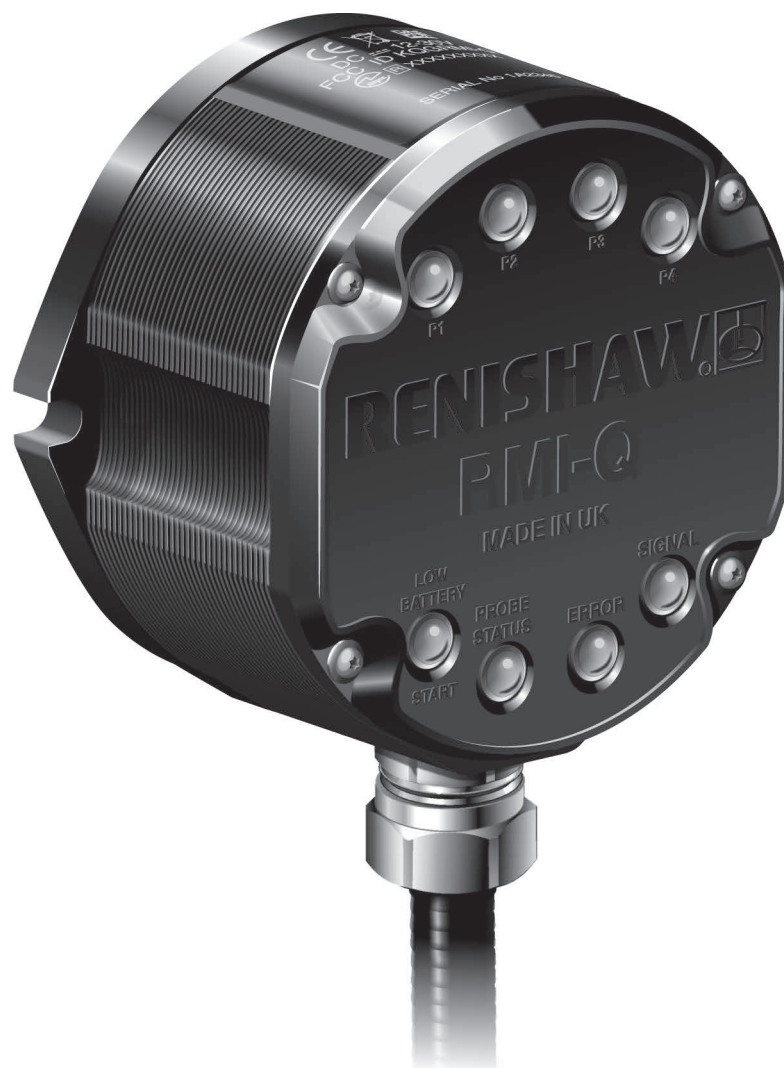


RMI-Q radio machine interface



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Renishaw part no: H-5687-8504-03-A

First issued: 11.2012

Revised: 07.2016

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Before you begin

1.1

Before you begin

Disclaimer

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Trade marks

RENISHAW and the probe symbol used in the RENISHAW logo are registered trade marks of Renishaw plc in the United Kingdom and other countries. **apply innovation** and names and designations of other Renishaw products and technologies are trade marks of Renishaw plc or its subsidiaries.

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

Warranty

Equipment requiring attention under warranty must be returned to your equipment supplier.

Unless otherwise specifically agreed in writing between you and Renishaw, if you purchased the equipment from a Renishaw company, the warranty provisions contained in Renishaw's CONDITIONS OF SALE apply. You should consult these conditions in order to find out the details of your warranty, but in summary the main exclusions from the warranty are if the equipment has been:

- neglected, mishandled or inappropriately used; or
- modified or altered in any way except with the prior written agreement of Renishaw.

If you purchased the equipment from any other supplier, you should contact them to find out what repairs are covered by their warranty.

Changes to equipment

Renishaw reserves the right to change equipment specifications without notice.

CNC machines

CNC machine tools must always be operated by fully trained personnel in accordance with the manufacturer's instructions.

Care of the interface

Keep system components clean.

RMP probe family

The RMP family of probes currently consists of the RMP40, RMP40M, RLP40, RMP60, RMP60M and RMP600. The RTS radio tool setter also forms part of Renishaw's family of radio transmission probes. The term RMP used throughout this installation guide refers to both the probes and the tool setter.

Patents

Features of the RMI-Q, and other similar Renishaw probes, are the subject of one or more of the following patents and/or patent applications:

CN 100466003	JP 4575781
CN 101287958	JP 5238749
CN 101482402	JP 5390719
EP 1576560	KR 1001244
EP 1931936	TW I333052
EP 2216761	US 7665219
IN 215787	US 7821420
IN WO2004/057552	US 9140547
IN WO2007/028964	

EC declaration of conformity



Renishaw plc hereby declares that the RMI-Q is in compliance with the essential requirements and other relevant provisions of Directive 1999/5/EC.

Contact Renishaw plc or visit www.renishaw.com/rmi-q for the full EC declaration of conformity.

WEEE directive



The use of this symbol on Renishaw products and/or accompanying documentation indicates that the product should not be mixed with general household waste upon disposal. It is the responsibility of the end user to dispose of this product at a designated collection point for waste electrical and electronic equipment (WEEE) to enable reuse or recycling. Correct disposal of this product will help to save valuable resources and prevent potential negative effects on the environment. For more information, please contact your local waste disposal service or Renishaw distributor.

FCC Information to user (USA only)

47 CFR Section 15.19

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

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

47 CFR 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.

Radio approval

Radio equipment – Canadian warning statements

English

Under Industry Canada regulations, this radio transmitter may only operate using an antenna of a type and maximum (or lesser) gain approved for the transmitter by Industry Canada.

To reduce potential radio interference to other users, the antenna type and its gain should be so chosen that the equivalent isotropically radiated power (e.i.r.p.) is not more than that necessary for successful communication.

This device complies with Industry Canada licence-exempt RSS standard(s). Operation is subject to the following two conditions: (1) this device may not cause interference, and (2) this device must accept any interference, including interference that may cause undesired operation of the device.

Français

Conformément à la réglementation d'Industrie Canada, le présent émetteur radio peut fonctionner avec une antenne d'un type et d'un gain maximal (ou inférieur) approuvé pour l'émetteur par Industrie Canada.

Dans le but de réduire les risques de brouillage radioélectrique à l'intention des autres utilisateurs, il faut choisir le type d'antenne et son gain de sorte que la puissance isotrope rayonnée équivalente (p.i.r.e.) ne dépasse pas l'intensité nécessaire à l'établissement d'une communication satisfaisante.

Le présent appareil est conforme aux CNR d'Industrie Canada applicables aux appareils radio exempts de licence. L'exploitation est autorisée aux deux conditions suivantes : (1) l'appareil ne doit pas produire de brouillage, et (2) l'utilisateur de l'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.

Radio approvals

Argentina: CNC ID: C-13041

Australia N26517

Brazil: 1866-13-2812



“Este equipamento opera em caráter secundário, isto é, não tem direito a proteção contra interferência prejudicial, mesmo de estações do mesmo tipo, e não pode causar interferência a sistemas operando em caráter primário.”

Canada: IC: 3928A-RMIQ

China: CMIIT ID: 2012DJ7575

Europe: CE

Japan: 205-2012137

Singapore: Reg. No: N2347-12



South Africa: TA-2013/1210



South Korea: MSIP-CRM-R1P-RMI-Q

Taiwan: CCAB13LP3040T2

附件一

低功率電波輻射性電機管理辦法

第十二條

經型式認證合格之低功率射頻電機，非經許可，公司、商號或使用者均不得擅自變更頻率、加大功率或變更原設計之特性及功能。

第十四條

低功率射頻電機之使用不得影響飛航安全及干擾合法通信；經發現有干擾現象時，應立即停用，並改善至無干擾時方得繼續使用。

前項合法通信，指依電信法規定作業之無線電通信。

低功率射頻電機須忍受合法通信或工業、科學及醫療用電波輻射性電機設備之干擾。

USA: FCC ID: KQGRMI-Q

Iceland India Indonesia Israel Liechtenstein
Malaysia Mexico Montenegro New Zealand
Norway Russia Switzerland The Philippines
Turkey Vietnam

Safety

Information to the user

In all applications involving the use of machine tools or CMMs, eye protection is recommended.

Information to the machine supplier/installer

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

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

Information to the equipment installer

All Renishaw equipment is designed to comply with the relevant EC and FCC regulatory requirements. It is the responsibility of the equipment installer to ensure that the following guidelines are adhered to, in order for the product to function in accordance with these regulations:

- any interface **MUST** be installed in a position away from any potential sources of electrical noise, i.e. power transformers, servo drives etc;
- all 0 V/ground connections should be connected to the machine "star point" (the "star point" is a single point return for all equipment ground and screen cables). This is very important and failure to adhere to this can cause a potential difference between grounds;
- all screens must be connected as outlined in the user instructions;
- cables must not be routed alongside high-current sources, i.e. motor power supply cables etc, or be near high-speed data lines;
- cable lengths should always be kept to a minimum.

Equipment operation

If this equipment is used in a manner not specified by the manufacturer, the protection provided by the equipment may be impaired.

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RMI-Q basics

2.1

Introduction

CNC machine tools which are using Renishaw spindle probes with radio signal transmission for workpiece inspection, or tool setters with radio signal transmission, require a Renishaw radio machine interface (such as the RMI-Q) for signal transmission. The RMI-Q, which acts as a combined radio transceiver and machine interface, converts signals from the RMP into voltage-free solid state relay (SSR) and driven outputs for transmission to the CNC machine controller.

The RMI-Q is designed to be mounted within the machine's working envelope.

Application of the RMI-Q enables individual radio turn on and subsequent operation of up to four separate 2nd generation RMPs, permitting numerous combinations of radio inspection probes and/or radio tool setters to be used on the same machine tool.

RTS, and other 2nd generation RMPs, are easily identified by a 'Q' marking. 1st generation RMPs, which do not have the 'Q' marking, may also be used with the RMI-Q. However, in machine tool applications where more than one RMP is required, it is recommended that only 2nd generation RMPs are used. Should there be a requirement to use a 1st generation RMP with the RMI-Q, it is necessary that any additional probes are 'Q' marked 2nd generation RMPs.

Optimum communication performance between the RMI-Q and the RMP is achieved when the RMI-Q is aligned towards the RMP, both positioned within the machine working environment. Other alignments within the machine working environment are permissible with negligible reduction in communication performance.

Mounting of the RMI-Q outside of the machine working envelope is possible but should be avoided as a reduced communication performance may result. For details about signal status, see "SIGNAL LED" on page 2.3.

CAUTION: RMI-Q operation of up to four separate RMPs is different to 'multiple probe mode' which is a function of the RMP that enables individual application of multiple probes but does not use radio turn on.

NOTE: When a RMI-Q is mounted outside of the machine working envelope, the radio communication to the RMP will be via reflective surfaces such as floor, ceiling and walls. It is highly likely that the radio communication link will be subjected to external radio signals from other devices and will result in a less robust communication performance. A reflective path must not exceed 15 m (49.2 ft).

Power supply

The RMI-Q can draw its supply from the CNC machine tool's 12 Vdc to 30 Vdc supply and present a peak load of up to 800 mA during turn on (typically <500 mA from 12 V to 30 V).

Input voltage ripple

The input voltage ripple must not cause the voltage to fall below 12 V or rise above 30 V.

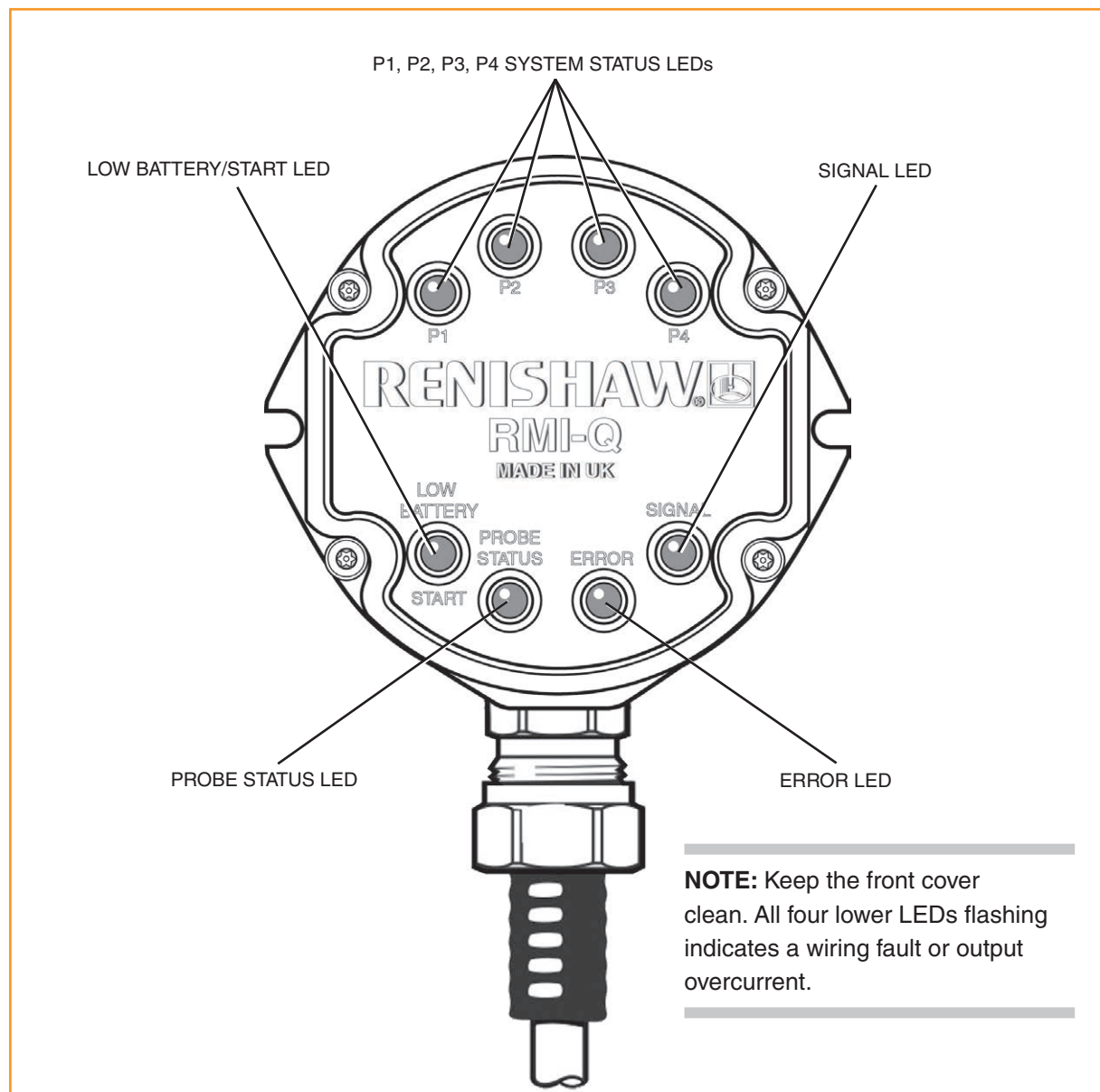
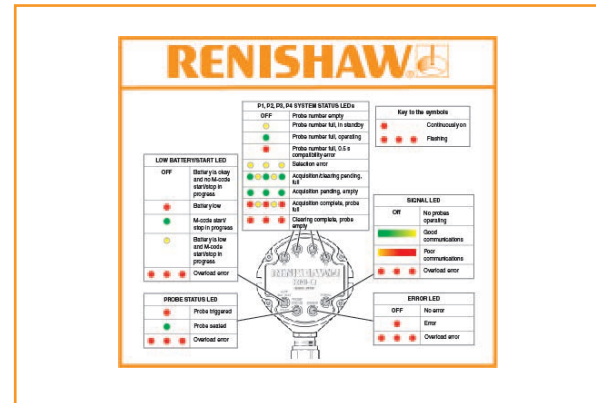
RMI-Q visual diagnostics

A visual indication of system status is provided by LEDs. Status is continuously updated and indication is provided for:

- P1, P2, P3, P4 SYSTEM STATUS;
- LOW BATTERY/START;
- PROBE STATUS;
- ERROR;
- SIGNAL CONDITION;

Magnetic label

A summary of RMI-Q activity is provided on a magnetic label. The label may be placed on any machine flat metal surface.



P1, P2, P3, P4 SYSTEM STATUS LEDs

Off	– Probe number empty.
Yellow	– Probe number full, in standby.
Green	– Probe number full, operating.
Red	– Probe number full, 0.5 s compatibility error.
Yellow/off	– Flashing: Selection error.
Green/yellow	– Flashing: Acquisition/clearing pending, probe full.
Green/off	– Flashing: Acquisition pending, probe empty.
Red/yellow	– Flashing: Acquisition complete, probe full.
Red/off	– Flashing: Clearing complete, probe empty.

LOW BATTERY / START LED

Off	– Battery is OK and no M-code start/stop in progress.
Red	– Battery is low.
Green	– M-code start/stop in progress.
Yellow	– Battery low and M-code start/stop in progress.
Red/off	– Flashing: RMI-Q has an overcurrent condition.

PROBE STATUS LED

Red	– Probe triggered.
Green	– Probe seated.
Red/off	– Flashing: RMI-Q has an overcurrent condition.

ERROR LED

Off	– No error.
Red	– Error, other outputs may be incorrect.
Red/off	– Flashing: RMI-Q has an overcurrent condition

SIGNAL LED

Off	– No probes operating.
Green	– Good communications.
Green/yellow	– Good communications.
Red	– Poor communications, radio link may fail.
Red/off	– Flashing: RMI-Q has an overcurrent condition.

NOTES:

The 'PROBE STATUS' LED is always illuminated when power is present at the RMI-Q (as the RMI-Q does not incorporate a separate 'power present' indicator).

All LEDs report the status of the partner RMP. If there is no partner in range, or the partner is off, then the 'PROBE STATUS' and 'ERROR' LEDs will illuminate red. The 'LOW BATTERY/START' and 'SIGNAL' LEDs will be off.

When the RMI-Q is powered on it will enter the acquire partner mode. This is indicated by a flashing green 'SIGNAL' LED (no change in outputs). After ~60 seconds it will switch to its normal mode listening for its partner.

The conditions shown by the 'LOW BATTERY/START', 'PROBE STATUS' and 'ERROR' LEDs are the same as those present on the electrical signal outputs.

RMI-Q inputs

Machine start inputs (P1, P2, P3, P4):

Machine start inputs are configurable as a level or pulsed signal.

P1	12 to 30 V (2.4 mA at 24 V) Dedicated start – level Common start – pulsed/level
P2, P3, P4	12 to 30 V (10 mA at 24 V) Dedicated start – level Common start – level

P1 machine start wires
(white +ve and brown -ve).

P2 machine start wires
(pink +ve and brown -ve).

P3 machine start wires
(white/red +ve and brown -ve).

P4 machine start wires
(white/blue +ve and brown -ve).

RMI-Q outputs

There are five outputs:

- Probe status 1 (SSR).
- Probe status 2a (5 V isolated driven skip).
- Probe status 2b (driven at power supply voltage).
- Error (SSR).
- Low battery (SSR).

All outputs can be inverted by using switches SW1 and SW2, (see “Switches SW1 and SW2” on page 2.8).

Probe status 1, Error, Low battery (SSR):

- ‘On’ resistance = 50 Ω max.
- Load voltage = 40 V max.
- Load current = 100 mA max.

Probe status 2a (5 V isolated driven skip):

- Load current = 50 mA max.

Output voltages

- Sourcing = 4.2 V min. at 10 mA.
= 2.2 V min. at 50 mA.

- Sinking = 0.4 V max. at 10 mA.
= 1.3 V max. at 50 mA.

Probe status 2b (driven at power supply voltage):

- Load current = 50 mA max.

Output voltages

- Sourcing voltage drop = 2.6 V max. at 10 mA.
= 3.5 V max. at 50 mA.
- Sinking voltage drop = 2.0 V max. at 10 mA.
= 2.9 V max. at 50 mA.

The 'LOW BATTERY/START', 'PROBE STATUS', 'ERROR' and 'SIGNAL' LEDs will start flashing red when an output overload has occurred. All outputs will be switched off. If this occurs, turn off the power supply and remove the source of the problem. Turning on the power supply will reset the RMI-Q.

CAUTIONS:

Power supply voltage

Do not exceed 30 V between: the black wire and the screen wire (green/yellow); the red wire and screen wire (green/yellow); or the red and black wires (power supply), as this could result in permanent damage to the RMI-Q and/or the customer power supply.

The use of in-line fuses at the machine cabinet end is recommended to provide protection for the RMI-Q and cable.

Screen connection

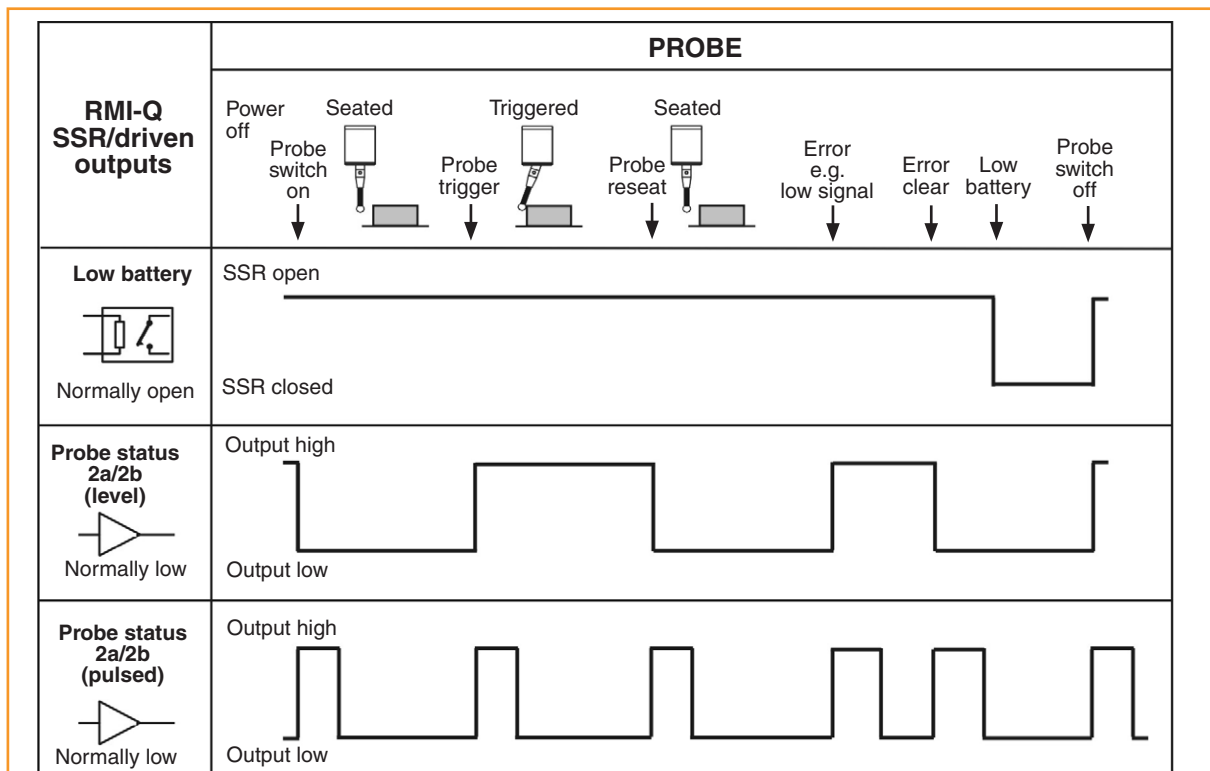
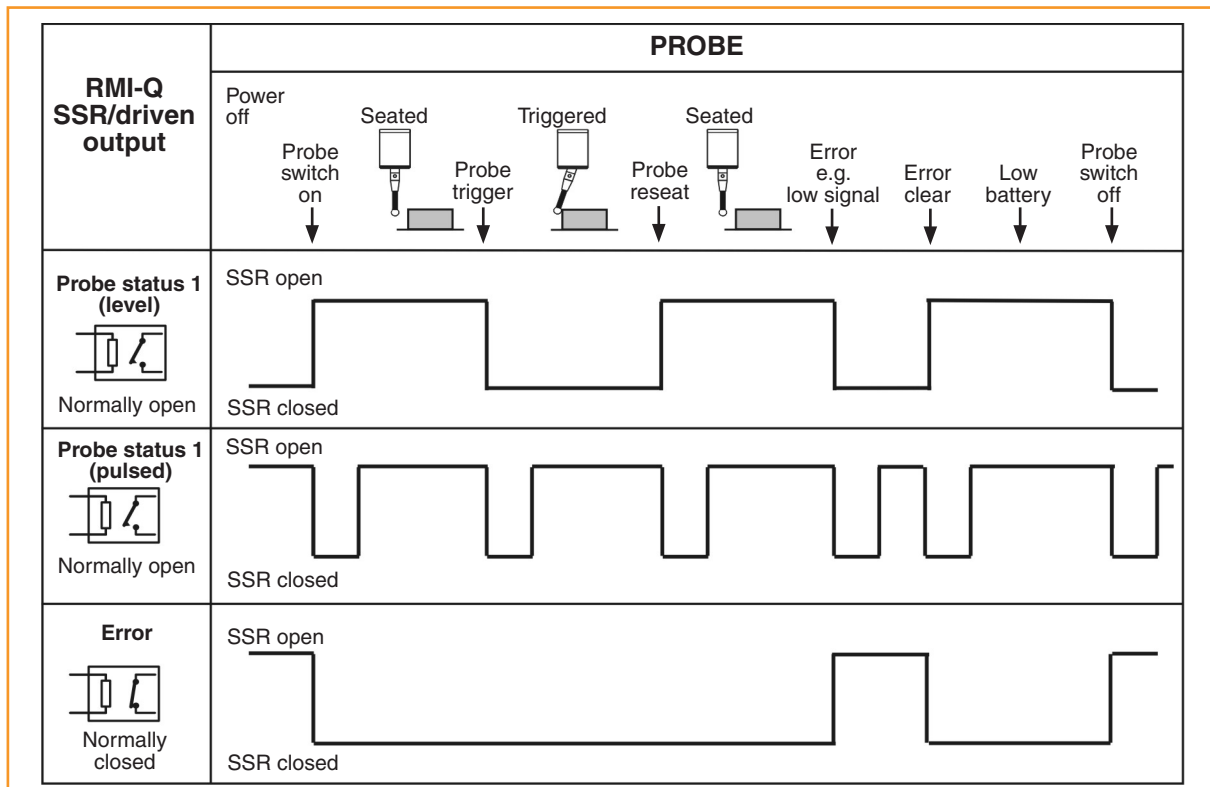
A good connection must be made to machine ground (“star point”).

Output stage circuit

Whilst the RMI-Q is powered, do not switch on/switch off output stages to enable/disable them as this could cause the over current protection to switch off the output completely.

Ensure that outputs from the RMI-Q do not exceed specified current ratings.

RMI-Q output waveforms

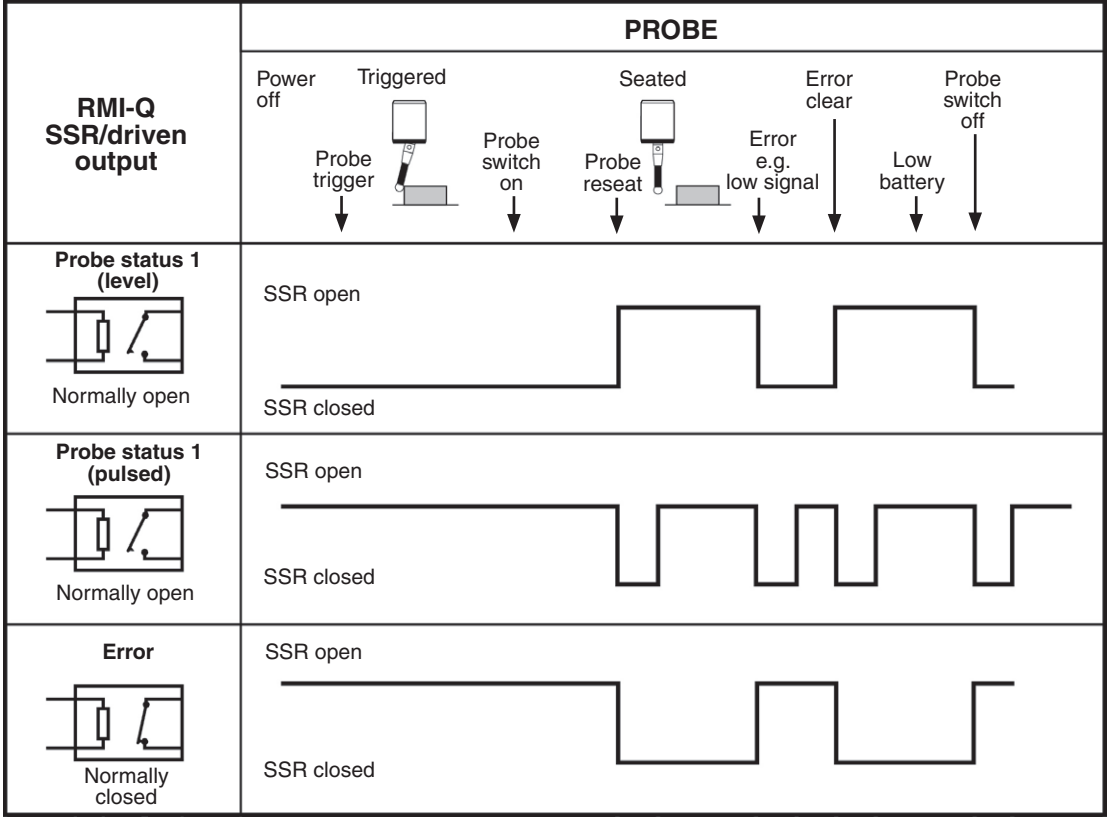


SIGNAL DELAYS

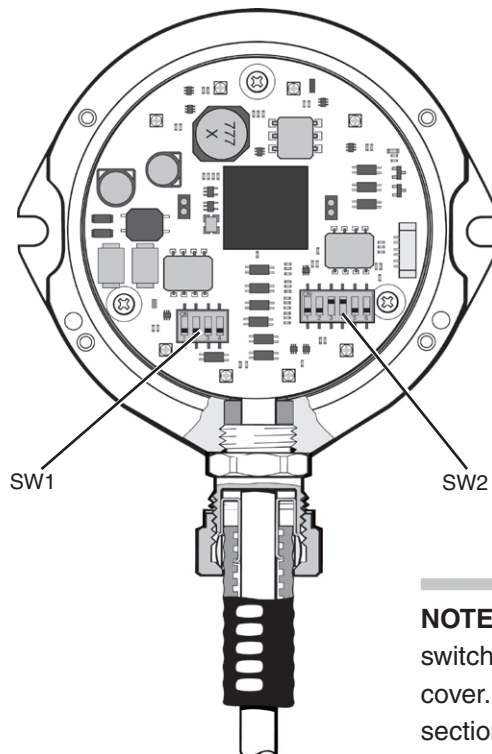
- Transmission delay** Probe trigger to output change of state = 10 ms variation $\pm 10 \mu\text{s}$.
(Enhanced trigger filter off)
- Start delay** Time from initiation of start signal to valid signal transmission = 1 sec max.
(Standard turn on mode)

Note : Pulsed outputs are 40 ms ± 1 ms duration.

RMI-Q seated start option

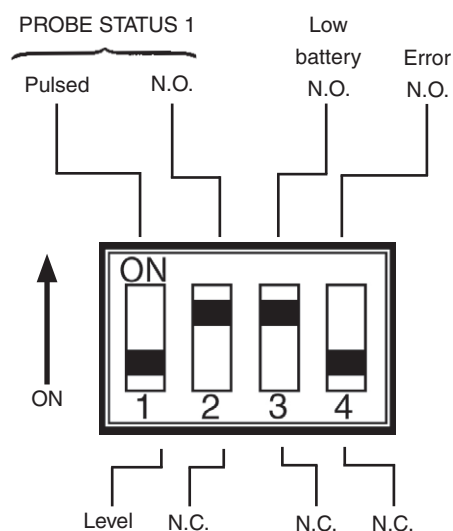


Switches SW1 and SW2



NOTE: To gain access to the switches, remove the front cover. For more information, see section 4, "Maintenance".

Switch SW1 output configuration



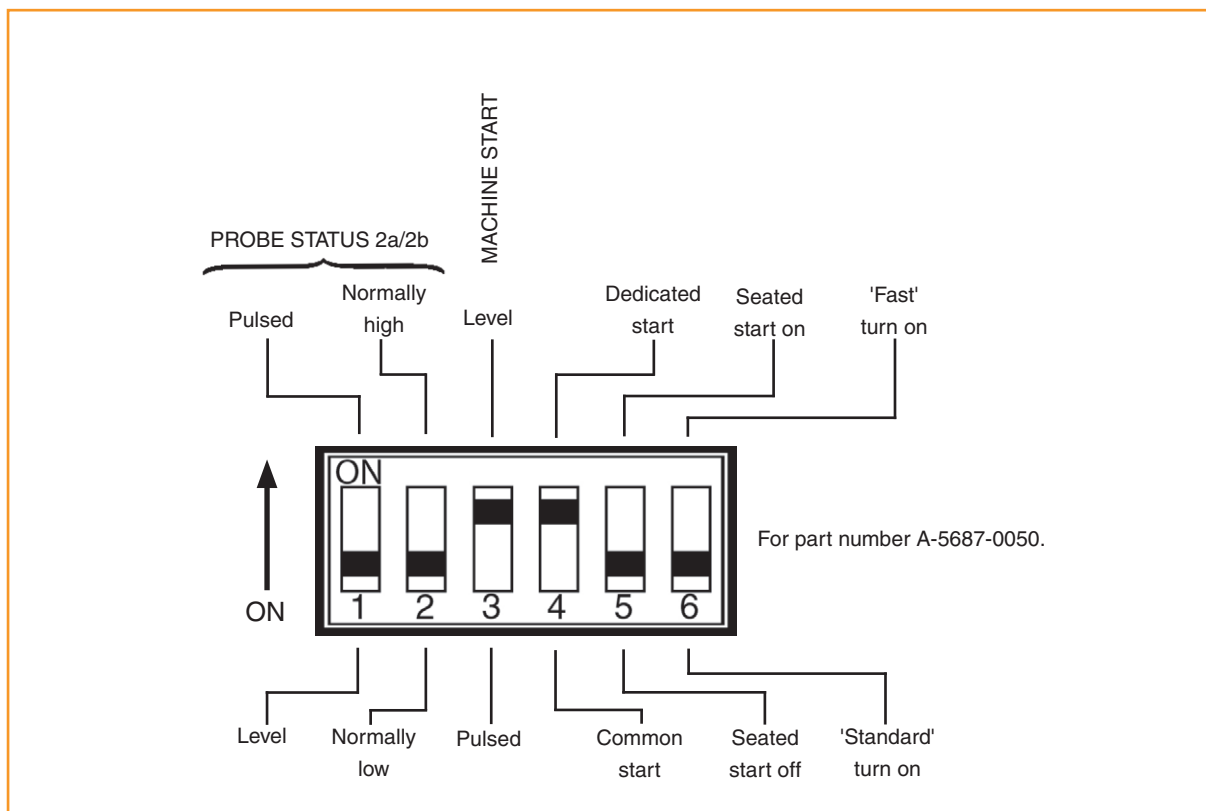
Abbreviations are as follows:

- N.O. = Normally Open
- N.C. = Normally Closed

Factory settings are shown.

CAUTION: Exercise caution when using error or probe SSR in N.O. mode as a wiring fault could cause loss of error condition and therefore could result in a non-failsafe condition.

Switch SW2 output configuration



Seated start on

When seated start on is selected, the RMI-Q will not drop the error line until the RMP has become seated. This provides compatibility with controllers that regard the RMP to be in error if it is started in a triggered condition.

'Fast' turn on

'Fast' turn on provides compatibility with controllers that have quicker response times, to give a reduced probing cycle time. By selecting 'fast' turn on, the system turn on time will be reduced by 0.5 seconds. This will also impact the probe's battery life. These turn on times apply to radio M-code on only. Please see the appropriate probe installation guide for more details.

NOTES:

In a poor RF environment, the turn on time of 1st generation RMPs may be extended.

'Fast' turn on cannot be used with 1st generation RMPs.

Dedicated start (level mode)

In dedicated start, a machine start input is required per probe that is configured for radio turn on.

Machine start inputs				Probe selected
P1	P2	P3	P4	
				None
*				Probe 1 on
	*			Probe 2 on
		*		Probe 3 on
			*	Probe 4 on

* Machine start input active. Any attempt to turn on more than one probe simultaneously will result in an error condition.

NOTES:

Level start mode is not compatible with RMPs configured for radio M-code on / time out off.

When level start is selected, switch 3 defaults to level. It is not possible to use pulsed mode when level start is selected.

For RMI compatibility mode, ensure poles 4, 5 and 6 are in the down position and set other poles to the required configuration.

Common start (level mode)

In common start (level mode), machine start inputs P2 and P3 are used to select the probe and machine start input P1 is used to start the selected probe. All inputs are level.

Machine start inputs P1, P2 and P3			Probe selected
Probe start P1	Probe selection inputs		
	P2	P3	
*			Probe 1
*	*		Probe 2
*		*	Probe 3
*	*	*	Probe 4

* Machine start input active.
When P1 is off, all probes are off.
When P1 is active, the selected probe will be on.





NOTES:


Any change to the probe selection inputs P2 and P3 whilst the probe is operating will result in an error condition.

Level start mode is not compatible with RMPs configured for radio M-code on / time out off.

Common start (pulsed mode)

In common start (pulsed mode), machine start inputs P2 and P3 are level inputs used to select the probe. Machine start input P1 is a pulsed input used to start the selected probe.

Machine start inputs P1, P2 and P3			Probe selected
Probe start P1	Probe selection inputs		
	P2	P3	
			Probe 1
	*		Probe 2
		*	Probe 3
	*	*	Probe 4

 Machine start input pulsed, so selected probe will change state.

* Probe selection inputs are level signals.

NOTES:

Machine start input P4 is not used in common start (level or pulsed mode).

Only the probe start signal P1 will be pulsed and will change the probe status between on and off. The probe selection inputs P2 and P3 will be level.

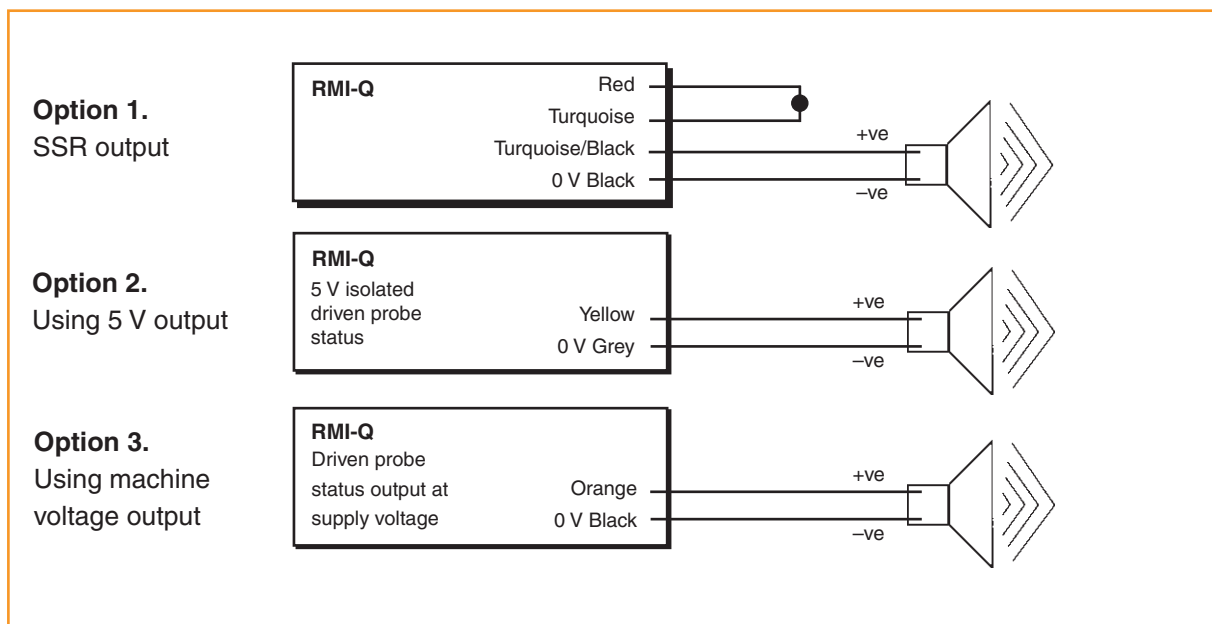
Remote external audible output

Any output (set to pulsed) can be utilised to operate an external remote audible indicator.

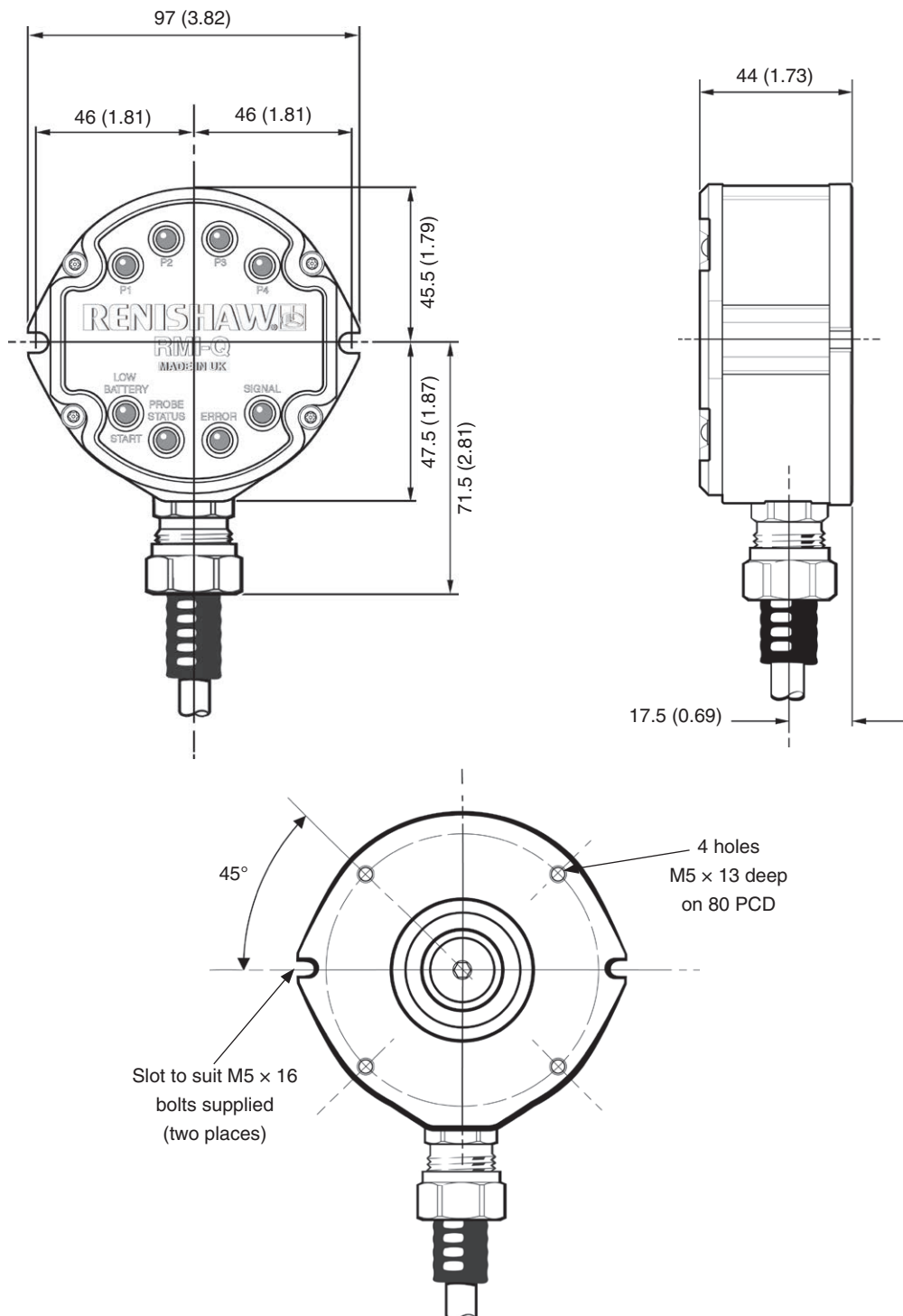
The audible indicator must comply with the output transistor specification.

i.e. up to 50 mA.
up to 30 V.

Wiring configurations are shown below.



RMI-Q dimensions



NOTE: When using rear exit cable, provide a Ø25 mm (Ø1.0 in) hole in the mounting for the cable to exit.

Dimensions given in mm (in)

RMI-Q specification

Principal application		All machining centres, 5-axis machines, twin spindle machines and vertical turret lathes.						
Transmission type		Frequency hopping spread spectrum (FHSS) radio Radio frequency 2400 MHz to 2483.5 MHz						
Compatible probes (see note 1)		Component setting/inspection: RMP40, RMP40M, RMP60, RMP60M and RMP600 Lathe inspection: RLP40 Tool setting: RTS						
Dimensions		<table><tr><td>Height</td><td>117 mm (4.60 in)</td></tr><tr><td>Width</td><td>97 mm (3.82 in)</td></tr><tr><td>Depth</td><td>44 mm (1.73 in)</td></tr></table>	Height	117 mm (4.60 in)	Width	97 mm (3.82 in)	Depth	44 mm (1.73 in)
Height	117 mm (4.60 in)							
Width	97 mm (3.82 in)							
Depth	44 mm (1.73 in)							
Operating range		Up to 15 m (49.2 ft)						
Weight		RMI-Q including 8 m (26.2 ft) of cable = 1050 g (37.04 oz) RMI-Q including 15 m (49.2 ft) of cable = 1625 g (57.32 oz)						
Supply voltage		12 Vdc to 30 Vdc						
Supply current		800 mA peak, <500 mA typical from 12 V to 30 V						
Configurable M-code input		Pulsed or level						
Output signal		Probe Status 1, Low Battery, Error Voltage-free solid-state relay (SSR) outputs, configurable normally open or normally closed. Probe Status 2a 5 V isolated driven output, invertible. Probe Status 2b Power supply voltage driven output, invertible.						
Input / output protection		Supply protected by resettable fuse. Outputs protected by over current protection circuit.						
Diagnostic LEDs		Start, low battery, probe status, error, signal condition and P1, P2, P3, P4 system status.						
Cable (to machine control)	Specification	Ø7.6 mm (0.30 in), 16-core screened cable, each core 18 x 0.1 mm						
	Length	8 m (26.2 ft) and 15 m (49.2 ft) standard lengths. Optional 30 m (98.4 ft) and 50 m (164.0 ft) cable assemblies are also available.						
Mounting		Flush mounting or directional mounting with optional mounting bracket (available separately).						
Environment		IP rating	IPX8 (EN/IEC60529)					
		Storage temperature	-25 °C to +70 °C (-13 °F to +158 °F)					
		Operating temperature	+5 °C to +55 °C (+41 °F to +131 °F)					

Note 1 For details of 1st generation compatibility, see "Introduction" on page 2.1.

System installation

RMI to RMI-Q upgrade

To upgrade from an RMI to an RMI-Q the following needs to be considered:

Mounting

The hole positions for mounting are the same on both RMI and RMI-Q.

The mounting bracket is the same for both the RMI and RMI-Q. For further information on the mounting bracket, see “Mounting bracket” on page 3-2.

Cable

The cable for RMI is 13 core, whereas for the RMI-Q it is 16 core (this is to allow for the extra probe inputs). For further information on the RMI-Q cable, see “RMI-Q cable” on page 3-7.

Wiring

Due to the extra cable cores, the wiring for RMI-Q is slightly different to allow multiple radio probes or tool setters to be used. For instructions describing how to wire the probe, see “Wiring diagram” on page 3-3.

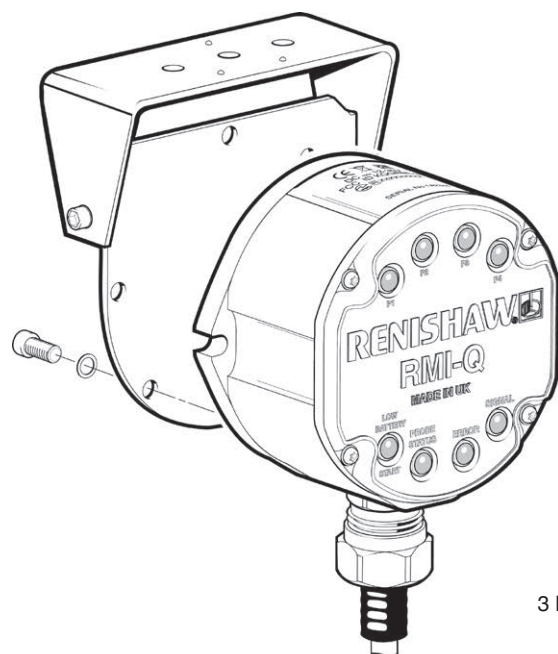
Switches

For instructions describing how to configure the switch settings to make the RMI-Q perform as a RMI, see section 2, “RMI-Q basics”.

Partnering

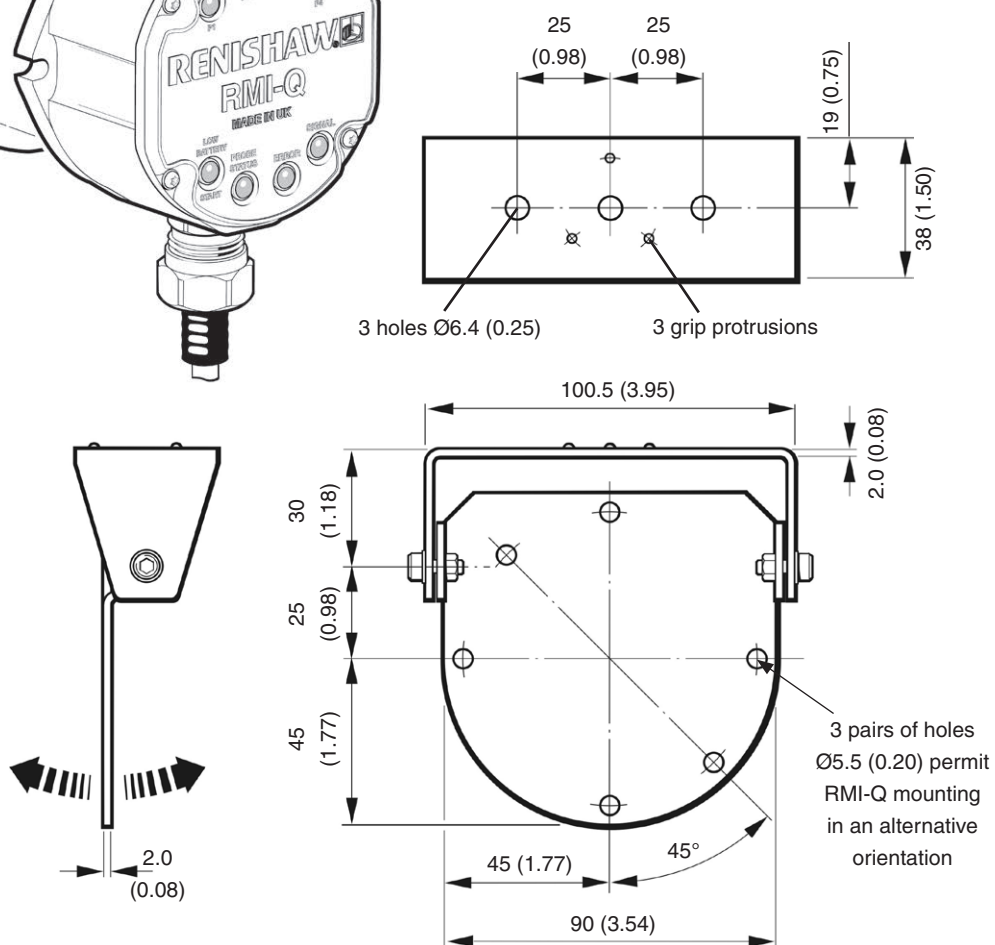
The RMI-Q can be partnered using the same methods as RMI. For instructions describing how to partner the RMI-Q, see “RMP – RMI-Q partnership” on pages 3-4 to 3-6. This section also details how to use the RMI-Q multiprobe functionality and ReniKey.

Mounting bracket (optional)

**NOTES:**

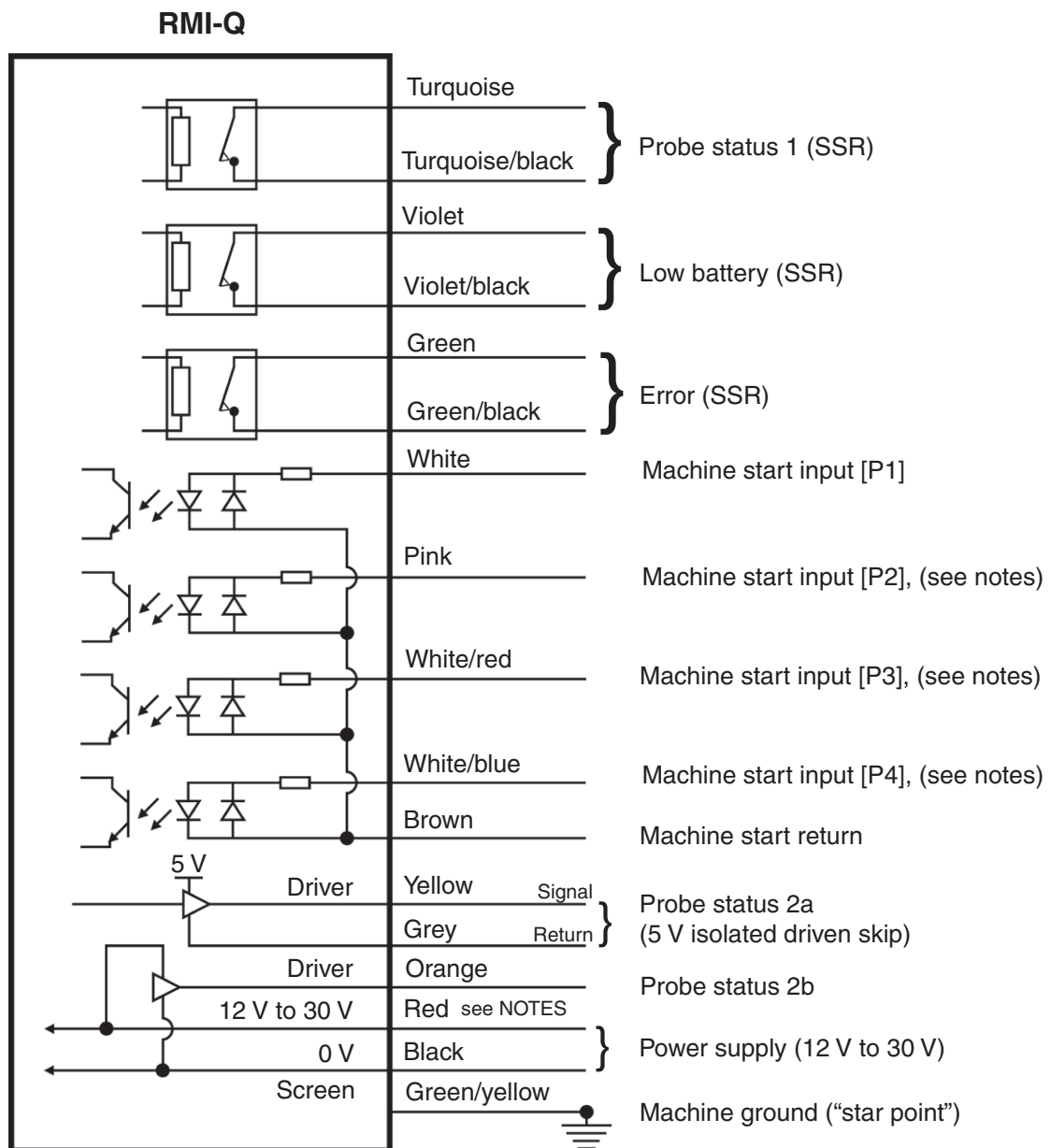
Install RMI-Q with cable exiting from lower side for good coolant run off.

Mounting bracket cannot be used with an RMI-Q in rear exit configuration.



Dimensions given in mm (in)

Wiring diagram (with output groupings shown)



CAUTION: The power supply 0 V should be terminated at the machine ground ("star point"). A negative supply can be used when wired appropriately.

NOTES:

A switch can be fitted between the machine power supply and the red wire, to aid powering up the RMI-Q when partnering.

Inputs P2–P4 are the difference between RMI and RMI-Q wiring, as these inputs allow multiple radio probes or tool setters to be used.

RMP – RMI-Q partnership

The RMP and RMI-Q must be placed into acquisition mode.

On the RMP, acquisition mode is achieved using Trigger Logic™.

On the RMI-Q, acquisition mode is achieved either by manually power cycling the RMI-Q, or via application of ReniKey which is a Renishaw machine macro cycle.

Trigger Logic is a method that allows the user to view and select all available mode settings in order to customise a probe to suit a specific application. Trigger Logic is activated by battery insertion and uses a sequence of stylus deflection (triggering) to systematically lead the user through the available choices to allow selection of the required mode options.

Current probe settings can be reviewed by simply removing the batteries for a minimum of 5 seconds, and then replacing them to activate the Trigger Logic review sequence.

To partner the RMP with the RMI-Q

Partnering is required during initial system set-up. Further partnering will be required if either the RMP or RMI-Q are changed.

Any RMP that is partnered with the RMI-Q, but then used with another system, will need to be cleared first from the RMI-Q before being partnered with the new system. The RMP will also need to be partnered again should it be brought back to the RMI-Q.

Partnering will not be lost by reconfiguration of probe settings or when changing batteries.

NOTES:

The system will not function correctly if more than one partnered RMI-Q is within the transmission range of the RMP.

Partnering will be lost when multiple probe mode is selected. Multiple probe mode is a function of the RMP. Please see the relevant RMP installation guide. For more information, see section 6, "Parts list").

To manually partner a single probe or tool setter with the RMI-Q proceed as follows:

1. Ensure the RMI-Q is powered down.
2. Use Trigger Logic to access RMP or RTS configuration mode.
3. Configure switch-on method (if applicable).
4. Configure switch-off method (if applicable).
5. Configure enhanced trigger filter and auto reset function (if applicable).
6. Enter acquisition mode menu on the RMP or RTS.

NOTE: Ensure the stylus is deflected momentarily at least every 20 seconds to remain in this mode.

7. Power on the RMI-Q.
8. Watch the RMI-Q P1 system status LED; after a couple of seconds the LED will repeatedly flash on and off green. This is the start of a 60 second interval in which the RMI-Q is in acquisition mode.
9. Deflect the stylus for less than 4 seconds to initiate the acquisition process.
10. After successful acquisition, the RMI-Q P1 system status LED will change to repeatedly flashing red and yellow (for 5 seconds) indicating that acquisition is complete and Probe 1 is full.
11. Leave RMP for 20 seconds to go into standby.
12. System is ready to use.

Partnering RMPs configured for 'multiple probe mode'

'Multiple probe mode' is a function of the RMP that enables individual application of multiple probes, but does not use radio turn on.

RMPs using 'multiple probe mode' can be stored in any of the RMI-Q locations. However, 'Q' marked 2nd generation RMPs cannot be mixed with non-'Q' marked RMPs in the same probe location when 'multiple probe mode' is used.

Partnering RMPs using ReniKey (recommended)

ReniKey is a Renishaw machine macro cycle. It enables up to four RMPs to be partnered with the RMI-Q without the need to power the RMI-Q off and then back on for each of the probes being partnered.

Please refer to the *ReniKey programming manual* (see Section 6, “Parts list”, for the part number of the relevant *ReniKey programming manual* for your controller). For more information or to download ReniKey free of charge please visit: www.renishaw.com/mtpsupport/renikey

NOTES:

ReniKey can be applied to any of the four machine start inputs.

ReniKey cannot be used with “smart” M-codes, i.e. those M-codes which are associated with the machine’s PLC which when activated prompt the checking of the ERROR or PROBE STATUS outputs for example.

Partnering can take place anywhere within the operating envelope.

1. Use Trigger Logic™ to access RMP or RTS configuration mode.
2. Configure switch-on method (if applicable).
3. Configure switch-off method (if applicable).
4. Configure enhanced trigger filter and auto reset function (if applicable).
5. Enter acquisition mode menu.
6. Apply one of the ReniKey commands. Please refer to the *ReniKey programming manual* (see Section 6, “Parts list”, for the part number of the relevant *ReniKey programming manual* for your controller).
7. Watch the RMI-Q corresponding system status LED; after a couple of seconds the LED will repeatedly flash on and off green. This is the start of a 60 second interval in which the RMI-Q is in acquisition mode.
8. Deflect the stylus for less than 4 seconds to initiate the acquisition process.

9. After successful acquisition, the RMI-Q respective system status LED will change to repeatedly flashing red and yellow (for 5 seconds) indicating that acquisition is complete and the slot is full.
10. Leave the RMP for 20 seconds to go into standby.
11. Repeat steps 1 to 11 for each RMP or RTS to be used with the RMI-Q ensuring each RMP or RTS is assigned to a different slot each time ReniKey is applied (P1–P4).
12. System is ready to use.

NOTES:

To check that turn on and off settings have not been accidentally changed, insert batteries to review current probe settings.

When holding the RMP do NOT wrap a hand, or anything else, around the glass window.

To partner up to four RMPs with the RMI-Q without ReniKey

The RMI-Q has four machine start inputs (P1–P4) that enable partnering of four radio probes (for more information, see “Wiring diagram” in Section 3, “System installation”).

The partnering procedure is dependent on the start method that has been selected (for more information, see “Start methods” in Section 2, “RMI-Q Basics”).

Partnering with dedicated start (Level mode)

If the RMI-Q is powered with all start inputs held low, the RMI-Q will complete its start up procedure and partner the RMP as Probe 1.

When the RMI-Q is powered with a single machine start input held high, the RMI-Q will complete its start up procedure and partner the RMP to the probe number represented by the selected machine start input.

Level mode				
Probe to be partnered	Machine start input			
	P1	P2	P3	P4
Probe 1				
Probe 2		*		
Probe 3			*	
Probe 4				*

The system status LED for the selected probe number will repeatedly flash on and off green whilst in acquisition mode.

Partnering with common start

When the RMI-Q is powered, specific machine start inputs need to be held high when partnering the RMP to a specific probe number.

Pulsed mode			
Probe to be partnered	Machine start input		
	P1	P2	P3
Probe 1			
Probe 2		*	
Probe 3			*
Probe 4		*	*

Level mode			
Probe to be partnered	Machine start input		
	P1	P2	P3
Probe 1			
Probe 2	*	*	
Probe 3	*		*
Probe 4	*	*	*

NOTES:

Activation of machine start input (P4) is not required when common start is selected.

To aid partnering, an on/off switch can be fitted between the machine power supply and the RMI-Q (red wire). This enables the RMI-Q to be momentarily powered off and then back on, for each of the probes being partnered, without having to power off the machine.

Removing the RMP from the RMI-Q

An RMP must be cleared from the RMI-Q when it is removed from the system. The probe number is cleared from the RMI-Q by repeating the partnering procedure whilst the corresponding machine start input is held high. The RMI-Q will then display that the probe number was cleared. Alternatively, the RMP can be cleared via application of the ReniKey machine macro cycle.

Please refer to the *ReniKey programming manual* (for more information, see Section 6, "Parts list", for the part number of the relevant *ReniKey programming manual* for your controller). For more information or to download ReniKey free of charge please visit: www.renishaw.com/mtpsupport/renikey. ReniKey can also be used to clear all probe numbers at the same time. If the cleared RMP is to be used again with the RMI-Q, it must be re-partnered.

Changing RMP position

If, during partnering with all procedures, the RMI-Q acquires an RMP that is already stored under a different probe number, the RMP will be cleared from its current location and stored under the new probe number selected for acquisition.

RMI-Q cable

Cable termination

A ferrule should be crimped onto each cable wire for a more positive connection at the terminal box.

Standard cable variants

The RMI-Q standard cables are 8 m (26.2 ft) and 15 m (49.2 ft) long.

Longer cables are available, (for more information, see Section 6, “Parts List”).

Cable specification

Ø7.6 mm (0.3 in), 16-core screened cable, each core 18 x 0.1 mm.

NOTE:

Maximum cable length:

30 m (98.42 ft) at 12 V

50 m (164.04 ft) at 24 V

Cable sealing

Coolant and dirt are prevented from entering the RMI-Q by the cable sealing gland. The RMI-Q cable can be protected against physical damage by fitting a flexible conduit if required.

Recommended flexible conduit is Anamet™ Sealtite HFX (5/16 in) polyurethane.

A conduit kit is available – for more information, see Section 6, “Parts list”.

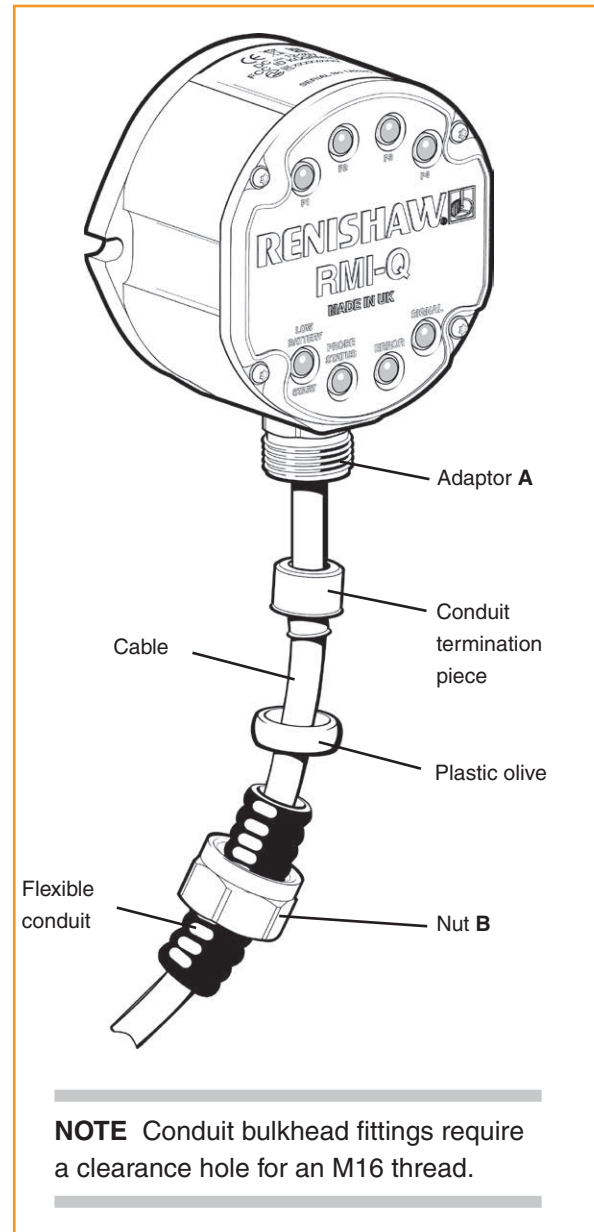
CAUTIONS:

Failure to adequately protect the cable can result in system failure due to either cable damage or coolant ingress through cores into the RMI-Q.

Failure due to inadequate cable protection will invalidate the warranty.

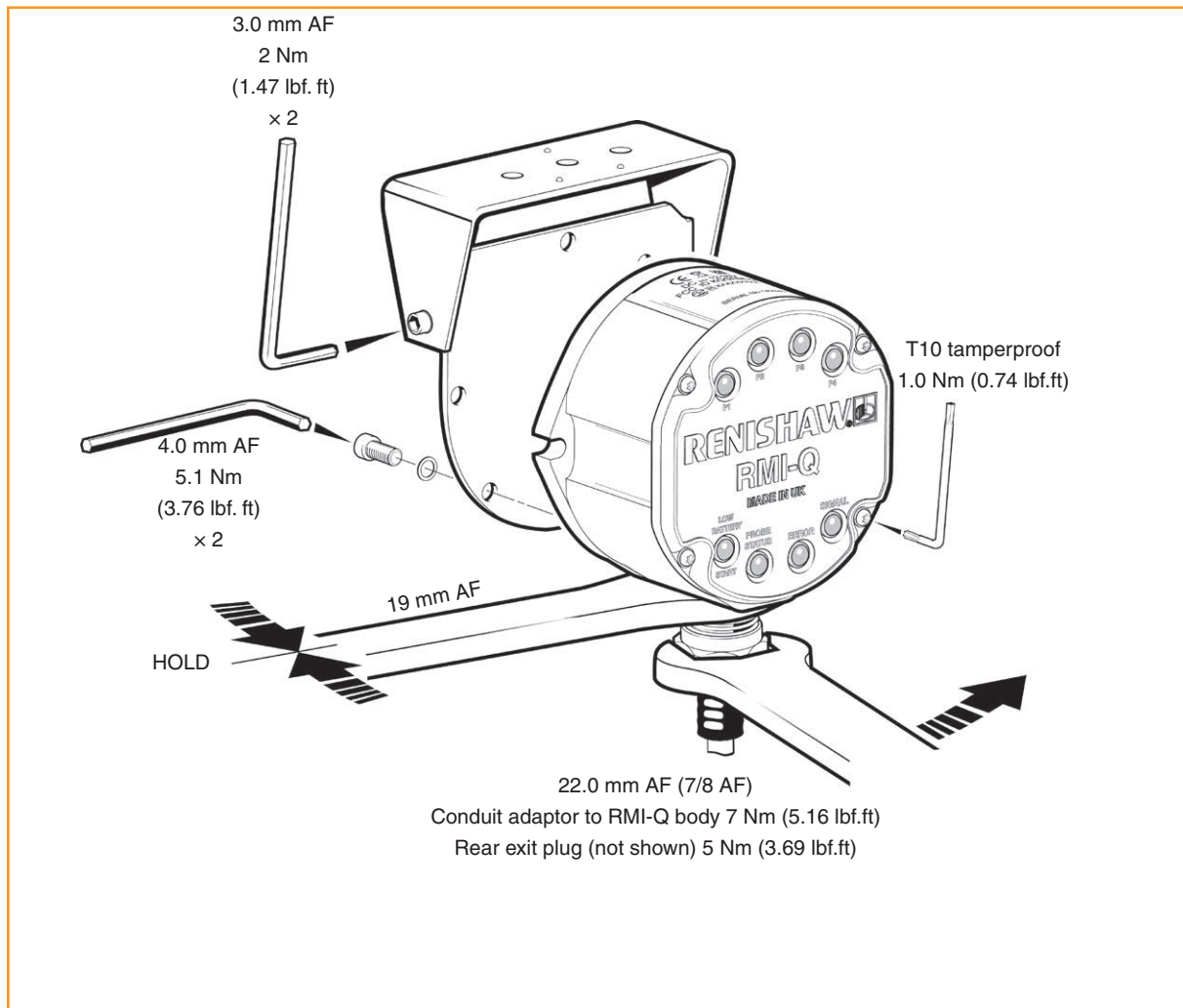
When tightening or loosening nut **B** on the conduit, ensure that torque is only applied between **A** and **B**.

Fitting flexible conduit



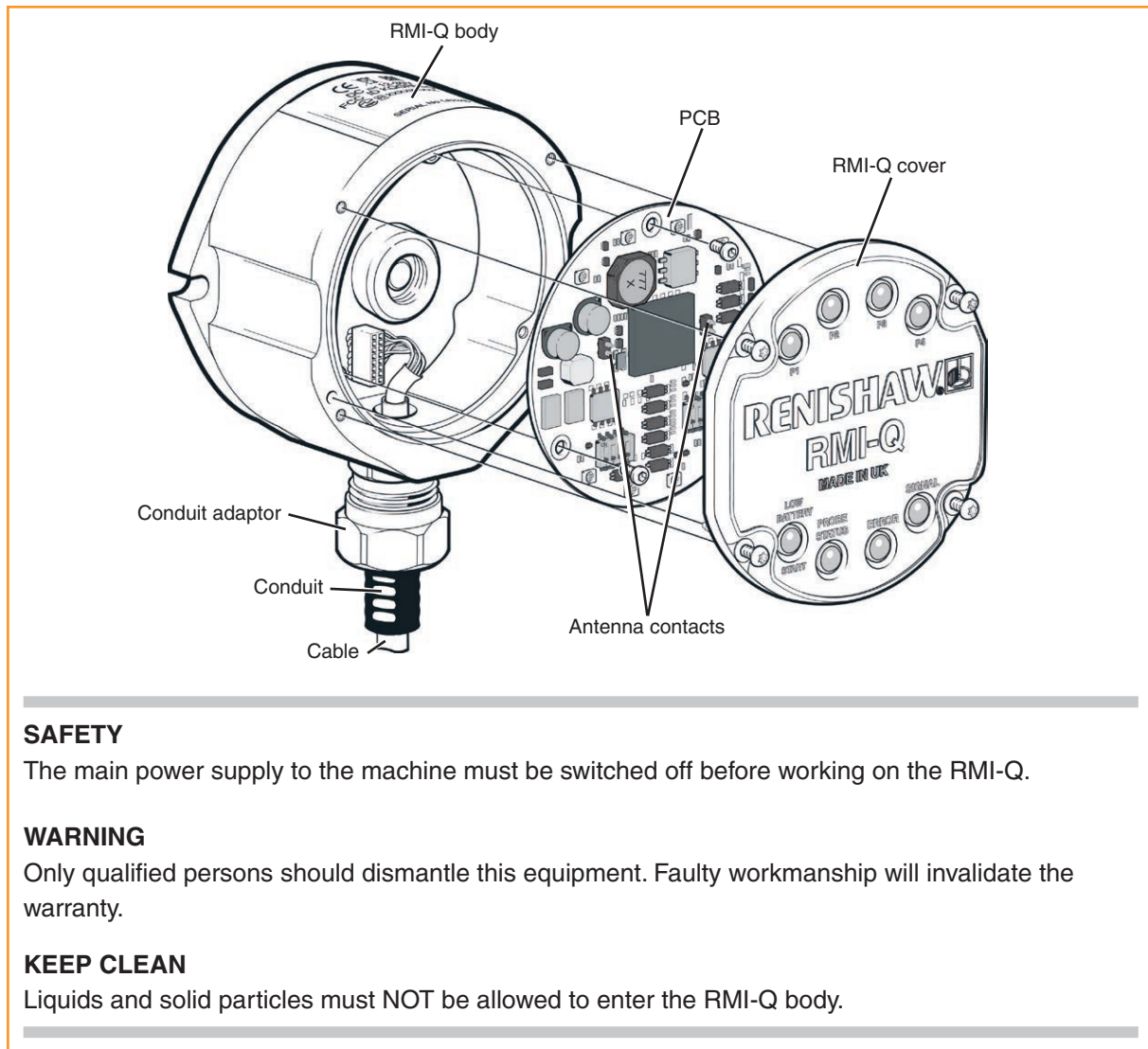
1. Slide nut **B** and the plastic olive onto the conduit.
2. Screw the conduit termination piece into the end of the conduit.
3. Fit the conduit to adaptor **A** and tighten nut **B**.

Screw torque values



Maintenance

4.1



RMI-Q cover

It is not necessary to remove the RMI-Q from the machine when adjusting the switches or installing replacement parts. For torque settings see “Screw torque values” in Section 3, “System installation”.

The front cover may be removed and replaced, as detailed in this section, if there is a need to change configuration.

Removing the RMI-Q cover

1. Clean the RMI-Q thoroughly before servicing to ensure no debris or coolant enters the unit.
2. Using the T10 tamperproof key (provided), unscrew (but do not remove) each captive screw and washer evenly from the cover.
3. When removing the cover, do not twist or rotate by hand.

Replacing the RMI-Q cover

1. Remove the O-ring from the cover. Ensure that the O-ring, the O-ring groove and the cover sealing face are clean. Lubricate the O-ring with silicone grease and refit to the cover.
2. Ensure that the O-ring seating on the RMI-Q body is clean, and that there are no scratch marks which could prevent complete sealing.
3. Ensure that the antenna contacts are clean.
4. Place the cover, complete with O-ring, onto the RMI-Q body.

NOTE: The O-ring should be lubricated with silicone grease to prevent damage. Do not allow grease to contaminate the antenna contacts.

IMPORTANT: Do not overtighten the cover as distortion could occur.

5. Tighten each captive screw and washer a few turns at a time, to pull the cover down evenly. Screw torque is 1.0 Nm (0.74 lbf.ft.).

Side exit to rear exit cable conversion

1. Remove RMI-Q cover. For instructions describing how to remove the RMI-Q cover, see “Removing the RMI-Q cover” on page 4-1.
2. Remove the three crosshead screws retaining the PCB. Carefully remove the PCB and disconnect the cable connection to the PCB.
3. Unscrew the conduit gland from the RMI-Q body.
4. Unscrew the rear exit plug and rubber grommet from the RMI-Q body.
5. Carefully remove the cable assembly and refit through the rear exit hole. Tighten the conduit gland. For torque settings see “Screw torque values” in Section 3, “System installation”.
6. Fit the rubber grommet and rear exit plug to the side exit hole and tighten.
7. Connect the PCB to the cable connector. Insert the PCB and retain with the three cross head screws. For torque settings see “Screw torque values” in Section 3, “System installation”.
8. Fit the RMI-Q cover. For instructions describing how to replace the RMI-Q cover, see “Replacing the RMI-Q cover” on page 4-2.

CAUTION Conversion from side exit cable to rear exit cable must only be undertaken by qualified personnel. Failure to do so will invalidate the warranty.

Fault-finding

5.1

Symptom	Cause	Action
No LEDs lit on RMI-Q.	Overvoltage, undervoltage or no power.	Check voltage supply.
	Damaged cable.	Check wiring.
RMI-Q status LEDs do not correspond to RMP status LEDs.	Radio link failure – RMP out of RMI-Q range.	Check position of RMI-Q, refer to the operating envelope in the relevant RMP installation guide. For more information, see Section 6, “Parts list”.
	RMP has been enclosed/shielded by metal.	Review installation.
	RMP and RMI-Q are not partnered.	Partner RMP and RMI-Q.
RMI-Q error LED illuminated. For more information, see “Error LED” in Section 2, “RMI-Q basics”.	RMP and RMI-Q are not partnered.	Partner RMP and RMI-Q.
	Exhausted RMP batteries.	Change RMP batteries.
	Probe not switched on.	Check configuration and alter as required.
	Probe out of range.	Check position of RMI-Q, refer to the operating envelope in the relevant RMP installation guide. For more information, see Section 6, “Parts list”.
	Probe selection error.	Verify that one RMP is working and is correctly selected.
	RMP is not compatible with 0.5 second turn on.	Change turn on time to 1 second.
All four lower LEDs flashing.	Wiring fault.	Check wiring.
	Output overcurrent.	Check wiring, turn power to RMI-Q off and on again to reset.

Symptom	Cause	Action
RMI-Q low battery LED lit.	Low RMP batteries.	Change RMP batteries soon.
Reduced range.	Local radio interference.	Identify and remove.
	RMP has been enclosed/ shielded by metal.	Review installation.
RMI-Q System Status LED is continually lit red.	RMP is not compatible for 0.5 second turn on.	Change RMI-Q configuration to standard turn on.
		Use an RMP with a 'Q' marking.
Probe will not turn off.	Time out off used with level start option.	Review system set-up.

Parts list

6.1

Type	Part number	Description
RMI-Q kit	A-5687-0049	RMI-Q with 8 m (26.2 ft) cable, tool kit, quick-start guide and radio approval label.
RMI-Q kit	A-5687-0050	RMI-Q with 15 m (49.2 ft) cable, tool kit, quick-start guide and radio approval label.
RMI-Q kit	A-5687-1050	RMI-Q with 15 m (49.2 ft) cable, tool kit, quick-start guide and radio approval label (switches set for RMI compatibility mode).
Mounting bracket	A-2033-0830	Mounting bracket.
Conduit kit	A-4113-0306	Conduit kit with 1 m (3.28 ft) of polyurethane conduit and bulkhead connector (M16 thread).
Cover assembly	A-5687-0305	Cover/antenna assembly: including cover screws, torx key and O-ring.
Cable assembly	A-5687-0306	Cable assembly 8 m (26.2 ft) long.
Cable assembly	A-5687-0302	Cable assembly 15 m (49.2 ft) long.
Cable assembly	A-5687-0303	Cable assembly 30 m (98.4 ft) long.
Cable assembly	A-5687-0304	Cable assembly 50 m (164.0 ft) long.
Tool kit	A-4113-0300	Comprising: 1 x T10 tamperproof key, 1 x 4 mm hex key, 14 x ferrules, 4 x M5 screws, 2 x M5 nut, 4 x M5 washers, 1 x O-ring (Ø34.5 x 3 mm).
RMI-Q support software	A-5687-5000	ReniKey machine macro cycles with programming manual and macro software for multiple RTS.
Publications. These can be downloaded from our website at www.renishaw.com		
RMI-Q	H-5687-8500	Quick-start guide: for rapid set-up of the RMI-Q radio machine interface.
RMP60	A-5742-8501	Quick-start guide: for rapid set-up of the RMP60 probe, includes CD with installation guides.
RMP600	A-5312-8500	Quick-start guide: for rapid set-up of the RMP600 probe, includes CD with installation guides.
RMP40	H-5480-8500	Quick-start guide: for rapid set-up of the RMP40 probe.
RLP40	H-5627-8500	Quick-start guide: for rapid set-up of the RLP40 probe.
RTS	A-5646-8500	Quick-start guide: for rapid set-up of the RTS probe, includes CD with installation guides.
ReniKey (generic)	H-5687-8601	ReniKey (generic) programming guide.
ReniKey (Heidenhain)	H-5687-8602	ReniKey (Heidenhain) programming guide.

NOTE: The serial number of each RMI-Q is found on the top of the housing.

Type	Part number	Description
ReniKey (Siemens)	H-5687-8603	Renikey (Siemens) programming guide.
Styli	H-1000-3200	Technical specification: Styli and accessories.
Probe software	H-2000-2298	Data sheet: Probe software for machine tools – programs and features.

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