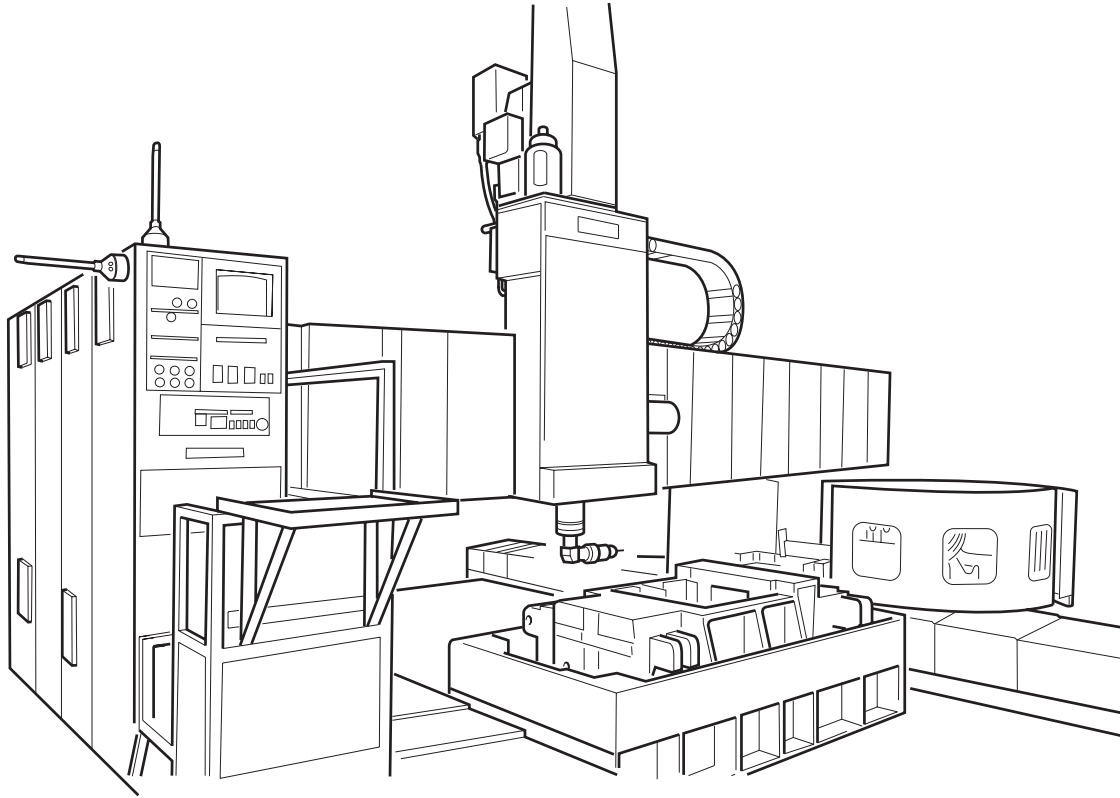


# MP16 radio probe system



## **MP3 touch trigger probe with selectable channel radio transmission**

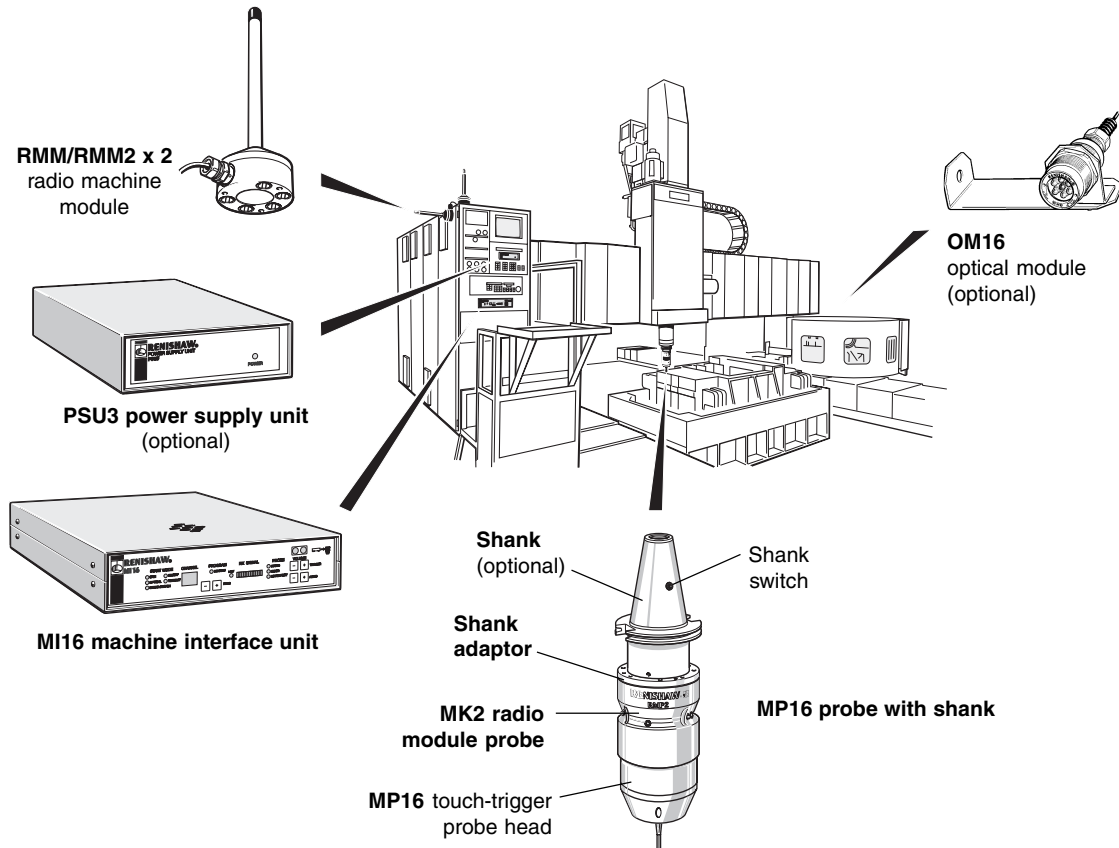
The MP16 radio probe system, with selectable channel radio transmission for probe systems, enables workpiece measurement and job set-up on 5-axis and large gantry machine tools.

Probe signals can be transmitted over distances of up to 15 metres (49.2 feet), without the need for line-of-sight operation.

## **The MP16 system**

- Uses FM transmission/reception of probe signals.
- Provides up to 69 user-selectable transmission channels.
- Allows the user to select and program both the probe activation and deactivation mode.
- Incorporates an optional OM16 optical module that allows the probe to be activated and deactivated using a machine M code.

## System overview



The MP16 radio probe system comprises:

- **MK2 radio module probe** (RMP2) or MK2 radio module probe with shank switch activation (RMP2-S).
- **MP16** touch trigger probe head.
- Two radio machine modules (**RMM** or **RMM2**).
- **Shank** (optional).
- **Shank adaptor**.
- **MI16 interface unit**.
- **OM16 optical module** (optional).
- **PSU3 power supply unit** (optional).

Once assembled, the MP16 probe head, MK2 radio module probe, shank adaptor and shank are stored in the machine tool changer and may be transferred to the machine spindle in the same way as conventional cutting tools. The MP16 probe head acts as an omnidirectional switch and is effective in the  $\pm X$ ,  $\pm Y$  and  $+Z$  directions.

During operation, when the probe stylus touches a workpiece feature, probe signals from the RMP2/RMP2-S are transmitted to the MK2 radio modules (RMM2s) 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 **RMP2/RMP2-S radio transmission frequencies** opposite.

Each frequency range is divided into separate channels, each channel having a typical bandwidth of 25 kHz, to permit many systems to operate in close proximity without the danger of interference. The operating channel is programmed by push buttons on the MI16.

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

The time delay between the probe's stylus contacting the workpiece and the MI16 machine interface providing an output signal to the CNC controller is approximately 12 ms  $\pm 10 \mu s$ .

The MI16 machine interface draws 24 V DC power from the CNC machine and presents a load of up to 500 mA. Alternatively, power can be supplied via a Renishaw PSU3 power supply unit which is mains-powered and suitable for use worldwide.

The OM16 optical module is an optional, optical transmission module, which provides the additional facility of M code activation and deactivation of the RMP2/RMP2-S.

## RMP2 activation/deactivation methods

The RMP2 offers the 'switch on'/'switch off' modes shown on the right; the mode is selected using the MI16 machine interface.

The RMP2-S, which is supplied with a dedicated shank incorporating a shank switch, is designed to switch on when the shank is inserted into the machine spindle and switch off when the shank is removed from the machine spindle. Again, this option is selectable via the MI16 machine interface.

Mode	Switch on method	Switch off method
<b>M code (optical) on-off</b>	An optical signal, generated by the OM16 in response to a machine M code, switches the RMP2 on.	An optical signal, generated by the OM16 in response to a machine M code, switches the RMP2 off.
<b>M code on (optical) timeout off</b>	An optical signal, generated by the OM16 in response to a machine M code, switches the RMP2 on.	The RMP2 automatically switches off after a period of 180 seconds ( $\pm 1$ second) has elapsed from when the RMP2 was switched on. The timeout period is reset for a further 180 seconds by a probe trigger signal.
<b>Spin on-off</b>	The RMP2 is switched on by rotating it in the machine's spindle at 500 rpm ( $\pm 50$ rpm). A minimum spin of 1 second is recommended to ensure reliable switch on.	The RMP2 is switched off by rotating it in the machine's spindle at 500 rpm ( $\pm 50$ rpm). A minimum spin of 1 second is recommended to ensure reliable switch off.
<b>Spin on timeout off</b>	The RMP2 is switched on by rotating it in the machine's spindle at 500 rpm ( $\pm 50$ rpm). A minimum spin of 1 second is recommended to ensure reliable switch on.	The RMP2 automatically switches off after a period of 180 seconds ( $\pm 1$ second) has elapsed from when the RMP2 was switched on. The timeout period is reset for a further 180 seconds by a probe trigger signal.
<b>RMP2-S shank switch</b>	The RMP2 is switched on when the switch fitted to its shank is pressed.	The RMP2 is switched off when the switch fitted to its shank is released.

## RMP2/RMP2-S radio transmission frequencies, range and batteries

Country of use	Nominal transmission frequency (MHz)	Number of transmission channels	Channel separation (kHz)	Operating range (metres)	Battery type	Battery life (hours)
European Union (EU)	433	69	25	15	2 off PP3 (MN1604)	60
USA	224	40	25	6	6 off AA (MN1500)	150
Japan	224	40	25	8	6 off AA (MN1500)	150

The RMP2/RMP2-S will typically continue to operate for 6 hours continuously (5 days at 5% usage of 72 minutes/day) after the MI16 'LOW BATTERY' LED illuminates.

Battery standby life is 1 year minimum. At 5% usage (72 minutes/day) the batteries will provide 50 days' use.

## RMP2/RMP2-S additional information

RMP2/RMP2-S mass:

The mass of the RMP2/RMP2-S, including the MP3 touch trigger probe, shank adaptor and 100 mm stylus, but not including the taper shank, is 2.1 kg (4.6 lb).

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

## Data sheet

### MP16 radio probe system

## Radio machine module (RMM2 or RMM)

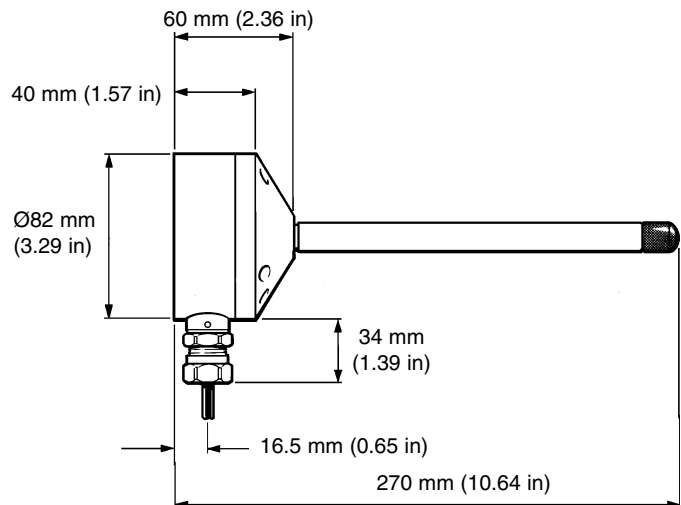
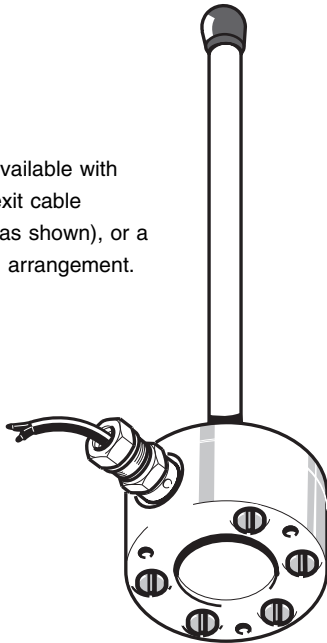
The radio machine module (RMM) is an antenna which receives radio signals from the RMP2, and passes the signals via a cable to the MI16 interface.

Two RMM units are supplied with each probe system. This system can be operated with a single RMM, but it may then be vulnerable to “dead spots” where reflections may cancel out some or all of the radio signals.

Each RMM is supplied with 10 metres of coaxial cable to allow connection of the unit to the MI16 machine interface. An additional antenna extension cable is available in 10 metre lengths.

The base of each RMM2 incorporates five permanent magnets to allow temporary fitting of the unit to a suitable metallic surface. Three M4 clearance holes are provided within the base to allow permanent fixing if required.

The RMM is available with either a side exit cable arrangement (as shown), or a rear exit cable arrangement.



## Shank and shank adaptor

Renishaw supplies a variety of shanks conforming to DIN 2080, DIN 69871, ANSI B5.50-1995 CAT and BT-1982. For further information on the range and size of shanks available, please refer to Renishaw data sheet part number H-2000-2011.

The shank adaptor connects the RMP2/RMP2-S to the shank. Three types of shank adaptor are available:

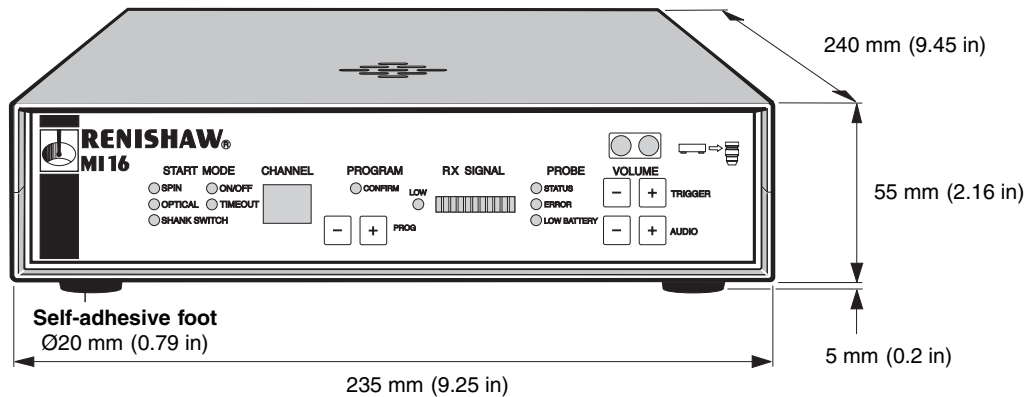
- Part number A-2056-0979 – which is suitable for mounting shanks incorporating two M8 grub screws that can be tightened against the spherical seat of the shank adaptor to retain the shank in position.
- Part number M-2056-0293 – which can be used for mounting shanks incorporating two M4 threaded mounting holes within their front mounting face and which can be screwed directly to the shank adaptor.

- Part number A-2137-0435 – which is used for mounting shank switch shanks to 224 MHz RMP2s. Two M4 screws are used to fasten the shank to the shank adaptor.

The RMP2-S 433 MHz can only be mounted to a shank using shank adaptor part number M-2056-0293.

For further information on shank/shank adaptor compatibility, refer to Renishaw data sheet part number H-2000-2011.

## MI16 machine interface



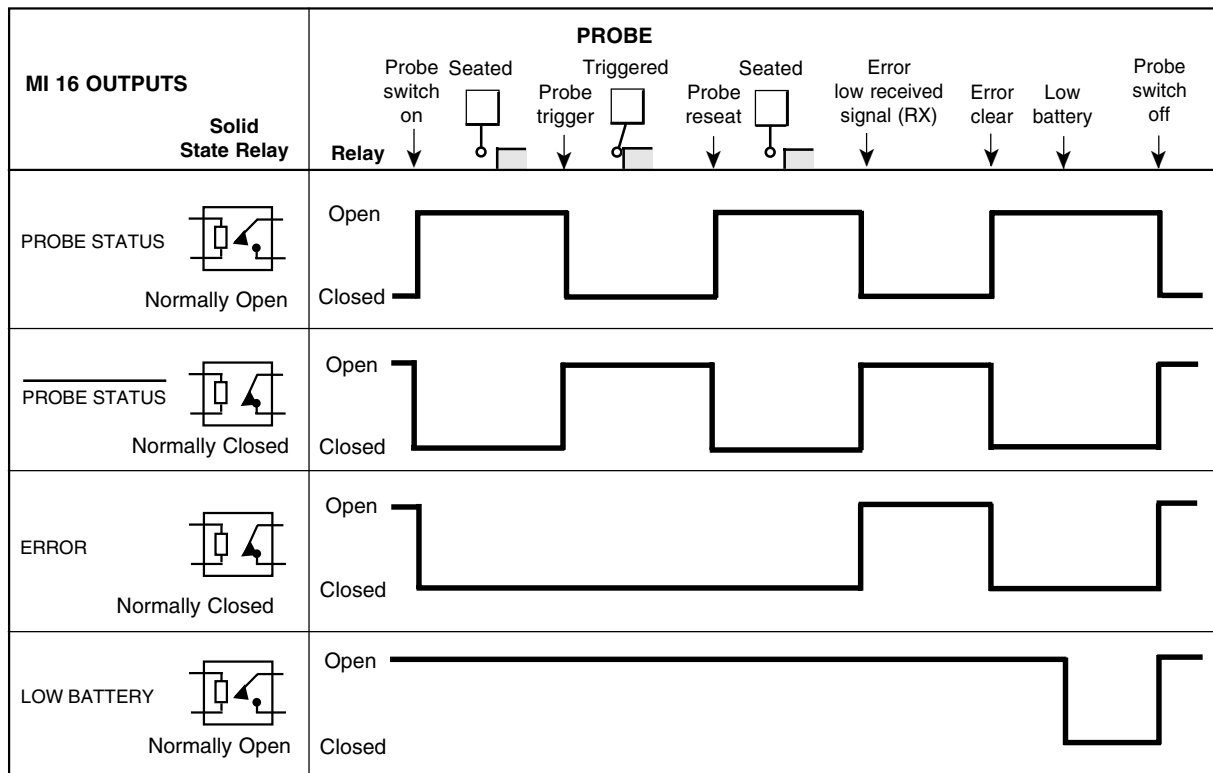
The MI16 machine interface is a radio receiver, converting signals into a form acceptable to the machine tool's CNC controller. It displays system status information and provides the means to program the RMP2/RMP2-S radio module probe.

The reception channel of the MI16 is set by push buttons on its front panel. The RMP2 channel and turn on mode are programmed by a short range optical link from the MI16.

All connections to the machine controller, the power supply input and the RMM2s are located on the rear panel of the MI16.

## MI16 machine interface output signals

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  $\pm 40$  mA and a maximum voltage of  $\pm 50$  V peak. The output waveforms are as shown below.

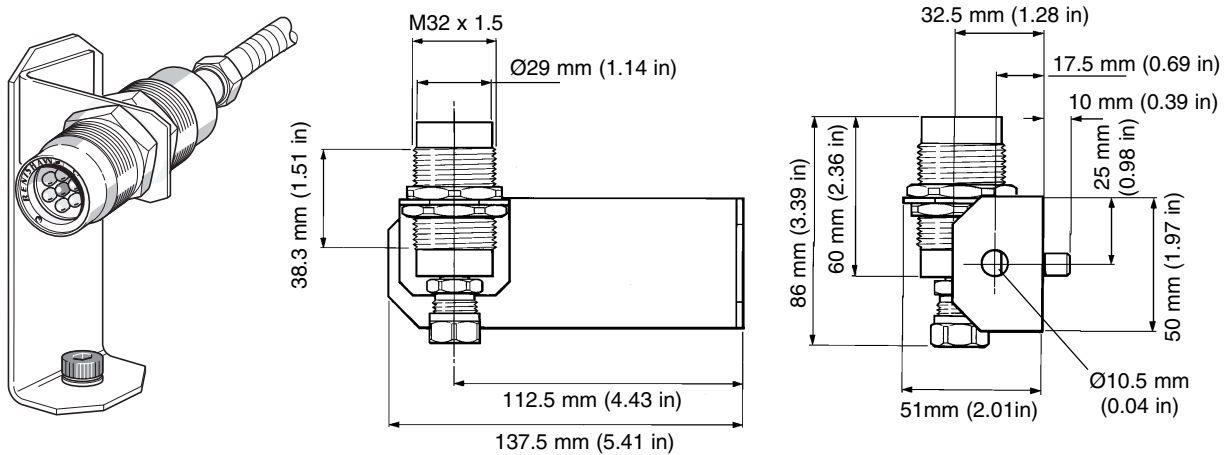


**Data sheet**  
MP16 radio probe system

**OM16 optical module (optional)**

The OM16 is an optional, optical transmission module, which provides the additional facility of M code activation and deactivation of the RMP2/RMP2-S.

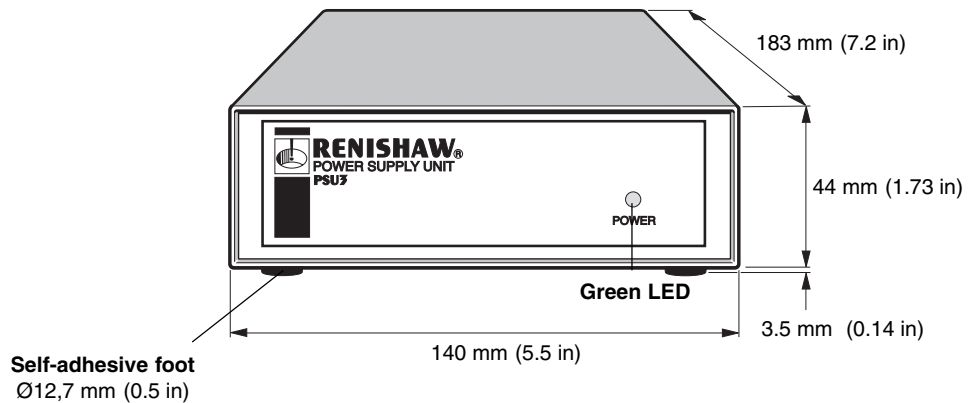
It is designed to be mounted on the machine tool via the mounting bracket supplied, or alternatively it can be mounted directly on the machine guarding using the two M32 x 1.5 locknuts provided. Each OM16 is supplied with 25 metres of cable as standard.



**PSU3 power supply unit (optional)**

In instances where it is not possible for the MI16 machine interface to draw its 24 V DC  $\pm 10\%$  power supply from the CNC machine, a Renishaw PSU3 power supply unit is available.

The PSU3 uses mains input voltage, presents a load of up to 500 mA and is designed for use worldwide.



## MP16 probe specification

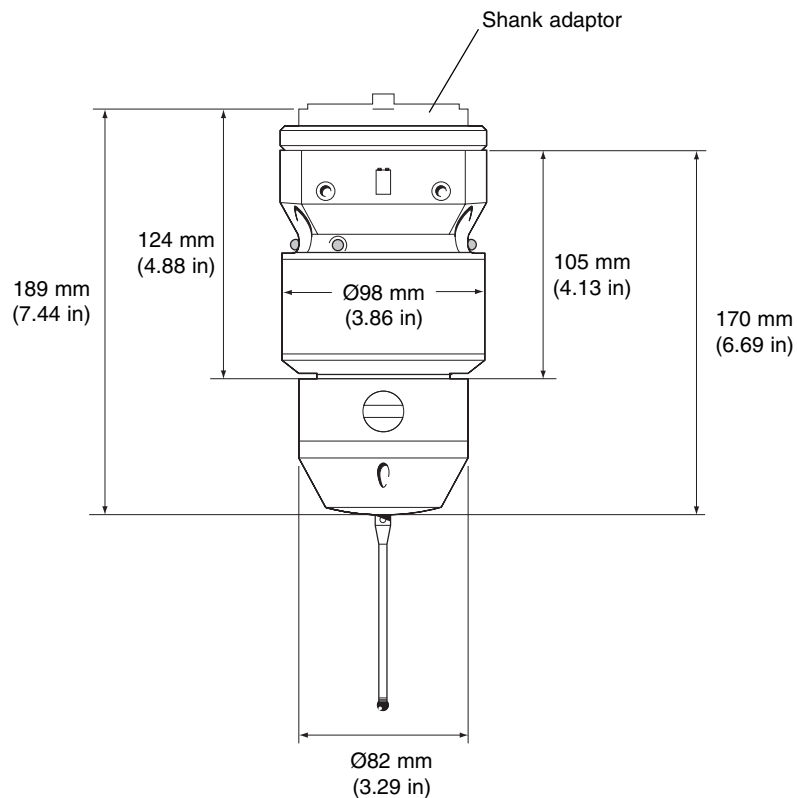
(see also the MP3 probe data sheet, part number H-2000-2040)

<b>Primary application</b>	Inspection probe for machining centres		
<b>Sense directions</b>	5-way X±, Y±, Z+		
<b>Trigger force (50 mm long stylus)</b>	XY	0.75 N - 1.5N, 75 gf - 150 gf (2.64 ozf - 5.29 ozf)	
	Z	4.9 N, 490 gf (17.28 ozf)	
<b>Overtravel</b>	50 mm stylus	XY	36 mm (1.4 in)
		Z	17 mm (0.67 in)
	100 mm stylus	XY	60 mm (2.6 in)
		Z	17 mm (0.67 in)
<b>Repeatability</b>	Maximum 2σ value of 1.0 μm (0.00004 in) 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).		
<b>Maximum recommended stylus length</b>	200 mm (7.87 in)		
<b>Recommended trigger speed</b>	3 m/min (10 ft/min)		

## RMP2 + MP16 probe dimensions

Note that the dimensions of the MP16 touch trigger probe, when mounted on the RMP2/RMP2-S, are shown with and without the shank adaptor (M-2056-0293) fitted. The overall length of the assembly, when the shank adaptor (A-2056-0979) is fitted, will be reduced by 2 mm.

The dimensions of the MP16 touch trigger probe, when mounted on the RMP2/RMP2-S, are as shown on the right.



## Parts list – Please quote the part number when ordering equipment

<b>Component</b>	<b>Part number for use in the EU (433 MHz frequency)</b>	<b>Part number for use in the USA and Japan (224 MHz frequency)</b>
RMP2	A-2137-0150	A-2137-0250 (USA) A-2137-0240 (Japan)
MI16	A-2137-0160	A-2137-0260
RMM2/RMM (side exit)	A-2137-0170	A-2056-0360
RMM2/RMM (rear exit)	A-2137-0470	A-2056-1077
RMM2/RMM with 10 m extension cable	A-2056-0322	A-2056-0322
OM16 kit	A-2137-0401	A-2137-0401
User guide	H-2000-5009	H-2000-5009
RMP2-S	A-2137-0180	use RMP2
Adaptor plate	M-2056-0293	M-2056-0293
Adaptor plate for shank switch	M-2056-0293	A-2137-0435
MP16 kit	A-2137-0100	A-2137-0220 (USA) A-2137-0200 (Japan)
RMP2-S assemblies	A-2137-0181 to 0191	N/A
MP16-S kits	A-2137-0101 to 0111	N/A

**Note:** All shank switch units are specials.

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main website at [www.renishaw.com](http://www.renishaw.com)**