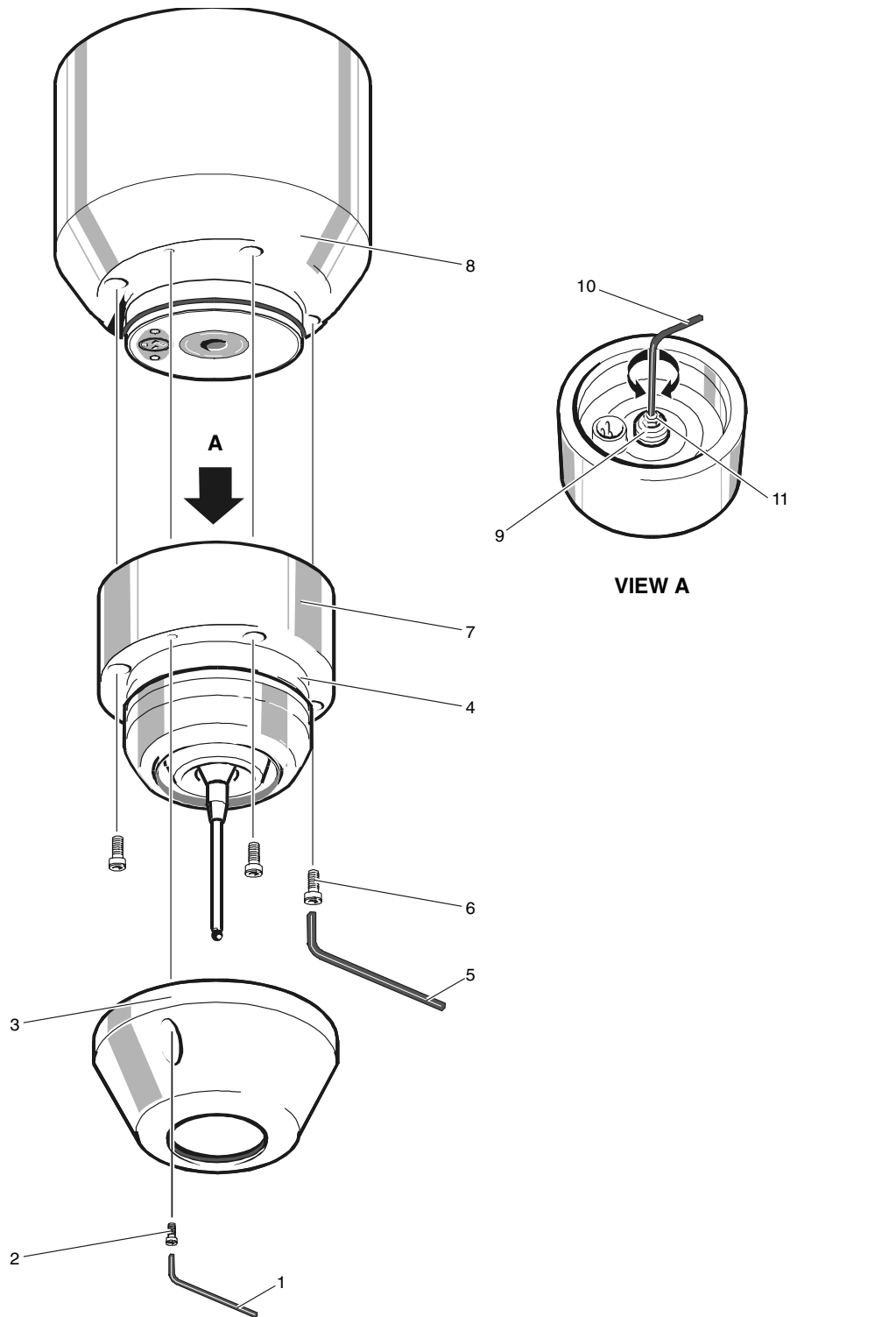
OVERTIGHTENING OF THE STYLUS SPRING FORCE ADJUSTMENT SCREW CAN RESULT IN INTERNAL DAMAGE TO THE MP3 TOUCH-TRIGGER PROBE.

- Rotate clockwise (when looking down on the screw) to increase the spring pressure and reduce the sensitivity of the probe.
- Rotate counter-clockwise (when looking down on the screw) to decrease the spring pressure and increase the sensitivity of the probe.

Continued on Page 4-6

4-6 System maintenance and troubleshooting

5. Continue to repeat step 4, checking the effect of each adjustment, until the required level of sensitivity is obtained.
6. Using a 7 mm AF socket, tighten the locknut [9] to 1.5 Nm (2 lbf.ft).
7. Reassemble the MP3 touch-trigger probe [7] to the RMP2/RMP2-S [8] and secure with the four M4x32 mm socket head capscrews [6].
8. Perform stylus on-centre adjustment of the MP3 touch-trigger probe [7] in accordance with “**Chapter 2 – System installation**”.



- | | |
|--|--|
| 1. 2.5 mm AF allen key | 7. MP3 touch-trigger probe |
| 2. M3x8 mm socket head capscrew (2 off) | 8. RMP2/RMP2-S |
| 3. Cover | 9. Locknut |
| 4. Probe head | 10. 2 mm AF allen key |
| 5. 3 mm AF allen key | 11. Stylus spring force adjustment screw |
| 6. M4x35 mm socket head capscrew (4 off) | |

Figure 4.2 – Adjusting the stylus spring force of the MP3 touch-trigger probe

RMP2/RMP2-S – battery renewal

Maintenance of the RMP2/RMP2-S is limited to the renewal of its batteries. To renew these batteries, carry out the following (see Figure 4.3):

CAUTIONS

CARE MUST BE TAKEN NOT TO DAMAGE THE BATTERY COVER SEAL WHEN REMOVING THE BATTERY COVER.

HANDLE BATTERIES IN ACCORDANCE WITH THE MANUFACTURER'S INSTRUCTIONS. USE ONLY THE RECOMMENDED BATTERY TYPE. DO NOT ALLOW THE BATTERY TERMINALS TO CONTACT OTHER METALLIC SURFACES.

Notes...

The following information relates to MK2 radio module probes fitted with two 9 V batteries. If your RMP2 is fitted with six 1.5 V batteries, please refer to the addendum contained at the back of this publication.

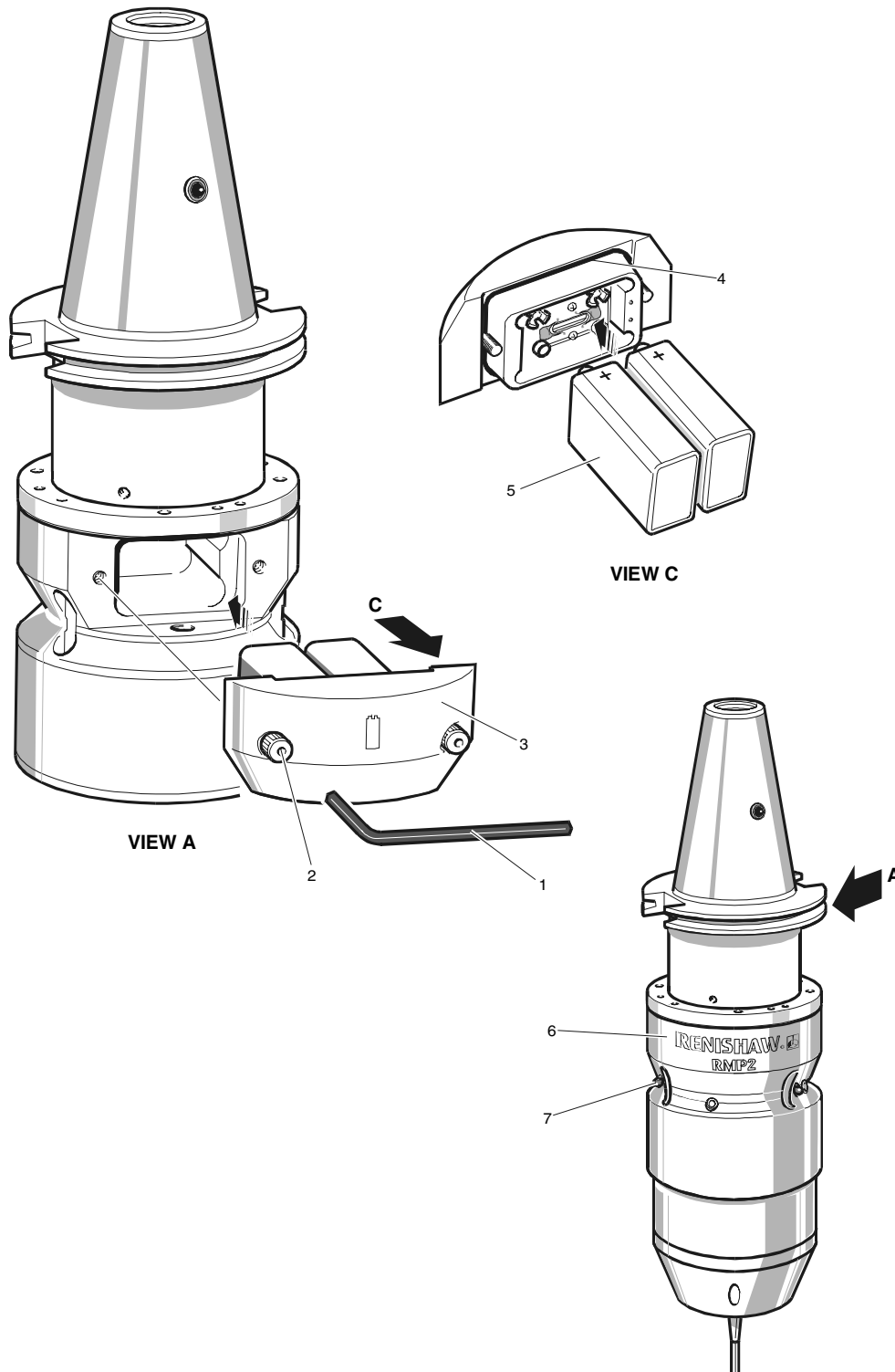
The RMP2/RMP2-S will enter its programming mode whenever battery contact is interrupted or when the batteries are renewed.

1. Using the 3 mm AF allen key [1] supplied, release the two battery cover retaining screws [2] and carefully remove the battery cover [3] from the RMP2/RMP2-S [6]. Remove and discard the exhausted batteries.
2. Ensuring the correct polarity, connect two new Duracell MN 1604 6LR61 (or equivalent) batteries [5] to the terminals within the battery cover [3].
3. Lightly smear the battery cover seal [4] with mineral oil or grease.

Note...

After the batteries [5] and battery cover [3] are fitted to the RMP2/RMP2-S, the probe status LED [7] will show a double flashing green condition and remain active in the programming mode for one minute.

4. Ensuring the correct orientation, carefully insert the batteries [5] into the battery compartment of the RMP2/RMP2-S until the battery cover [3] abuts the cover mounting flange on the RMP2/RMP2-S body. Hand-tighten the two battery cover retaining screws [2] to retain the cover in position. Using the 3 mm AF allen key [1], tighten the two battery cover retaining screws [2] to 3 Nm (2.2 lbf.ft).



1. 3 mm AF allen key
2. Battery cover retaining screw (2 off)
3. Battery cover
4. Battery cover seal
5. Battery (2 off)
6. RMP2/RMP2-S
7. Probe status LED

Figure 4.3 – Fitting new batteries to the RMP2/RMP2-S

Troubleshooting

Using audio diagnostics to identify interference

Interference can result in poor reliability of the MP16 touch-trigger probe system by corrupting the radio transmission signals between the RMP2/RMP2-S and the two RMM2 radio module machines. In such instances, the following procedure should be used (see Figure 4.4):

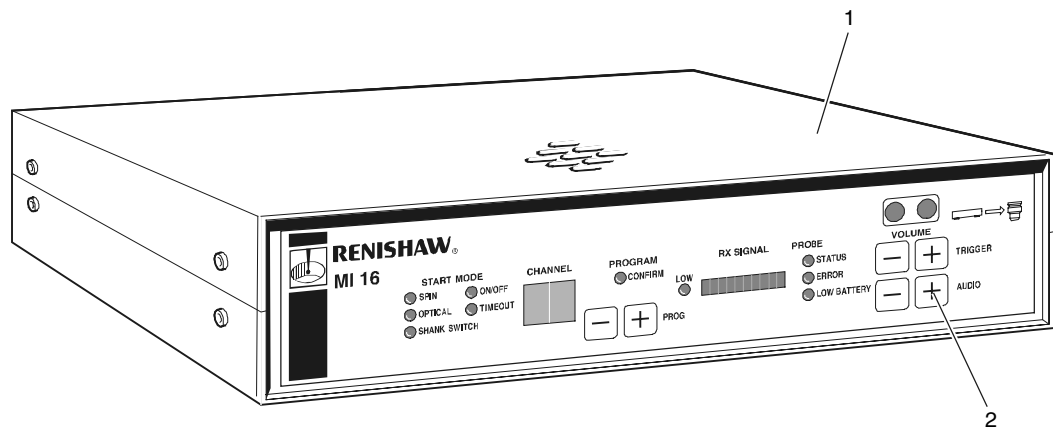
Using the 'VOLUME AUDIO +' button [2], located on the front panel of the MI16 [1], set the volume of the audio diagnostics to maximum.

Note...

When the MP3 touch-trigger probe is 'triggered', a change in tone of the audio diagnostics will be observed. To familiarise yourself with this tone, 'trigger' the probe by hand and observe the tone emitted.

Switch on the RMP2/RMP2-S in accordance with "**Chapter 3 – System operation**"; the audio diagnostics should emit a constant audible tone. If any other signals (noises) are observed, it will be necessary to systematically switch off all possible sources of interference (arc welders, pagers, remote control alarm signals, mobile telephones etc) until the source is identified. Once identified, either remove the source of the interference from the working environment or, where this is not possible, alter the radio frequency channel of the RMP2/RMP2-S to eliminate the interference.

Switch off the RMP2/RMP2-S in accordance with "**Chapter 3 – System operation**"; the audio diagnostics should now emit no audible tone (some background 'hiss' may be evident and is acceptable). If any other signals (noises) are observed, it will be necessary to systematically switch off all possible sources of interference (arc welders, pagers, remote control alarm signals, mobile telephones etc) until the source is identified. Once identified, either remove the source of the interference from the working environment or, where this is not possible, alter the radio frequency channel of the RMP2/RMP2-S to eliminate the interference.



1. MI16
2. 'VOLUME AUDIO+' button

Figure 4.4 – Adjusting the volume of the MI16 audio diagnostics

Fault diagnosis

The fault diagnosis information contained in the following table is based on Renishaw's vast experience of probing systems, and provides details of the faults you are most likely to incur over the life of your MP16 touch-trigger probe system. Each fault is listed sequentially, in order of probability, and offers both the probable cause(s) and the rectification action necessary to recover from the fault.

PROBE SYSTEM FAILS TO SWITCH ON	
<u>Possible cause</u>	<u>Action</u>
Probe is already switched on.	Check that probe is off. Where necessary, switch off the probe in accordance with " Chapter 3 – System operation ".
You are attempting to switch on the probe within 2 seconds of switching the probe off.	Leave 2 seconds minimum between the probe 'switch on' and 'switch off'.
Dead battery.	Change batteries in accordance with " Chapter 4 – Maintenance and troubleshooting ".
Battery has been incorrectly fitted.	Check batteries for correct installation in accordance with " Chapter 4 – Maintenance and troubleshooting ".
Probe is not aligned with OM16.	Verify alignment in accordance with " Chapter 2 – System installation ".
Swarf build up on window of OM16.	Remove swarf.
Beam between OM16 and the probe is obstructed.	Clear obstruction.
Duration and speed (rpm) of spin cycle incorrect.	Verify spin rpm and duration in accordance with " Chapter 2 – System installation ".

PROBE SYSTEM FAILS TO SWITCH ON (Continued)

<u>Possible cause</u>	<u>Action</u>
Shank switch of RMP2-S has failed.	Verify switch operation.
OM16 is not transmitting the start signal.	Verify that orange LED of the OM16 illuminates when a start signal is sent.
MI16 machine interface unit is not receiving the machine M code.	Check the power supply to the MI16. Check condition of all connections and outputs.
MP3 probe switched on but no signal is being received by the MI16.	Transmission channels of the MI16 and RMP2/RMP2-S have been incorrectly programmed. Re-program in accordance with “ Chapter 2 – System installation ”.
	RMM2 radio machine modules are located within a ‘blind spot’. Relocate RMM(s) and check signal strength in accordance with “ Chapter 2 – System installation ”.
No power supply to OM16.	Verify that OM16 has a power supply.
No power supply to MI16 machine interface unit.	Verify that MI16 has a power supply. Check all connections and fuses. Verify power supply is a stable 24 V.
External interference source disrupting radio transmission	Use audio diagnostic facility in accordance with “ Chapter 4 – Maintenance and troubleshooting ”.

PROBE STOPS IN MID-CYCLE (PROBE OPEN/FAIL)

Possible cause

Probe has falsely-triggered due to shock and vibration during an axial move.

Probe has collided with foreign object.

Damaged cables.

Power supply de-activated.
Loose probe assembly.

Probe unable to find the part within program window.

Dead battery.

Battery has been incorrectly fitted.

External interference source disrupting radio transmission.

Action

Check probe settings in accordance with **Chapter 4 - Maintenance and troubleshooting**.
Reduce axial speed of probe.
Reduce stylus mass.

Remove obstruction.

Check all cables.

Check power supply.
Check tightness of probe styli and probe shank.

Part out of position or missing.

Change batteries in accordance with **“Chapter 4 – Maintenance and troubleshooting”**.

Check batteries for correct installation in accordance with **“Chapter 4 – Maintenance and troubleshooting”**.

Use audio diagnostic facility in accordance with **“Chapter 4 – Maintenance and troubleshooting”**.

PROBE CRASHES

Possible cause

Action

Probe signals are being taken from a tool setting probe.

Verify system functionality.

Workpiece is obstructing the path of the probe.

Review software in accordance with manufacturer's instructions.

Probe length offsets have been removed.

Review software in accordance with manufacturer's instructions.

POOR REPEATABILITY AND ACCURACY

Possible cause

Action

Swarf on part.

Remove swarf.

Tool change repeatability is poor.

Verify probe repeatability using a single point move.

Probe position has changed due to loosening of probe assembly.

Verify tightness of probe styli, on-centre adjustment mechanism and shank mounting.

Probe position has changed from its calibrated position by 180° or due to M19 orientation.

Verify probe position. Check on-centre setting and, if necessary, adjust to within 20% of part tolerance.

Calibration and updating of offsets is not occurring.

Review software in accordance with manufacturer's instructions.

Calibration and probing speeds are not the same.

Review software in accordance with manufacturer's instructions.

Calibrated feature has moved.

Verify position of calibrated feature.

POOR REPEATABILITY AND ACCURACY (Continued)

Possible cause

Action

Measurement is occurring as the stylus leaves a surface.

Review software in accordance with manufacturer's instructions.

Probing is being performed within the machine's acceleration and deceleration zones.

Review software in accordance with manufacturer's instructions.

Probe feedrate is too high for machine/controller.

Perform simple repeatability trials at various speeds.

Temperature variation is causing excessive movement in the machine and the workpiece.

Minimise machine and workpiece temperature changes. Increase the frequency of calibration.

Machine has poor repeatability due to loose encoders, backlash, tight slideways and/or accident damage.

Perform a health check on your machine tool.

PROBE FAILS TO SWITCH OFF

<u>Possible cause</u>	<u>Action</u>
Probe set in 'time-out' mode.	Wait for a minimum of 3 minutes for the probe to switch off.
Probe set in 'time-out' mode causing timer to reset in the tool carousel.	Use a lighter stylus. Review use of 'optical on/time-out' mode.
No line of sight between probe and OM16 when switch off signal is sent.	Ensure line of sight is maintained.
You are attempting to switch off the probe within 2 seconds of switching the probe on.	Leave 2 seconds minimum between probe 'switch off' and 'switch on'.
Probe is not aligned with OM16.	Verify alignment in accordance with. "Chapter 2 – System installation" .
Swarf build up on window of OM16.	Remove swarf.
Beam between OM16 and the probe is obstructed.	Clear obstruction.
Duration and speed (rpm) of spin cycle incorrect.	Verify spin rpm and duration. in accordance with "Chapter 3 – System operation" .

PROBE STATUS LED FAILS TO ILLUMINATE

<u>Possible cause</u>	<u>Action</u>
Batteries installed incorrectly.	Check batteries for correct installation in accordance with "Chapter 4 – Maintenance and troubleshooting" .

4-18 System maintenance and troubleshooting

MI16 FRONT PANEL LEDS FAIL TO ILLUMINATE WITH POWER SWITCHED ON

Possible cause

Action

Faulty electrical contact.

Check all connections.

Blown fuse.

Check all fuses. Replace blown fuse.

Incorrect power supply.

Ensure power supply is 24 Vdc.

MI16 'PROBE LOW BATTERY' LED REMAINS ILLUMINATED

Possible cause

Action

Incorrectly installed batteries

Check batteries for correct installation in accordance with "**Chapter 4 – Maintenance and troubleshooting**".

Fully discharged batteries

Renew batteries in accordance with "**Chapter 4 – Maintenance and troubleshooting**".

PROBE IS TRANSMITTING SPURIOUS READINGS

Possible cause

Action

Damaged cables.

Check all cables for damage. Renew cables if damage is found.

Electrical interference

Move transmission cables clear of any cables carrying high voltage currents.

External interference source disrupting radio transmission

Use audio diagnostic facility in accordance with "**Chapter 4 – Maintenance and troubleshooting**".

PROBE IS TRANSMITTING SPURIOUS READINGS (Continued)

<u>Possible cause</u>	<u>Action</u>
Poorly regulated power supply.	Ensure that the power supply is correctly regulated.
Excessive machine vibration.	Eliminate machine vibration.
Loose mountings or stylus.	Check and tighten mountings. Tighten stylus.

PROBE FAILS TO RESEAT CORRECTLY

<u>Possible cause</u>	<u>Action</u>
Inner and/or outer diaphragm is damaged.	Inspect/renew diaphragms in accordance with Chapter 4 - Maintenance and troubleshooting.
Stylus ball is not clearing the surface after contact.	Review software.

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SPARES LIST

EUROPEAN VERSION (INCLUDING UNITED KINGDOM) (433.075 – 434.775 MHz)

The following table contains a complete list of spares that may be ordered to support and maintain your MP16 touch-trigger probe system over its lifetime. All parts are listed in alpha-numerical order and may be ordered direct through any Renishaw company; for a full list of these, refer to the last page of this publication at the front of this publication.

Part number	Part description
A-2053-5358	MP3 probe (includes probe tool kit: A-2053-7531)
A-2053-7531	Probe tool kit , comprising: <ul style="list-style-type: none"> • 1.98 mm diameter stylus tool • 1.5 mm AF allen key • 2.0 mm AF allen key(two) • 2.5 mm AF allen key • 3.0 mm AF allen key • 4.0 mm AF allen key
A-2056-0005	MI16 machine interface panel mounting kit
A-2056-0374	Shank adaptor fitting kit , comprising: <ul style="list-style-type: none"> • Two M4x12 socket head capscrews (P-SC01-0412) • Four M4x25 socket head capscrews (P-SC01-0425) • Four M4x12 flat point grubscrew (P-SC34-0412) • Two spring washers (P-WA04-0015)
A-2056-0979	Shank adaptor (not suitable for use with RMP2-S)
A-2137-0100	RMP2 kit , comprising: <ul style="list-style-type: none"> • RMP2 (A-2137-0150) • MI16 (A-2137-0160) • Two RMMs (A-2137-0170) • MP3 probe (A-2053-5358) • Shank adaptor (A-2056-0979/M-2056-0293) • Tool kit (A-2053-7531) • MP16 touch-trigger probe system Installation and user's guide (H-2000-5009)

Part number	Part description
A-2137-0101	<p>RMP2-S kit (ANSI-1985-CAT-SIZE 40), comprising:</p> <ul style="list-style-type: none"> • RMP2-S (A-2137-0180) • MI16 (A-2137-0160) • Two RMMs (A-2137-0170) • MP3 probe (A-2053-5358) • Shank adaptor (M-2056-0293) • Tool kit (A-2053-7531). • Shank (see data sheet H-2000-2011). • MP16 touch-trigger probe system Installation and user's guide (H-2000-5009)
A-2137-0102	<p>RMP2-S kit (ANSI-1985-CAT-SIZE 45), comprising:</p> <ul style="list-style-type: none"> • RMP2-S (A-2137-0180) • MI16 (A-2137-0160) • Two RMMs (A-2137-0170) • MP3 probe (A-2053-5358) • Shank adaptor (M-2056-0293) • Tool kit (A-2053-7531). • Shank (see data sheet H-2000-2011). • MP16 touch-trigger probe system Installation and user's guide (H-2000-5009)
A-2137-0103	<p>RMP2-S kit (ANSI-1985-CAT-SIZE 50), comprising:</p> <ul style="list-style-type: none"> • RMP2-S (A-2137-0180) • MI16 (A-2137-0160) • Two RMMs (A-2137-0170) • MP3 probe (A-2053-5358) • Shank adaptor (M-2056-0293) • Tool kit (A-2053-7531). • Shank (see data sheet H-2000-2011). • MP16 touch-trigger probe system Installation and user's guide (H-2000-5009)
A-2137-0104	<p>RMP2-S kit (ANSI-1978-CAT-SIZE 40), comprising:</p> <ul style="list-style-type: none"> • RMP2-S (A-2137-0180) • MI16 (A-2137-0160) • Two RMMs (A-2137-0170) • MP3 probe (A-2053-5358) • Shank adaptor (M-2056-0293) • Tool kit (A-2053-7531). • Shank (see data sheet H-2000-2011). • MP16 touch-trigger probe system Installation and user's guide (H-2000-5009)

Part number	Part description
A-2137-0105	<p>RMP2-S kit (ANSI-1978-CAT-SIZE 45), comprising:</p> <ul style="list-style-type: none"> • RMP2-S (A-2137-0180) • MI16 (A-2137-0160) • Two RMMs (A-2137-0170) • MP3 probe (A-2053-5358) • Shank adaptor (M-2056-0293) • Tool kit (A-2053-7531). • Shank (see data sheet H-2000-2011). • MP16 touch-trigger probe system Installation and user's guide (H-2000-5009)
A-2137-0106	<p>RMP2-S kit (ANSI-1978-CAT-SIZE 50), comprising:</p> <ul style="list-style-type: none"> • RMP2-S (A-2137-0180) • MI16 (A-2137-0160) • Two RMMs (A-2137-0170) • MP3 probe (A-2053-5358) • Shank adaptor (M-2056-0293) • Tool kit (A-2053-7531). • Shank (see data sheet H-2000-2011). • MP16 touch-trigger probe system Installation and user's guide (H-2000-5009)
A-2137-0107	<p>RMP2-S kit (DIN 69871-SIZE 40), comprising:</p> <ul style="list-style-type: none"> • RMP2-S (A-2137-0180) • MI16 (A-2137-0160) • Two RMMs (A-2137-0170) • MP3 probe (A-2053-5358) • Shank adaptor (M-2056-0293) • Tool kit (A-2053-7531). • Shank (see data sheet H-2000-2011).
A-2137-0108	<p>RMP2-S kit (DIN 69871-SIZE 45), comprising:</p> <ul style="list-style-type: none"> • RMP2-S (A-2137-0180) • MI16 (A-2137-0160) • Two RMMs (A-2137-0170) • MP3 probe (A-2053-5358) • Shank adaptor (M-2056-0293) • Tool kit (A-2053-7531). • Shank (see data sheet H-2000-2011). • MP16 touch-trigger probe system Installation and user's guide (H-2000-5009)

Part number	Part description
A-2137-0109	<p>RMP2-S kit (DIN 69871-SIZE 50), comprising:</p> <ul style="list-style-type: none"> • RMP2-S (A-2137-0180) • MI16 (A-2137-0160) • Two RMMs (A-2137-0170) • MP3 probe (A-2053-5358) • Shank adaptor (M-2056-0293) • Tool kit (A-2053-7531). • Shank (see data sheet H-2000-2011). • MP16 touch-trigger probe system Installation and user's guide (H-2000-5009)
A-2137-0110	<p>RMP2-S kit (BT-1982-SIZE 40), comprising:</p> <ul style="list-style-type: none"> • RMP2-S (A-2137-0180) • MI16 (A-2137-0160) • Two RMMs (A-2137-0170) • MP3 probe (A-2053-5358) • Shank adaptor (M-2056-0293) • Tool kit (A-2053-7531). • Shank (see data sheet H-2000-2011). • MP16 touch-trigger probe system Installation and user's guide (H-2000-5009)
A-2137-0111	<p>RMP2-S kit (BT-1982-SIZE 50), comprising:</p> <ul style="list-style-type: none"> • RMP2-S (A-2137-0180) • MI16 (A-2137-0160) • Two RMMs (A-2137-0170) • MP3 probe (A-2053-5358) • Shank adaptor (M-2056-0293) • Probe tool kit (A-2053-7531). • Shank (see data sheet H-2000-2011). • MP16 touch-trigger probe system Installation and user's guide (H-2000-5009)
A-2137-0150	<p>RMP2 (includes probe tool kit: A-2053-7531)</p>
A-2137-0160	<p>MI16 machine interface</p>
A-2137-0170	<p>RMM radio machine module</p>
A-2137-0180	<p>RMP2-S (includes probe tool kit: A-2053-7531)</p>
A-2137-0400	<p>OM16 optical module (includes mounting bracket)</p>
M-2056-0293	<p>Shank adaptor</p>
P-BTO3-0001	<p>Battery (Duracell MN1604 PP3 9 V)</p>
	<p>Taper shank (for further information, please refer to the Taper shanks for machine tool probes Data sheet H-2000-2011)</p>

SPARES LIST

USA VERSION (224.5 – 225.475 MHz)

The following table contains a complete list of spares that may be ordered to support and maintain your MP16 touch-trigger probe system over its lifetime. All parts are listed in alpha-numerical order and may be ordered direct through any Renishaw company; for a full list of these, refer to the last page of this publication for a list of countries where Renishaw companies are located.

Part number	Part description
A-2053-5358	MP3 probe (includes probe tool kit: A-2053-7531)
A-2053-7531	Probe tool kit , comprising: <ul style="list-style-type: none"> • 1.98 mm diameter stylus tool • 1.5 mm AF allen key • 2.0 mm AF allen key(two) • 2.5 mm AF allen key • 3.0 mm AF allen key • 4.0 mm AF allen key
A-2056-0005	MI16 machine interface panel mounting kit
A-2056-0374	Shank adaptor fitting kit , comprising: <ul style="list-style-type: none"> • Two M4x12 socket head capscrews (P-SC01-0412) • Four M4x25 socket head capscrews (P-SC01-0425) • Four M4x12 flat point grub screw (P-SC34-0412) • Two spring washers (P-WA04-0015)
A-2056-0979	Shank adaptor
A-2137-0200	RMP2 kit , comprising: <ul style="list-style-type: none"> • RMP2 (A-2137-0250) • MI16 (A-2137-0260) • Two RMMs (A-2056-0360) • MP3 probe (A-2053-5358) • Shank adaptor (A-2056-0979/M-2056-0293) • Tool kit (A-2053-7531). • MP16 touch-trigger probe system Installation and user's guide (H-2000-5009)

Part number	Part description
A-2137-0250	RMP2 (includes probe tool kit: A-2053-7531)
A-2137-0260	MI16 machine interface
A-2056-0360	RMM radio machine module
A-2137-0400	OM16 optical module (includes mounting bracket)
A-2137-0435	Adaptor plate kit
H-2000-5009	MP16 touch-trigger probe system Installation and user's guide
M-2056-0293	Shank adaptor
P-BTO3-0005	<p>Battery (Duracell MN1500 LR6 1.5 V)</p> <p>Taper shank (for further information, please refer to the Taper shanks for machine tool probes Data sheet H-2000-2011)</p> <p>RMP2 kit with taper shank (for information relating to RMP2 kits supplied with taper shanks, please contact your supplier or nearest Renishaw subsidiary company. Refer to 'Before You Begin' for a list of countries where Renishaw companies are located).</p>

SPARES LIST

JAPANESE VERSION (224.5 – 225.475 MHz)

The following table contains a complete list of spares that may be ordered to support and maintain your MP16 touch-trigger probe system over its lifetime. All parts are listed in alpha-numerical order and may be ordered direct through any Renishaw company; for a full list of these, refer to the last page of this publication for a list of countries where Renishaw companies are located.

Part number	Part description
A-2053-5358	MP3 probe (includes probe tool kit: A-2053-7531)
A-2053-7531	Probe tool kit , comprising: <ul style="list-style-type: none"> • 1.98 mm diameter stylus tool • 1.5 mm AF allen key • 2.0 mm AF allen key(two) • 2.5 mm AF allen key • 3.0 mm AF allen key • 4.0 mm AF allen key
A-2056-0005	MI16 machine interface panel mounting kit
A-2056-0374	Shank adaptor fitting kit , comprising: <ul style="list-style-type: none"> • Two M4x12 socket head capscrews (P-SC01-0412) • Four M4x25 socket head capscrews (P-SC01-0425) • Four M4x12 flat point grub screw (P-SC34-0412) • Two spring washers (P-WA04-0015)
A-2056-0979	Shank adaptor
A-2137-0220	RMP2 kit , comprising: <ul style="list-style-type: none"> • RMP2 (A-2137-0240) • MI16 (A-2137-0260) • Two RMMs (A-2056-0360) • MP3 probe (A-2053-5358) • Shank adaptor (A-2056-0979/M-2056-0293) • Tool kit (A-2053-7531). • MP16 touch-trigger probe system Installation and user's guide (H-2000-5009)

Part number	Part description
A-2137-0240	RMP2 (includes probe tool kit: A-2053-7531)
A-2137-0260	MI16 machine interface
A-2056-0360	RMM radio machine module
A-2137-0400	OM16 optical module (includes mounting bracket)
A-2137-0435	Adaptor plate kit
H-2000-5009	MP16 touch-trigger probe system Installation and user's guide
M-2056-0293	Shank adaptor
P-BTO3-0005	Battery (Duracell MN1500 LR6 1.5 V) Taper shank (for further information, please refer to the Taper shanks for machine tool probes Data sheet H-2000-2011) RMP2 kit with taper shank (for information relating to RMP2 kits supplied with taper shanks, please contact your supplier or nearest Renishaw subsidiary company. Refer to ' Before You Begin ' for a list of countries where Renishaw companies are located).

Addendum A

RMP2 radio module probes fitted with Duracell MN1500 LR6 1.5 V batteries

The following addendum, which should be read in conjunction with Chapters 1 through 4 of this publication, provides information on the latest versions of the Renishaw Mk2 radio module probe.

Contained in this addendum

- Introduction..... A-2
- Mounting the RMP2 on a shank..... A-3
- Installing the batteries into the RMP2 A-16

Introduction

Note...

Please note that no version of Mk2 RMP2 radio module probe incorporating six Duracell MN1500 LR6 1.5 V batteries is currently available for use in Continental Europe or the UK.

Incorporating six Duracell MN1500 LR6 1.5 V batteries, the latest versions of the Mk2 RMP2 radio module probe offer enhanced levels of battery life when compared with RMP2s incorporating two Duracell MN1604 PP3 9 V batteries. Typically, battery capacity is increased from 550 mAh to 2250 mAh, 5% usage (72 min./day) is increased from 50 days to 110 days, and continuous life is increased from 60 hrs to 135 hrs.

Superceding earlier versions of RMP2, as well as earlier versions of the RMP2-S, the latest version RMP2 can also be supplied with adaptor plate kit (part no. A-2137-0435) to allow easier fitment to shanks incorporating a shank switch.

Mounting the RMP2 on a shank

Notes...

Three types of shank adaptor are available for mounting the latest version RMP2 on a shank. These are:

- Shank adaptor (part no. A-2056-0979) – used for mounting shanks incorporating two M8 grub screws, which are tightened against the conical seat of the shank adaptor to retain the shank in position.
- Shank adaptor (part no. M-2056-0293) – used for mounting shanks incorporating two M4 threaded mounting holes within their front mounting face.
- Shank adaptor (part no. A-2137-0435) – used for mounting shanks incorporating two M4 threaded mounting holes within their front mounting face, and which include an integral shank switch.

For further information on shank/shank adaptor compatibility, refer to Renishaw's "Taper shanks for machine tool probe data sheet – Part No. H-2000-2011". Where necessary, this document may be obtained from your supplier or nearest Renishaw Group company; refer to the last page of this publication for a list of countries where Renishaw companies are located.

Continued on Page 4

Mounting the RMP2 on a shank (non-shank switch)

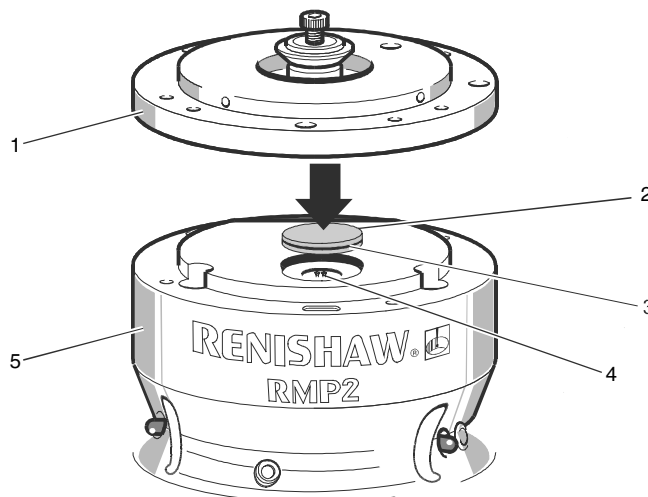
Mounting shank adaptor (part no. A-2056-0979) on the RMP2

The procedure for mounting shank adaptor (part no. A-2056-0979) on the RMP2 is identical to that described in **Chapter 2 – System Installation** with the following exception (see Figure A):

Note...

Before mounting the shank adaptor (part no. A-2056-0979) on the RMP2, check that you have the blanking cap (part no. M-2137-0427) supplied with the RMP2. Where necessary, this item may be obtained through your supplier (refer to the last page of this publication for a list of countries where Renishaw companies are located).

1. Visually examine the blanking cap to ensure that the 'O' ring [3] is undamaged. If damage is found, a replacement 'O' ring (part no. P-RS02-0004) may be obtained through your supplier.
2. Prior to mounting the shank adaptor [1] to the RMP2 [5], locate the blanking cap [2] over the two-way socket [4] located within the top face of the RMP2 and gently press down into position.



1. Shank adaptor (part no. A-2056-0979)
2. Blanking cap
3. 'O' ring
4. Two-way socket
5. RMP2

Figure A – Mounting the latest version RMP2 on a shank adaptor (part no. A-2056-0979)

Mounting shank adaptor (part no. A-2056-0979) on a shank

The procedure for mounting shank adaptor (part no. A-2056-0979) on a shank is identical to that described in **Chapter 2 – System installation**.

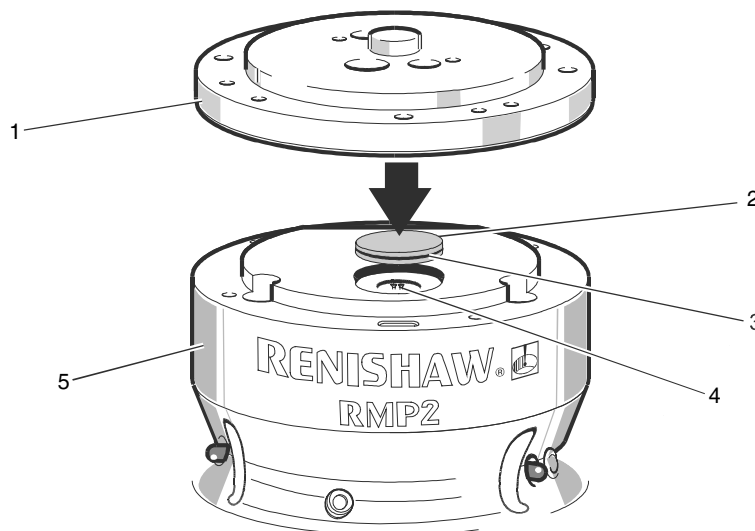
Mounting shank adaptor (part no. M-2056-0293) on the RMP2

The procedure for mounting shank adaptor (part no. M-2056-0293) on the RMP2 is identical to that described in **Chapter 2 – System Installation** with the following exception (see Figure B):

Note...

Before mounting the shank adaptor (part no. M-2056-0293) on the RMP2, check that you have the blanking cap (part no. M-2137-0427) supplied with the RMP2. Where necessary, this item may be obtained through your supplier (refer to the last page of this publication for a list of countries where Renishaw companies are located).

1. Visually examine the blanking cap to ensure that the 'O' ring [3] is undamaged. If damage is found, a replacement 'O' ring (part no. P-RS02-0004) may be obtained through your supplier.
2. Prior to mounting the shank adaptor [1] to the RMP2 [5], locate the blanking cap [2] over the two-way socket [4] located within the top face of the RMP2 and gently press down into position.



1. Shank adaptor (part no. M-2056-0293)
2. Blanking cap
3. 'O' ring
4. Two-way socket
5. RMP2

Figure B – Mounting the latest version RMP2 on a shank adaptor (part no. M-2056-0293)

Mounting shank adaptor (part no. M-2056-0293) on a shank

The procedure for mounting shank adaptor (part no. M-2056-0293) on a shank is identical to that described in **Chapter 2 – System installation**.

Mounting the RMP2 on a shank incorporating a shank switch

Mounting shank adaptor (part no. A-2137-0435) on a shank incorporating a shank switch

Notes...

The following procedure need only be performed where the RMP2 and the shank have been ordered separately.

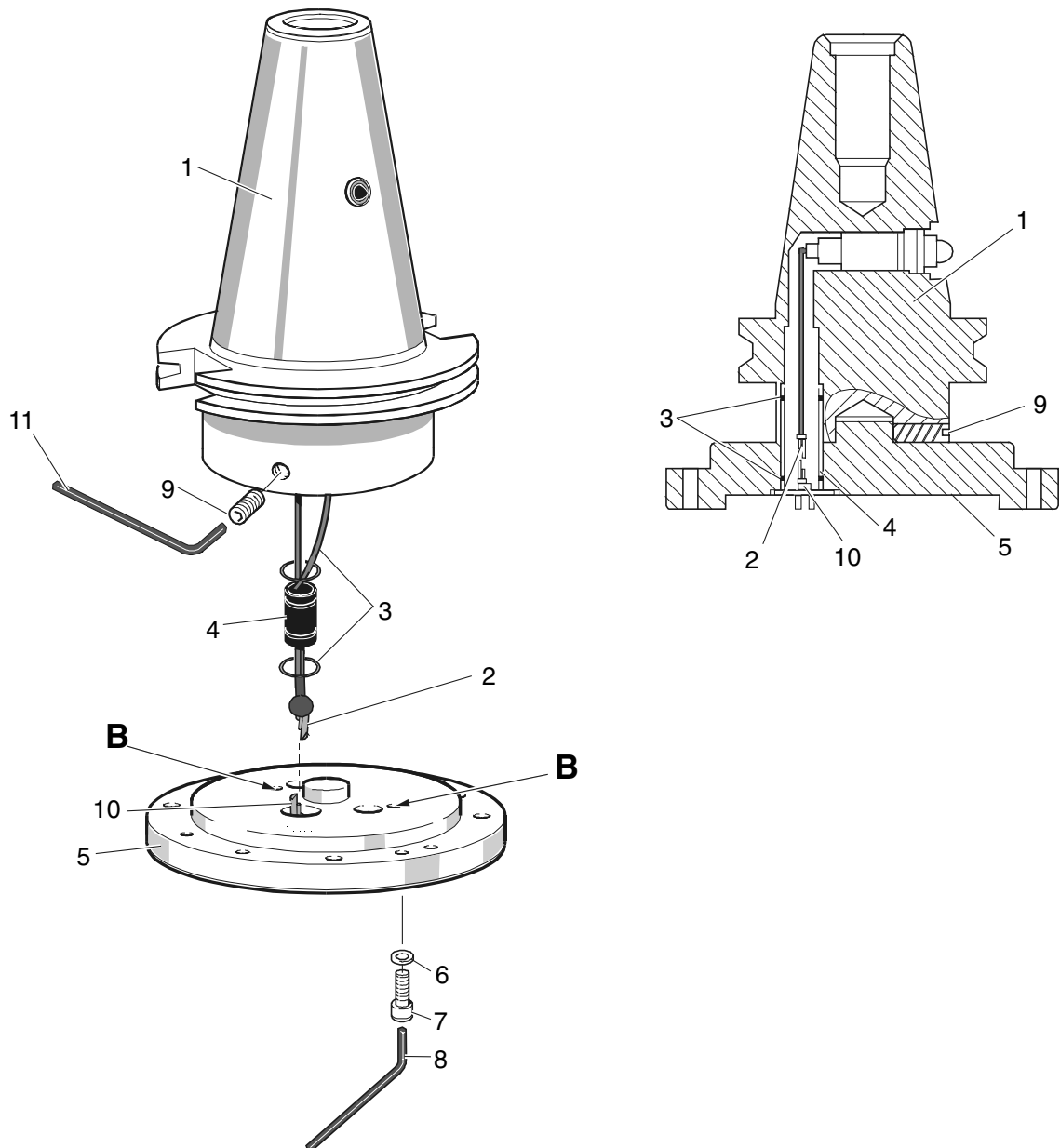
Do not attempt this procedure without first confirming that the following parts are available. Where required, these may be ordered through your supplier or nearest Renishaw company (refer to the last page of this publication for a list of countries where Renishaw companies are located):

- Connector (part no. P-CN23-0503)
- Bobbin (part no. M-2056-0323)
- 'O' ring (part no. P-RS01-0018) (2 off)
- 'O' ring (part no. P-RS02-0022)
- Shank adaptor (part no. A-2137-0435)
- M4x16 mm socket head capscrew (part no. PSCO1-0416) (2 off)
- M4 anti-vibration washer (part no. P-WA07-0040) (2 off)
- 4.8 mm dia x 12 mm long heat shrink sleeving
- 2.4 mm dia x 40 mm long heat shrink sleeving

To mount the RMP2 on a shank, carry out the following procedure (see Figure C):

1. Cut two 40 mm lengths of 2.4 mm diameter heat shrink sleeving (supplied). Gently slide one length of sleeving over each of the two wires emerging from the shank [1]. Continue to slide each length of sleeving down each wire until it abuts the bottom face of the shank recess.
2. Carefully solder connector [2] (part no. P-CN23-0503) to the two wires emerging from the shank [1]. Clean each joint and allow to fully cool.
3. Inspect each soldered joint in turn for soundness and, if satisfactory, carefully position heat shrink sleeving over the joint.
4. Ensuring that both the shank wires and the solder joints are well protected, shrink each length of sleeving into position using a suitable heat gun.

Continued on Page 10



1. Shank (typical)
2. Connector (P-CN23-0503)
3. 'O' ring (P-RS01-0018) (2 off)
4. Bobbin
5. Shank adaptor (A-2137-0435)
6. M4 anti-vibration washer (2 off)
7. M4x16 mm socket head capscrew (2 off)
8. 3 mm AF allen key
9. M4x12 mm grub screw (4 off)
10. Connector (P-CN23-0504)
11. 2 mm AF allen key

Figure C – Mounting shank adaptor A-2137-0435 on a shank incorporating a shank switch

5. Assemble the two 'O' rings [3] (part no. P-RS01-0018) to the bobbin [4]. Lightly smear the two 'O' rings with mineral oil.
6. Carefully pass connector [2], and attached shank wires, through the internal bore of the bobbin [4].
7. Align the bobbin [4] with the location bore within the base of the shank [1] and gently press the bobbin down into position.
8. Connect connector [2] to connector [10] located within the top face of the shank adaptor [5] and position the bobbin location bore of the shank adaptor over the top face of the bobbin [4].
9. Ensuring that the two M4 tapped holes within the mounting face of the shank [1] align with the two accommodation bores (**B**) within the flange of the shank adaptor [5], carefully press the shank adaptor over the bobbin to abut the shank.
10. Fit one M4 anti-vibration washer [6] to each of the two M4x16 mm socket head capscrews [7].
11. Insert the two M4x16 mm socket head capscrews [7] through accommodation bores (**B**) of shank adaptor [5] to engage the tapped holes of the shank [1]. Using the 3 mm AF allen key [8] supplied, tighten the two socket head capscrews to achieve a final torque of 3 Nm (2.2 lbf.ft).
12. Using the 2 mm AF allen key [11] supplied, tighten the four M4x12 mm grubscrews [9] located within the flange of the shank [1] to 2 Nm (1.7 lbf.ft).

Mounting the shank adaptor (part no. A-2137-0435) and attached shank on the RMP2

CAUTION

THE PROBE MOUNTING KIT SUPPLIED WITH THE MP16 TOUCH-TRIGGER PROBE SYSTEM INCLUDES ANTI-VIBRATION WASHERS WHICH MUST BE FITTED TO THE SOCKET HEAD CAPSCREWS USED TO SECURE THE SHANK ADAPTOR TO THE RMP2. FAILURE TO FIT THESE WASHERS COULD RESULT IN LOOSENING OF THE SOCKET HEAD CAPSCREWS DURING PROBE OPERATION.

Notes...

Shank adaptor (part no. A-2137-0435) is mounted on the RMP2 using one of the following two methods:

- Using four M4x25 mm socket head capscrews, located through accommodation bores within the RMP2, and secured in M4 tapped holes within the shank adaptor.
- Using four M5x20 mm socket head capscrews, located through accommodation bores within the shank adaptor, and secured in M5 tapped holes within the RMP2.

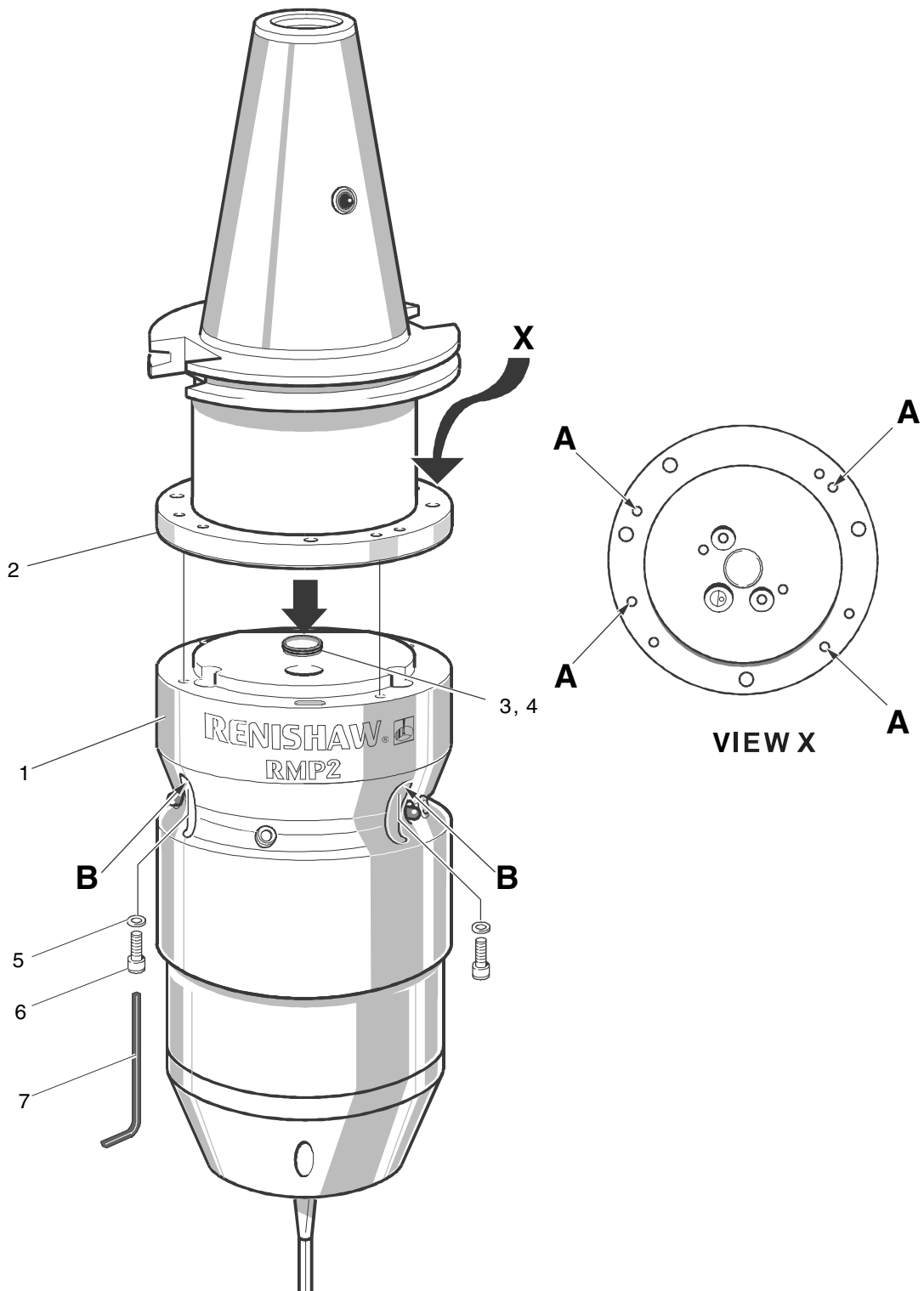
Do not attempt the procedures without first confirming that the following parts are available (supplied with shank adaptor). Where required, these may be ordered through your supplier or nearest Renishaw company (refer to the last page of this publication for a list of countries where Renishaw companies are located):

- 'O' ring collar (part no. M-2137-0424)
- 'O' ring (part no. P-RS02-0004) (2 off)

Mounting shank adaptor (part no. A-2137-0435) on the RMP2 using four M4x25 mm socket head capscrews

To mount the shank adaptor (part no. A-2137-0435) on the RMP2 using four M4x25 mm socket head capscrews, carry out the following (see Figure D):

1. If required, Fit the two 'O' rings [4] to the 'O' ring collar [3].
2. Gently press the 'O' ring collar [3] into the accommodation bore within the top face of the RMP2 [1].
3. Carefully position the shank adaptor [2] over the top face of the RMP2 and, ensuring that the 'O' ring adaptor [3] locates within the MP3 PCB accommodation bore of the shank adaptor, press the two components firmly together.
4. Referring to Figure D, align the four M4 threaded bores (**A**) of the shank adaptor [2] with the four tapped holes (**B**) of the RMP2 [1].
5. Fit one M4 anti-vibration washer [5] to each of the four M4x25 mm socket head capscrews [6].
6. Insert the four M4x25 mm socket head capscrews [6] through accommodation bores (**B**) of the RMP2 [2] to engage the tapped holes (**A**) of the shank adaptor [2]. Using the 3 mm AF allen key [7] supplied, systematically tighten the four socket head capscrews to achieve a final torque of 3 Nm (2.2 lbf.ft).



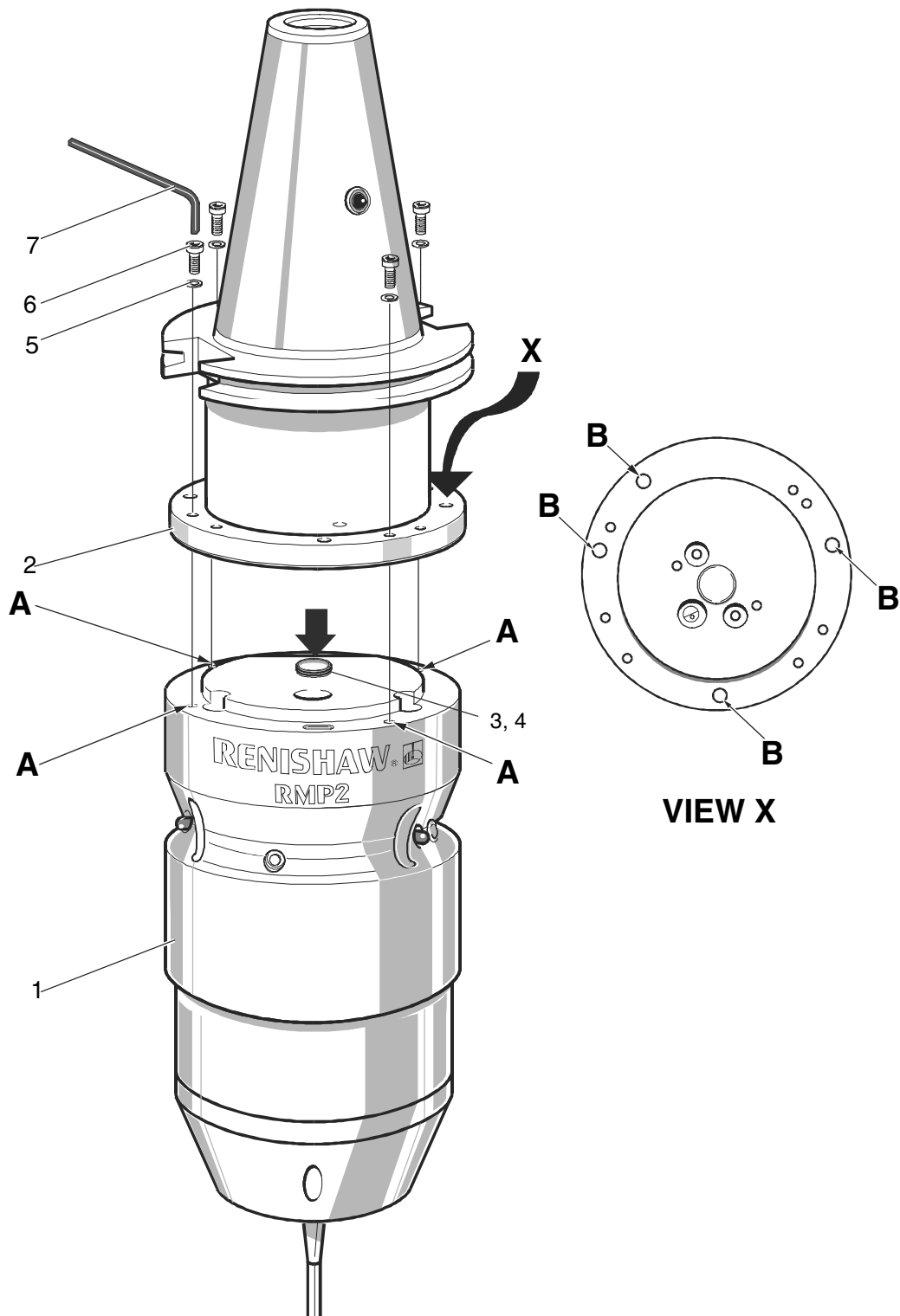
1. RMP2
2. Shank adaptor (A-2137-0435)
3. 'O' ring collar
4. 'O' ring (2 off)
5. M4 anti-vibration washer (4 off)
6. M4x25 mm socket head capscrew (4 off)
7. 3 mm AF allen key

Figure D – Mounting shank adaptor A-2137-0435 on the RMP2 using four M4 socket head screws

Mounting shank adaptor (part no. A-2137-0435) on the RMP2 using four M5x20 mm socket head capscrews

To mount the shank adaptor (part no. A-2137-0435) to the RMP2 using four M5x20 mm socket head capscrews, carry out the following (see Figure E):

1. If required, Fit the two 'O' rings [4] to the 'O' ring collar [3].
2. Gently press the 'O' ring collar [3] into the accommodation bore within the top face of the RMP2 [1].
3. Carefully position the shank adaptor [2] over the top face of the RMP2 and, ensuring that the 'O' ring adaptor [3] locates within the MP3 PCB accommodation bore of the shank adaptor, press the two components firmly together.
4. Referring to Figure E, align the four accommodation bores (**A**) of the shank adaptor [2] with the four M5 tapped holes (**B**) of the RMP2 [1].
5. Fit one M5 anti-vibration washer [4] to each of the four M5x20 mm socket head capscrews [5].
6. Insert the four M5x20 mm socket head capscrews [5] through accommodation bores (**A**) of the shank adaptor [2] to engage the M5 tapped holes (**B**) of the RMP2-S [1]. Using the 4 mm AF allen key [6] supplied, systematically tighten the four socket head capscrews to achieve a final torque of 5.1 Nm (3.76 lbf.ft).



1. RMP2
2. Shank adaptor (A-2137-0435)
3. 'O' ring collar (M-2137-0424)
4. 'O' ring (P-RS02-0004 (2 off))
5. M5 anti-vibration washer (4 off)
6. M5x20 mm socket head capscrew (4 off)
7. 4 mm AF allen key

Figure E – Mounting shank adaptor A-2137-0435 on the RMP2 using four M5 socket head screws

Fitting the six Duracell MN1500 LR6 1.5 V batteries into the RMP2

Note...

Before programming the RMP2, fit the six batteries (supplied) within the RMP2 body.

To fit the six MN1500 LR6 1.5 V batteries (supplied) into the RMP2, carry out the following (see Figure F):

CAUTIONS

CARE MUST BE TAKEN NOT TO DAMAGE THE BATTERY COVER SEAL WHEN REMOVING THE BATTERY COVER.

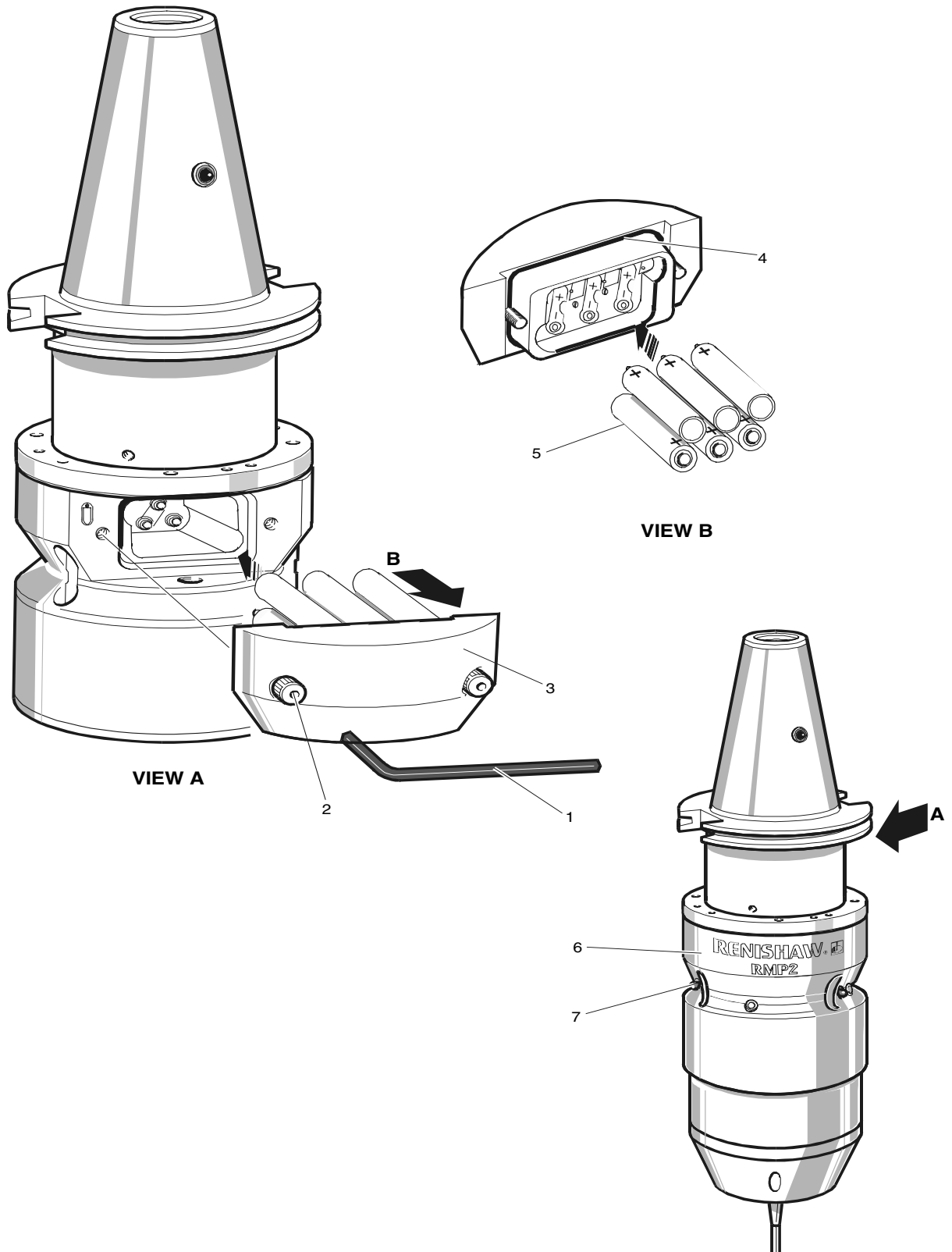
HANDLE BATTERIES IN ACCORDANCE WITH THE MANUFACTURER'S INSTRUCTIONS. USE ONLY THE RECOMMENDED BATTERY TYPE. DO NOT ALLOW THE BATTERY TERMINALS TO CONTACT OTHER METALLIC SURFACES.

1. Using the 3 mm AF allen key [1] supplied, release the two battery cover retaining screws [2] and carefully remove the battery cover [3] from the RMP2 [6].
2. Ensuring the correct polarity, connect the six batteries [5] to the terminals within the battery cover [3].
3. Lightly smear the battery cover seal [4] with mineral oil or grease.

Note...

After the batteries [5] and battery cover [3] are fitted to the RMP2, the probe status LED [7] will show a double flashing green condition and remain active in the programming mode for one minute.

4. Ensuring correct orientation, carefully insert the batteries [5] into the battery compartment of the RMP2 until the battery cover [3] abuts the cover mounting flange on the RMP2 body. Hand-tighten the two battery cover retaining screws [2] to retain the cover in position.
5. Using the 3 mm AF allen key [1], tighten the two battery cover retaining screws [2] to 3 Nm (2.2 lbf.ft).



- 1. 3 mm AF allen key
- 2. Battery cover retaining screw (2 off)
- 3. Battery cover
- 4. Battery cover seal
- 5. Battery (P-BT03-0005) (6 off)
- 6. RMP2
- 7. Probe status LED

Figure F – Fitting the batteries to the RMP2

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Addendum B

Selection of MI16 radio reception sensitivity

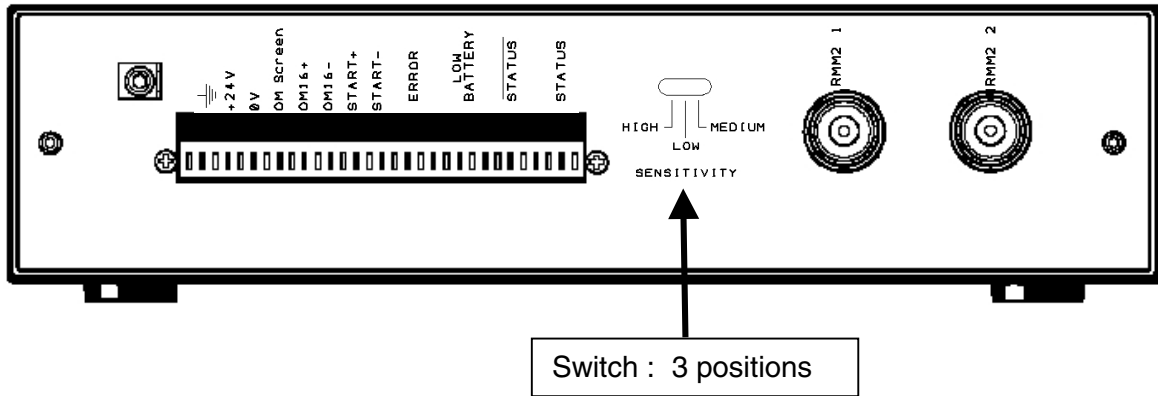
This addendum should be read in conjunction with Chapters 1 and 2 of this publication.

Contained in this addendum

- Introduction..... B-2
- Guidelines for selecting the switch position..... B-2

Introduction

The MI16 MK3 version has an integral switch which allows selection of the radio reception sensitivity level. The switch is located on the rear panel.



The sensitivity can be selected from three levels:

- HIGH : Maximum sensitivity position
- LOW : Minimum sensitivity position
- MEDIUM : This position is a compromise between the high and low levels.

Guidelines for selecting the switch position

The sensitivity switch position that is selected is dependent on the power version of the probe that is sold in each market. The following positions are suggested for these regions:

- HIGH: USA market
- LOW: EU market
- MEDIUM: Japanese market

Adjustment from these positions should be made to optimise performance where probe signals are weak or when interference is being experienced.

NOTE ...

Selection of the MI16 interface sensitivity setting must not be used as an alternative to installing the RMM2 antenna correctly (see Chapter 2 – System installation).

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