RENISHAW
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RCS PK1 robot probe

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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

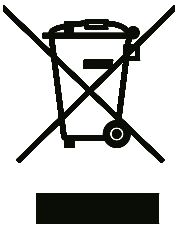
REACH regulation

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

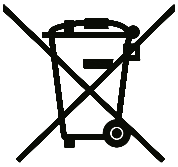
Compliant with EC directive 2011/65/EU (RoHS)

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 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/probes-china-rohs--45886

Australia

Australia regulatory compliance mark (RCM) scheme

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

Safety

Information to the user

In all applications involving the use of industrial robots, appropriate PPE is recommended.

The RCS PK1 system must be installed observing safety precautions. Before starting, ensure that the robot is in a safe condition with the power switched OFF. Refer to the robot controller user manual for operating instructions.

Information to the equipment installer

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

- Any device MUST be installed in a position away from any potential sources of electrical noise (for example, power transformers, servo drives).
- All 0 V/ground connections should be connected to the robot “star point” (the “star point” is a single point return for all equipment ground and screen cables). 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 (for example, motor power supply cables), 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.

Introduction

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

Intended use

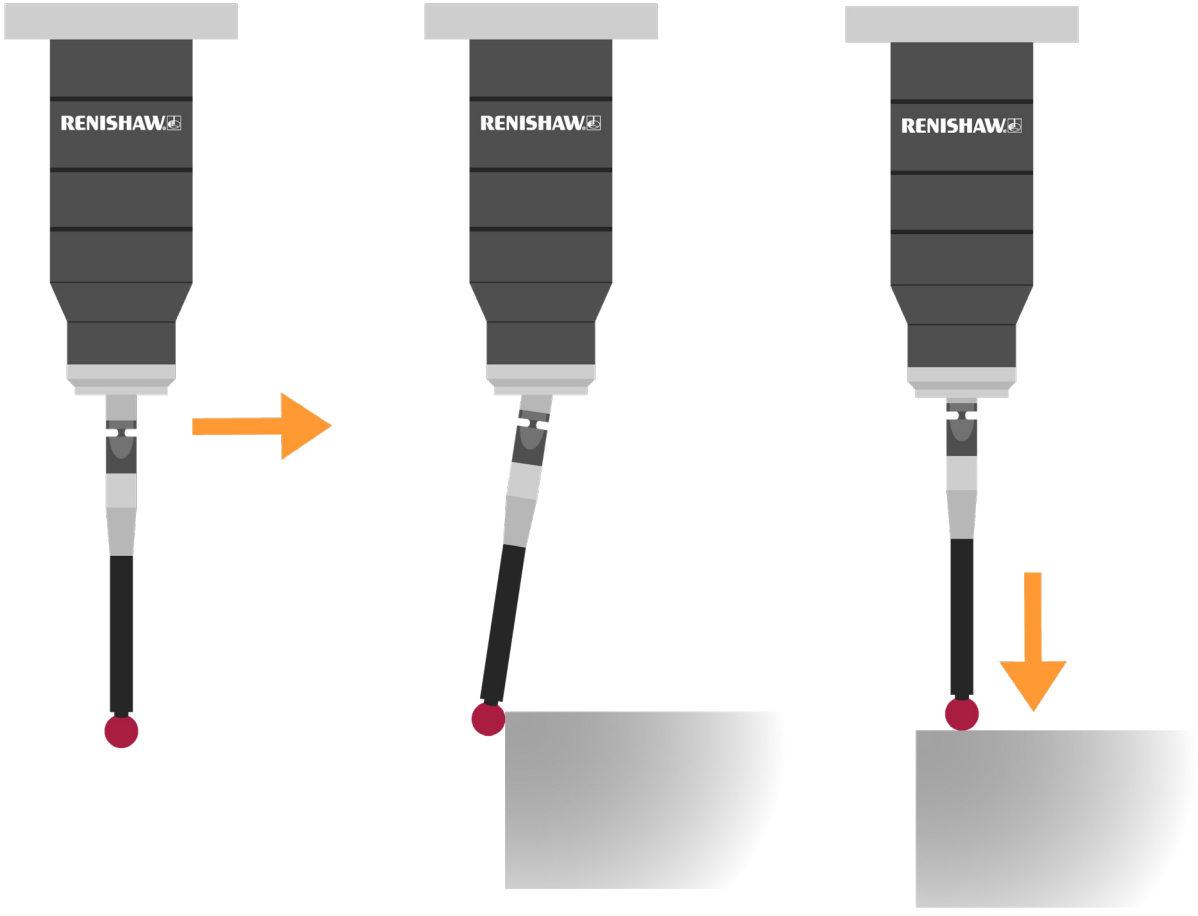
The RCS PK1 probe can be mounted alongside any end-of-arm tooling, such as; spindles, grippers, welding torches, and spray guns. The addition of a probe to a cell enhances various robot applications, including initial part and tool location by performing alignment routines. Routines can also be used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

Probe trigger

A probe trigger signal is generated when the probe's stylus is driven against a surface. The macros 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		50 mm to 100 mm stylus material depends on application. Use of an in-line break stem is advised.
Weight		480 g
Sense directions		Radial (XY) / Axial (Z)
Unidirectional reliability		1.00 µm (40 µin) 2s [1]
Stylus trigger force [2] [3] **Radial low force** **Radial high force** **Axial direction**		 1.00 N, 102 gf (3.59 ozf) 1.85 N, 188 gf (6.65 ozf) 7.40 N, 754 gf (26.61 ozf)
Stylus overtravel limits radial plane		14.87 mm (0.55 in) ±12.5°
Stylus overtravel limits axial plane		6.5 mm (0.26 in)
Mounting		ISO 9409-1-50-4-M6
Environment	**IP rating**	IPX8, BS EN 60529:1992+A2:2013
	Storage temperature	–10 °C to +70 °C (14 °F to +158 °F)
	Operating temperature	+10 °C to +40 °C (+41 °F to +131 °F)
Cable		4 Core screen cable with polyurethane sheath. Each core 7/0.2 insulated. Ø4.35 mm x 1.0m (3 ft 3 in).
Contact type		Normally open or normally closed
Supply voltage		12 Vdc to 30 Vdc
Supply current		18 mA nominal, 25 mA max
Output current		50 mA max
Protection		Short circuit

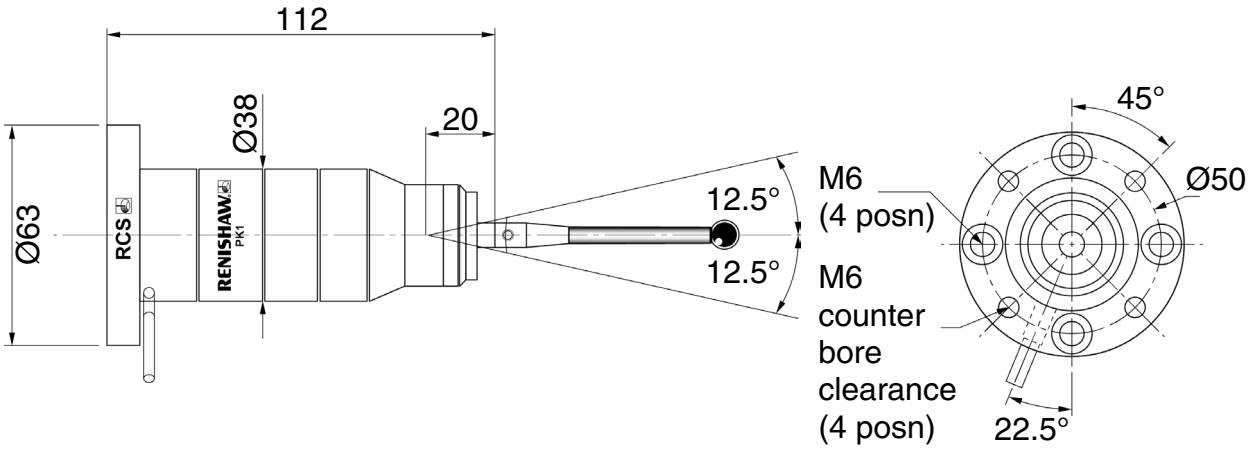
1 Performance specification is tested at a standard test velocity of 480 mm/min (18.9 in/min) with a 35 mm stylus. Significantly higher velocity is possible depending on application requirements.

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.

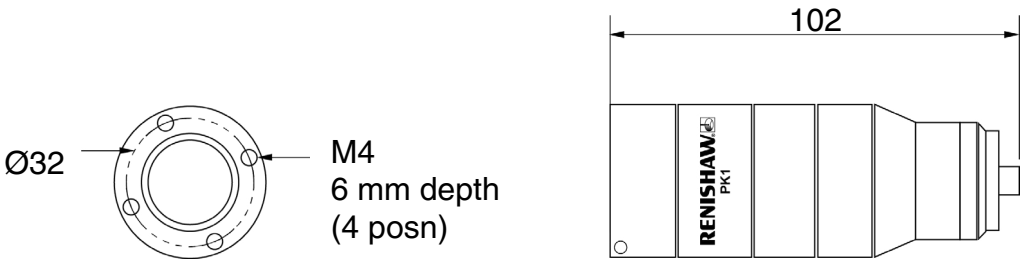
Dimensions

RCS PK1 – with flange



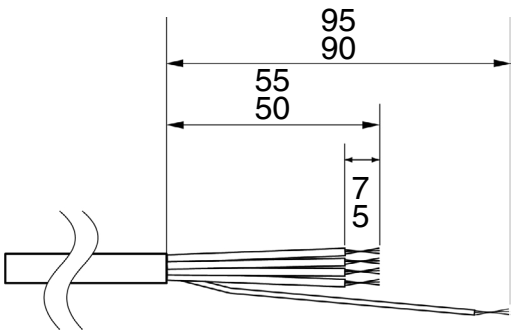
Dimensions given in mm

RCS PK1 – without flange



Dimensions given in mm

RCS PK1 – cable



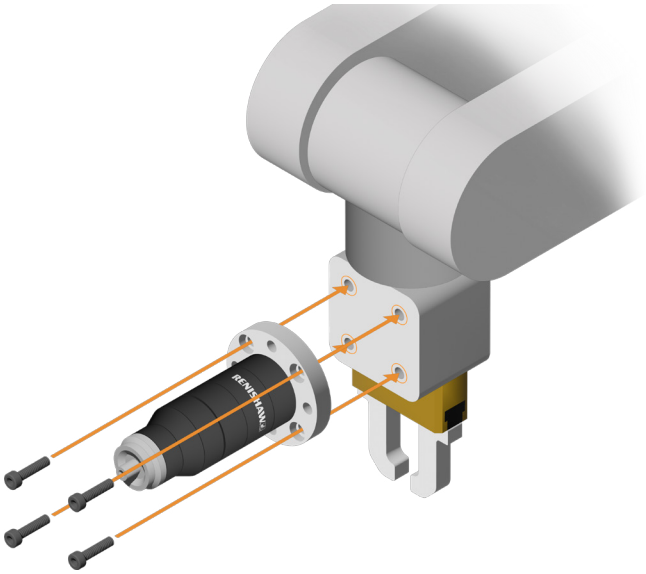
Dimensions given in mm

System installation

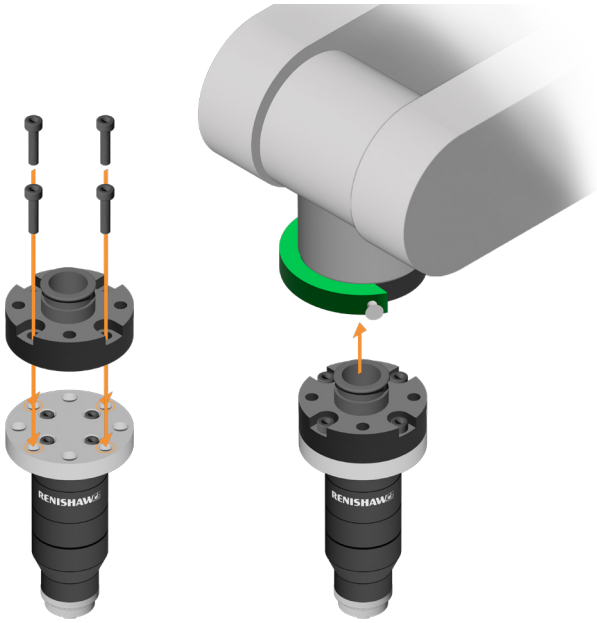
The RCS PK1 has its own mounting option built into the design of the device, this consists of eight holes suitable for M6 holes that can be attached directly to the robot flange or fixed to end of arm tooling. This coincides with the ISO 9409-1-50-4-M6 standard.

Suggested mounted options:

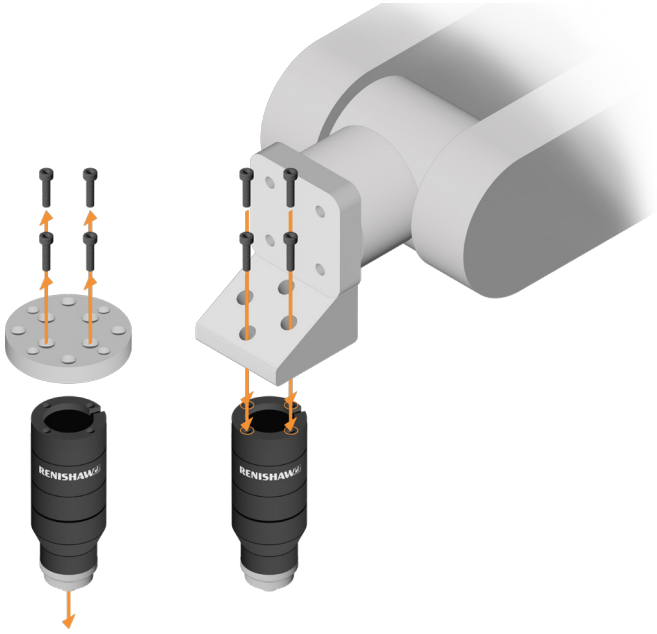
1. Four M6 screws to be fixed through counter bore holes on the mounting bracket.



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

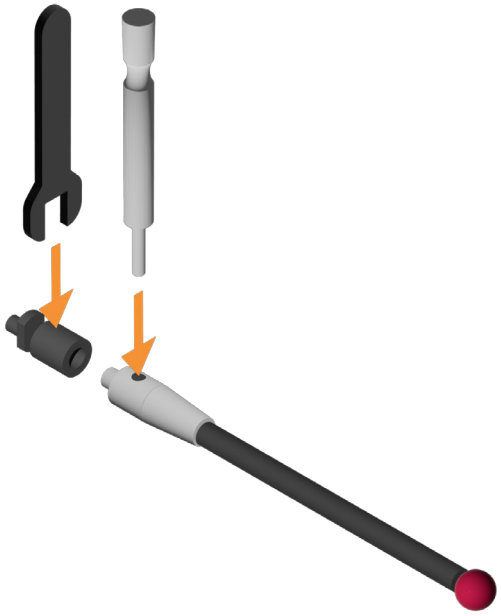


3. The probe body can be detached from the mounting bracket. The probe body can then be fixed directly onto the interface using M4 screws.

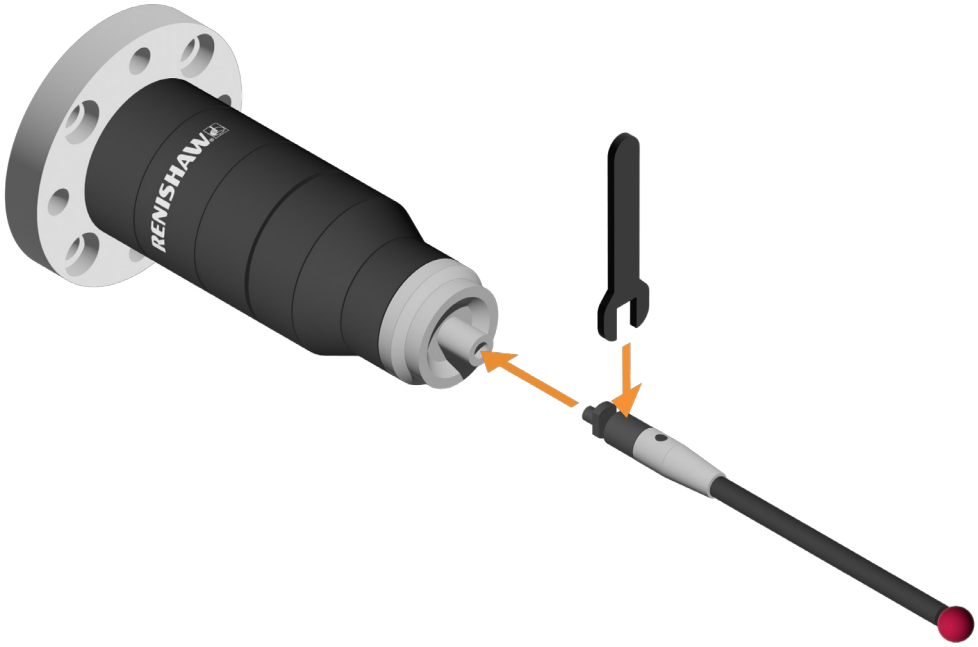


Stylus installation

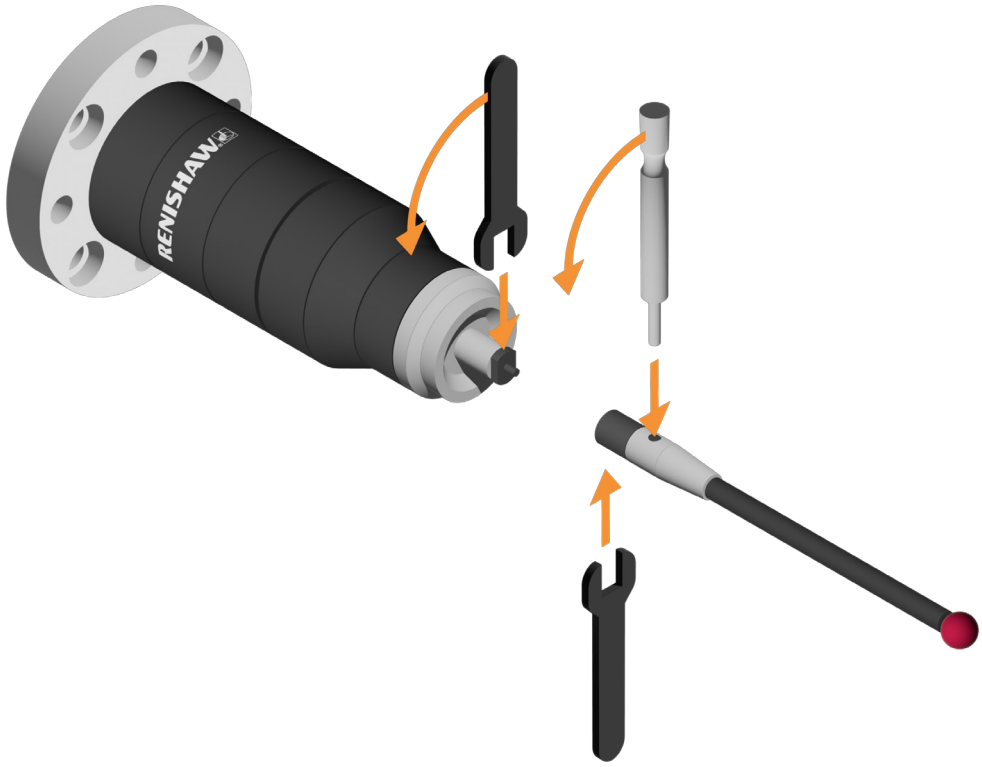
1. Attach the break stem to the stylus using the C-spanner and stylus tool.



2. Using the C-spanner, attach the break stem and stylus to your probe.

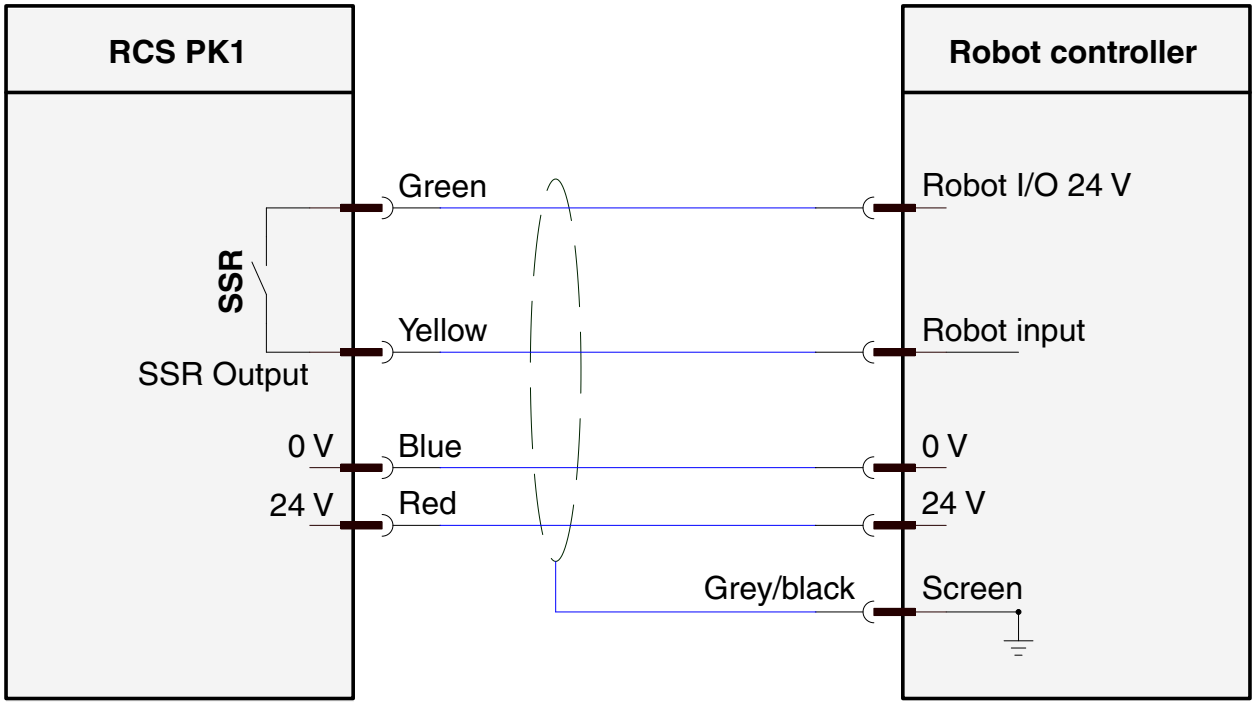


3. To remove a broken break stem, use the C-spanner to unscrew the broken piece from the probe. Use the stylus tool and C-spanner to remove the remainder of the break stem from the stylus.



Recommended connection diagram

RCS PK1 to robot controller



NOTE: For normally open contact (Blue to 24 V, Red to 0 V).

Electrical connections

CAUTION: Solid state relays (SSR) are susceptible to electromagnetic interference, the cable must be routed to avoid power cables or other sources of high frequency electromagnetic interference.

Calibrating a probe

To understand the position of all elements within a robot 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 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.

To run a probe calibration routine you will need to install the macros on your robot controller. For more information on macro instructions for your manufacturer, see the RCS P-series User guides at: **www.renishaw.com/rcs-support**.

Maintenance

WARNING: Before carrying out any maintenance operations, ensure that the machine is safe to work on and electrical power to the interface unit is switched off.

Service

Only the maintenance routines described in these instructions may be undertaken.

Further dismantling and repair of Renishaw equipment must be carried out at an authorised Renishaw service centre.

Equipment requiring repair, overhaul or attention under warranty should be returned to your supplier.

Cleaning

CAUTION: The probe must be handled with care.

- Do not allow debris to build up around the probe body.
- Do not allow dirt or liquids to enter the sealed working parts.
- Keep system mating surfaces clean.
- Do not wash with high pressure jets.

Once a month, remove the stylus front cap (the C-spanner is provided for easy cap removal) then remove all residue by washing with deionised water.

WARNING: Do not use a sharp tool or a degreasing agent.

The cleaning interval may be extended or reduced, depending on the rate at which dirt accumulates. If the inner diaphragm is damaged, return the probe to your supplier for repair.

Parts list

Item	Part number	Description
RCS PK1	A-6967-6100	The RCS PK1 is a hard-wired probe with built in interface and a flange mounting plate. Complete with C-spanner and M4 stylus tool.
C-spanner	A-2063-7587	C-spanner.
M4 stylus tool	A-5004-7587	M4 stylus tool.
RCS PK service kit	A-6967-6201	RCS PK service kit comprises front cover, eyelid seal, spring and O-ring.

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