Installation guide

RENISHAW
apply innovation™

RCS O-PK1 robot optical probe

Contents

Legal information

Warranty

Unless you and Renishaw have agreed and signed a separate written agreement, the equipment and/or software are sold subject to the Renishaw Standard Terms and Conditions supplied with such equipment and/or software, or available on request from your local Renishaw office.

Renishaw warrants its equipment and software for a limited period (as set out in the Standard Terms and Conditions), provided that they are installed and used exactly as defined in associated Renishaw documentation. You should consult these Standard Terms and Conditions to find out the full details of your warranty.

Equipment and/or software purchased by you from a third-party supplier is subject to separate terms and conditions supplied with such equipment and/or software. You should contact your third-party supplier for details. If you purchased the equipment from any other supplier, you should contact them to find out what repairs are covered by their warranty.

Regulations and conformance

EU and UK

Declaration of conformity

Renishaw plc hereby declares that RCS P-series system complies with the essential requirements and other relevant provisions of:

- the applicable EU directives and regulations
- the relevant statutory instruments under UK law
- the full text of the declaration of conformity is available upon request

Safety

In compliance with BS EN 61010-1:2010 the product is safe to use in the following environmental conditions:

- Indoor use only
- Altitude up to 2,000 m
- Maximum relative humidity (non-condensing) of 80% for temperatures up to 31° C, decreasing linearly to 50% relative humidity at 40° C
- Pollution degree 2

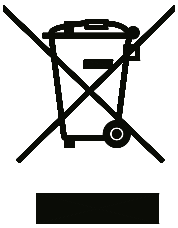
REACH regulation

Information required by Article 33(1) of Regulation (EC) No 1907/2006 (“REACH”) relating to products containing substances of very high concern (SVHCs) is available at: **www.renishaw.com/REACH**

RoHS compliance

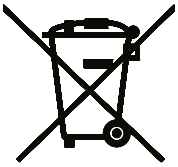
Compliant with EC directive 2011/65/EU (RoHS)

Disposal of waste electrical and electronic equipment



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, contact your local waste disposal service or Renishaw distributor.

Disposal of batteries



The use of this symbol on the batteries, packaging or accompanying documents indicates that used batteries should not be mixed with general household waste. Dispose of the used batteries at a designated collection point. This will prevent potential negative effects on the environment and human health which could otherwise arise from inappropriate waste handling. Contact your local authority or waste disposal service concerning the separate collection and disposal of batteries. All lithium and rechargeable batteries must be fully discharged or protected from short circuiting prior to disposal.

USA

FCC Compliance Statement

Supplier's Declaration of Conformity
47 CFR section 2.1077 compliance information
Unique Identifier: RCS O-PK1 robot probe
Responsible Party – U.S. Contact Information

Renishaw Inc.
1001 Wesemann Drive
West Dundee
Illinois
IL 60118
United States
Telephone number: +1 847 286 9953
Email: **usa@renishaw.com**

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.

47 CFR Section 15.105

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at their own expense.

Canada

ICES information to user (Canada only)

Class A Equipment Statement

This ISM device complies with Canadian ICES-001(A) / NMB-001(A).

Cet appareil ISM est conforme à la norme ICES-001(A) / NMB-001(A) du Canada.

China

China RoHS

For more information on China RoHS, visit:
www.renishaw.com.cn/zh/china-rohs-machine-tool-probing-systems--44440.

Australia

Australia regulatory compliance mark (RCM) scheme

The full text of the declaration of conformity is available upon request.

Safety

Information to the user

This product is supplied with non-rechargeable batteries that do not contain lithium. For specific battery operating, safety and disposal guidelines refer to the battery manufacturers' literature.

- Do not attempt to recharge the batteries.
- Replace the batteries only with the specified type.
- Do not mix new and used batteries in the product.
- Do not mix different types or brands of batteries in the product.
- Ensure that all batteries are inserted with the correct polarity in accordance with the instructions in this manual and indicated on the product.
- Do not store the batteries in direct sunlight.
- Do not expose the batteries to water.
- Do not expose the batteries to heat or dispose of batteries in a fire.
- Avoid forced discharge of the batteries.
- Do not short circuit the batteries.
- Do not disassemble, apply excessive pressure, pierce, deform or subject the batteries to impact.
- Do not swallow the batteries.
- Keep the batteries out of the reach of children.
- If the batteries are swollen or damaged do not use them in the product and exercise caution when handling them.
- Dispose of waste batteries in accordance with your local environmental and safety laws.

Ensure that you comply with international and national battery transport regulations when transporting batteries or this product with the batteries inserted. To reduce the risk of shipment delays, should you need to return this product to Renishaw for any reason, do not return any batteries.

Information to the robot integrator/installer

It is the robot integrator/installer'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.

If the probe fails, the probe signal may falsely indicate a probe seated condition. Do not rely on probe signals to halt the movement of the robot.

Equipment operation

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

Optical safety

This product contains LEDs that emit both visible and invisible light.

OMP40-2 is ranked Risk Group: Exempt (safe by design).

The product was evaluated and classified using the following standard:

BS EN 62471:2008 The photobiological safety of lamps and lamp systems.

Renishaw recommends that you do not stare at or look directly into any LED device, irrespective of its risk classification.

Introduction

The RCS O-PK1 probe is a radio probe designed for use with industrial robots. It enables precise alignment of tool and part frames for robot set up and automated cell recovery.

The RCS O-PK1 is specifically designed for various robot applications and provides an easy-to-mount solution for attachment to robot arms. The RCS O-PK1 has two variants; the O-PK1 F and the O-PK1 S. The F model provides a flange mounting option whereas the S model offers a shank adaptor. RCS O-PK1 probe is compatible with the Renishaw M4 stylus range.

Intended use

The RCS O-PK1 probe can be mounted alongside any end-of-arm tooling, such as; spindles, grippers, welding torches, and spray guns. The addition of a probe to a cell enhances various robot applications, including initial part and tool location by performing alignment routines. Routines can also be used for in-process control, to update tool or part frames if they have changed position.

Additional Information

The RCS O-PK1 equipment incorporates the OMP40-2 product. The following installation topics are covered by the OMP40-2 radio machine probe installation guide (Renishaw part no. H-4071-8504), visit the machine tool technical document resource web page at: **www.renishaw.com/resourcecentre/en/details/--141394**

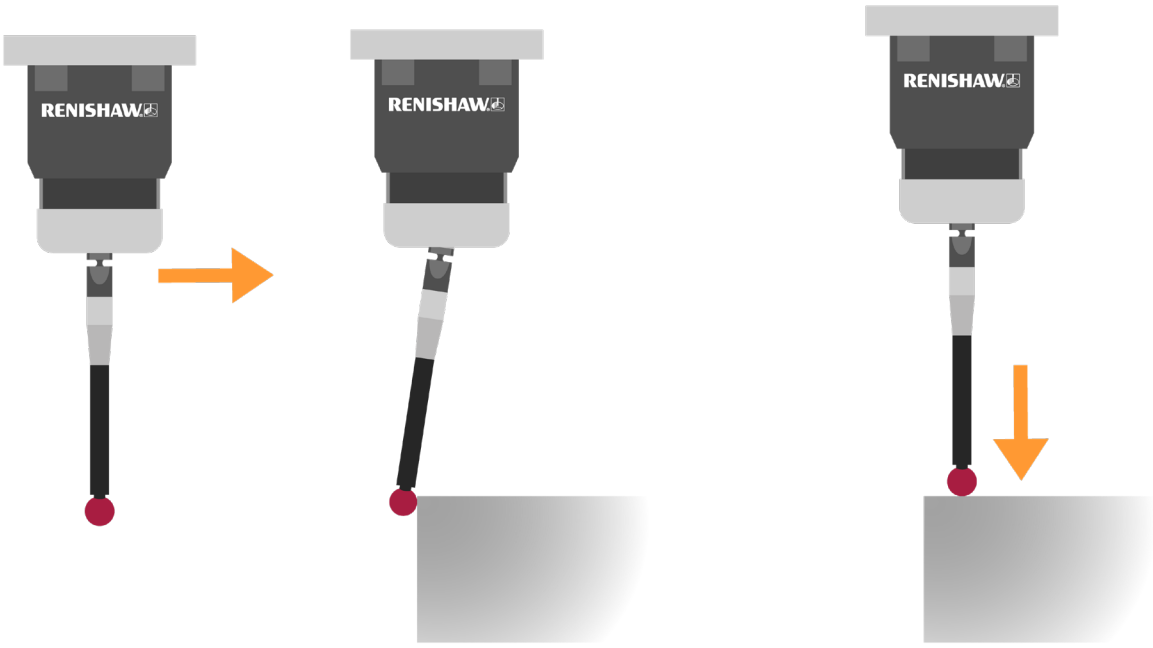
- Configurable settings
- Enhanced trigger filter
- Multiple probe modes
- Acquisition mode
- Battery specification
- Positioning the probe and receiver
- Fitting the stylus
- Installing batteries
- Probe settings
- Probe partnering
- Operating modes
- Cleaning the probe
- Changing the batteries

Probe trigger

A probe trigger signal is generated when the probes stylus is driven against a surface. The macro programs provided record the contact position and this data can be used by the robot controller or RPU.

When installing the probe there are certain parameters that must be considered. The touch speed parameters will be set to a default value but may need to be adjusted to allow the robot to stop within the limits of the stylus overtravel and robot capability. If any adjustment is required contact your local Renishaw representative.

To ensure a trigger signal is being generated, manually deflect the stylus within the limits of the stylus overtravel. Observe the teach pendant to check that the digital input changes to an ON state.



System delays

System delays are repeatable to less than 2 µs and are constant in each direction in which measurement is taken.

Delays are automatically compensated for, provided a calibration move is made in the same direction and at the same velocity as each measurement move.

Specification

Recommended styli		M4 50 mm to 100 mm stylus. Material depends on application. Use of an in-line break stem is advised.
Weight	With flange mount	RCS O-PK1 F: 490.8 g
	With shank mount	RCS O-PK1 S: 445.3 g
Transmission type		360° infrared optical transmission (modulated or legacy).
Switch-on methods		Optical on
Switch-off methods		Optical off or timer off
Spindle speed (maximum)		1,000 r/min
Operating range		Up to 5 m (16.4 ft)
Receiver/interface		OMI-2
Sense directions		Omni-directional ±X, ±Y, +Z
Unidirectional repeatability maximum 2σ value in any direction		1.00 µm (40 µin) 2σ [1]
Stylus trigger force [2, 3]	Radial low force	0.50 N, 51 gf (1.80 ozf)
	Radial high force	0.90 N, 92 gf (3.24 ozf)
	Axial direction	5.85 N, 597 gf (21.04 ozf)
Stylus overtravel limits radial plane		±12.5°
Stylus overtravel limits axial plane		6 mm (0.24 in)
Environment	**IP rating**	IPX8, BS EN 60529:1992+A2:2013
	IK rating (RMP40) (typical)	IK01, BS EN 62262:2002+A1:2021 [for glass window]
	Storage temperature	–25 °C to +70 °C (–13 °F to +158 °F)
	Operating temperature	+5 °C to +55 °C (+41 °F to +131 °F)

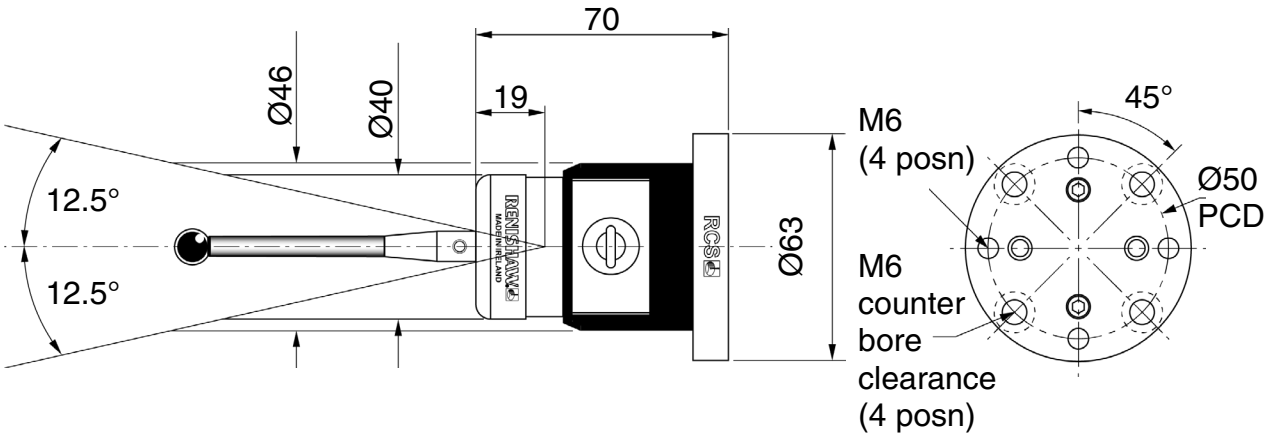
1 Performance specification is tested at a standard test velocity of 480 mm/min (18.9 in/min) with a 50 mm stylus. Significantly higher velocity is possible depending on application requirements.

2 Trigger force, which is critical in some applications, is the force exerted on the component by the stylus when the probe triggers. The maximum force applied will occur after the trigger point (overtravel). The force value depends on related variables including measuring speed, machine deceleration and latency.

3 These are the factory settings, manual adjustment is not possible.

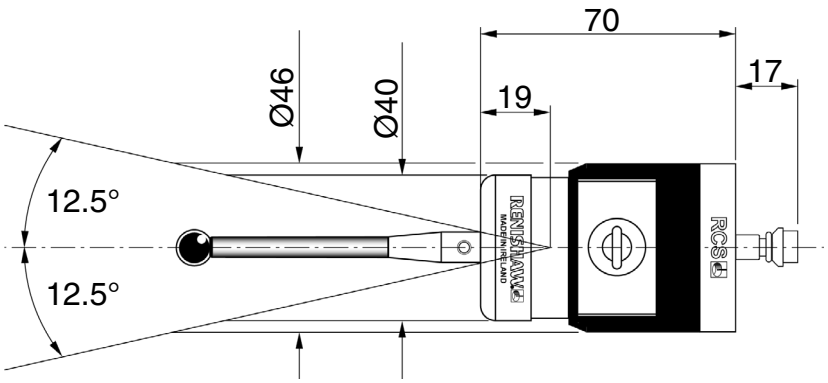
Dimensions

RCS O-PK1 F



Dimensions given in mm

RCS O-PK1 S



Dimensions given in mm

System installation

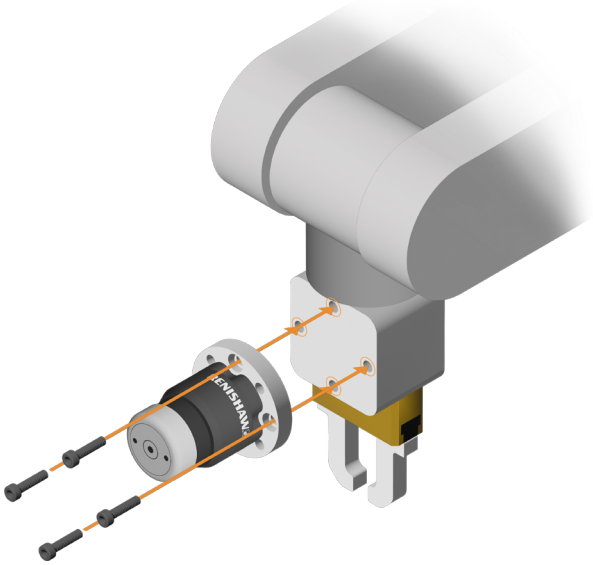
Mounting options

RCS O-PK1 F

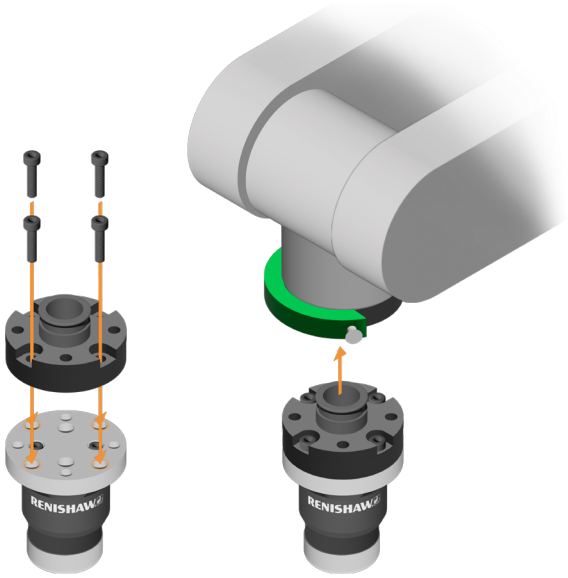
There are two different methods for mounting the O-PK1 probe to the flange (see below). The user should select the mounting option most suited to individual cell set-up.

NOTE: The flange mounting option adheres to the following ISO standard:
ISO 9409-1-50-4-M6

1. Four M6 fasteners to be fixed through counter bore holes on the mounting bracket.



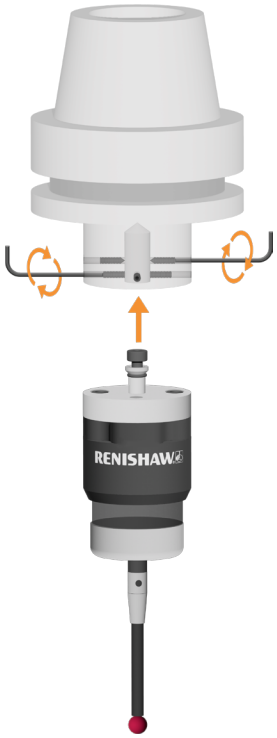
2. Four M6 fasteners to be fixed through the rear side of the bracket directly onto the interface.



RCS O-PK1 S

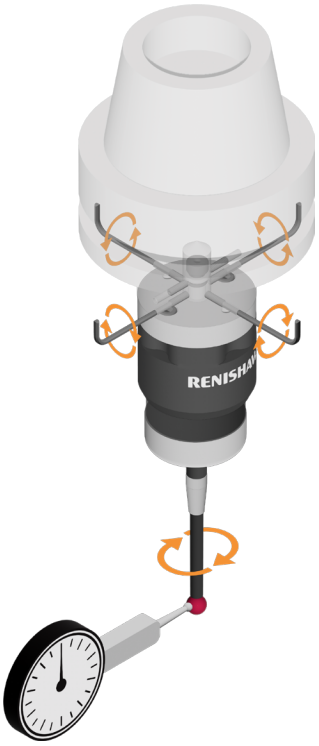
To mount the RCS O-PK1 S, follow these five steps.

1. Loosen all grub screws and fit the shank attachment into the tool holder.



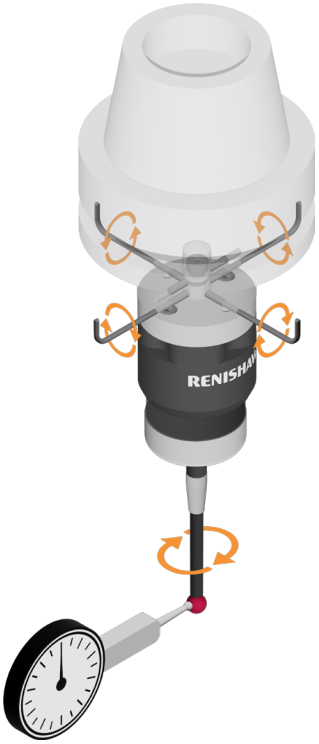
2. Tighten the upper grub screws to fix the probe in place.

3. Using the dial test indicator measure the amount of run out affecting the stylus. Adjust the four lower grub screws to 1.5 Nm – 2.2 Nm of torque achieving ±10 µm of runout.



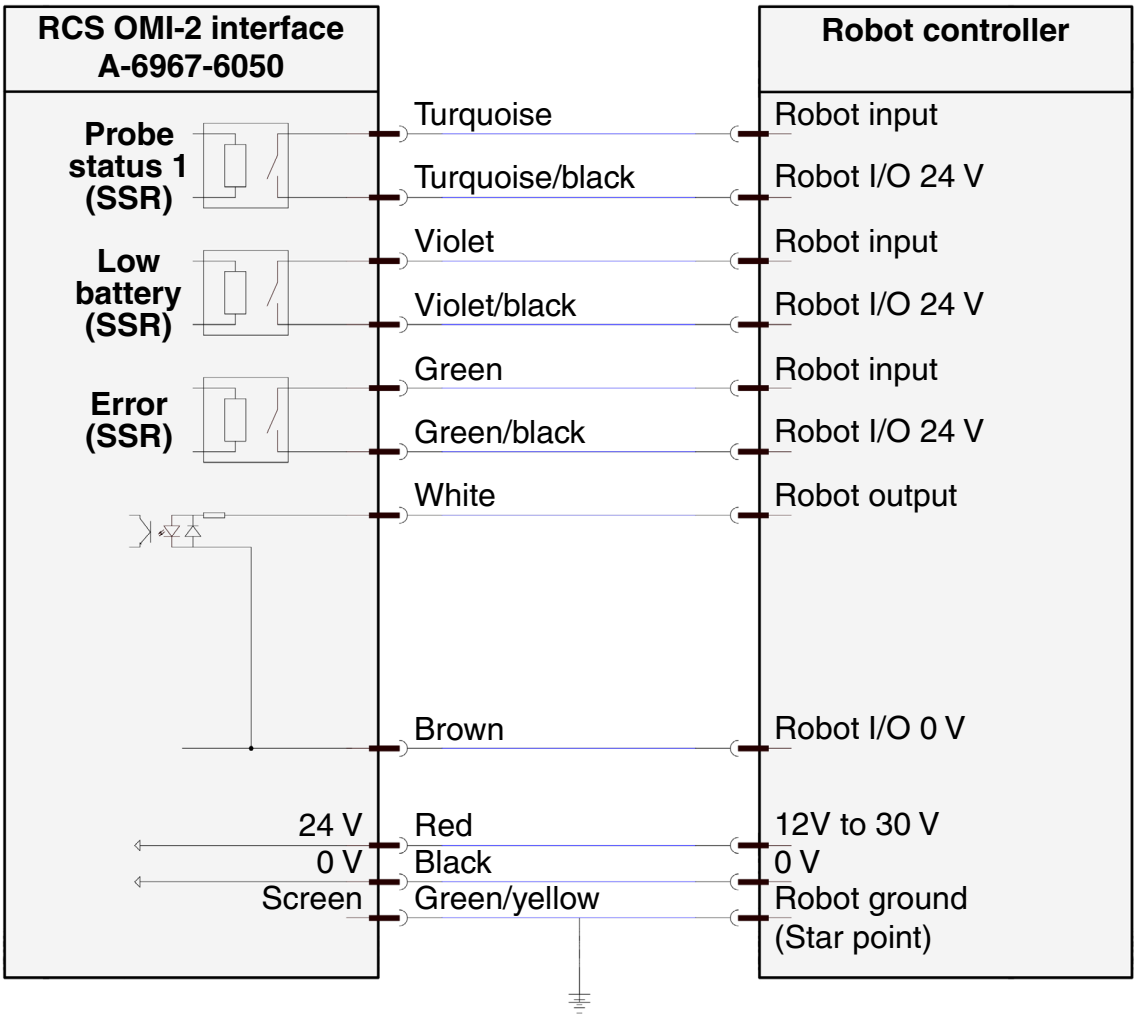
4. Using the dial test indicator measure the amount of run out affecting the stylus. Adjust the two upper grub screws to 1.5 Nm – 2.2 Nm of torque achieving approximately ±10 µm of runout.

5. Using the dial test indicator measure the amount of run out affecting the stylus. Adjust the four lower grub screws to 1.5 Nm – 2.2 Nm of torque achieving approximately ±2.5 µm of runout.



Recommended connection diagram

RCS O-PK1 to robot controller



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

NOTES: A switch can be fitted between the robot power supply and the red wire, to aid powering up the OMI-2 when partnering.

Further installation information can be found in the OMI-2 optical machine interface installation guide (Renishaw part no. H-5191-8504), visit the machine tool technical document resource web page at:
www.renishaw.com/resourcecentre/en/details/--141596.

Calibrating a probe

To understand the position of all elements within a cell the probe must be calibrated before use. Calibration of the probe provides an updated tool centre point (TCP) to enable accurate measurements.

It is important that the probe is calibrated in the following circumstances:

- when a probe system is to be used for the first time.
- when a new stylus is fitted to the probe.
- when it is suspected that the stylus has become distorted or that the probe has been crashed.
- at regular intervals to compensate for mechanical changes of your robot.

A probe calibration routine can be run using bespoke macros. For some manufacturers, Renishaw provides a teach pendant application that has step by step instructions. The supported teach pendant apps can be found at: **www.renishaw.com/softwarelicensing**.

A probe is calibrated using a datum sphere of known diameter. This provides a value for the stylus ball radius, which is automatically stored during the calibration routine. The stored value is then used automatically by the measuring cycles to give the true size of a feature. The value is also used to give true positions of single surface features.

NOTE: Stored radius values are dependent on robot performance and will be different from the physical sizes. Only use Renishaw supplied datum spheres for calibration.

For more information on macro instructions for your manufacturer, see the RCS P-series user guides at: **www.renishaw.com/rcs-support**.

NOTES: If a probe and shank assembly is dropped, it must be rechecked for correct on-centre adjustment. Do not hit or tap the probe to achieve on-centre adjustment.

Maintenance

Service and cleaning information can be found in the OMP40-2 optical machine probe installation guide (Renishaw part no. H-4071-8504). Visit the machine tool technical document resource web page at:
www.renishaw.com/resourcecentre/en/details/--141394.

Parts list

Item	Part number	Description
RCS O-PK1 F	A-6967-6120	RCS O-PK1 optical probe with flange mount and M4 stylus tool.
RCS O-PK1 S	A-6967-6125	RCS O-PK1 optical probe with shank mount and M4 stylus tool.
RCS stylus pack	A-6852-6505	M4 50 mm carbon fibre stylus, M4 100 mm carbon fibre stylus, 2 x break stems, 5 mm spanner.
Batteries	P-BT03-0007	½ AA battery lithium thionyl chloride (pack of two).
Battery cassette	A-4071-1166	OMP40 battery cassette assembly.
Battery gasket	A-4038-0301	OMP40 battery cap gasket kit.
RCS OMI-2 (15 m)	A-6967-6050	OMI-2 complete with cable 15 m (49 ft) long.

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#renishaw

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