# PHS1 servo position head system user's guide

Documentation part number: H-1000-5081-03-A

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## General information



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### Warranty

Renishaw plc warrants its equipment for a limited period (as set out in our Standard Terms and Conditions of Sale) provided that it is installed exactly as defined in associated Renishaw documentation.

Prior consent must be obtained from Renishaw if non-Renishaw equipment (e.g. interfaces and/or cabling) is to be used or substituted. Failure to comply with this will invalidate the Renishaw warranty.

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## Care of equipment

Renishaw probes and associated systems are precision tools used for obtaining precise measurements and must therefore be treated with care.

## Changes to Renishaw products

Renishaw reserves the right to improve, change or modify its hardware or software without incurring any obligations to make changes to Renishaw equipment previously sold.

## Patents

Features of Renishaw's PHS1 servo positioning head system and associated products are the subjects of the following patents and patent applications:

| | |
|---|---|
| EP 0856377 | US 5971903 |
| | US 6047612 |
| | US 6209411 |

# FCC (USA only)

## Information to user (47CFR 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 you will be required to correct the interference at your own expense.

## Information to user (47CFR 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.

# Warnings - GB

**NOTE:** The PHS1 servo positioning head contains pre-loaded spring elements which can be dangerous if any attempt is made to disassemble the head.

Pinch hazards exist between moving parts and between moving and static parts. Do not hold the probe head during movements, or when manually changing a probe.

Beware of unexpected movement. The user should remain outside the full working envelope of probe head / extension / probe combinations.

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

There are external air pipes on certain installations. Care should be taken to ensure that the pipes are securely fastened to the barbed air fittings.

For instructions regarding the safe cleaning of Renishaw products, refer to the maintenance information in the relevant product documentation.

Remove power before performing any maintenance operations.

Refer to the machine supplier's operating instructions.

**NOTE:** There are no mains powered units in the PHS1 system.

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 documentation, 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 stop machine movement.

The expected method of providing an emergency stop for Renishaw products is to remove power.

# International safety instructions

**EN - WARNING:** You must now turn to appendix 1 and read the safety instructions in your own language before unpacking and installing this product.

**CS - UPOZORNĚNÍ:** Před rozbalením a instalací tohoto výrobku čtěte bezpečnostní pokyny uvedené v Příloze 1.

**DA - SIKKEREDHED:** Læs sikkerhedsinstrukserne i Appendix 1 FØR udpakning og installation af dette produkt!

**DE - SICHERHEITSANWEISUNGEN:** Lesen Sie die Sicherheitsanweisungen in Ihrer Sprache im Anhang 1 vor dem Auspacken und Installieren des Produktes.

**EL - ΑΣΦΑΛΕΙΑ:** Πρέπει τώρα να γυρίσετε στο Κεφάλαιο 1 και να διαβάσετε τις οδηγίες ασφαλείας στη δική σας γλώσσα προτού ανοίξετε αυτό το προϊόν για να το εγκαταστήσετε.

**ES - SEGURIDAD:** Debe volver al Apéndice 1 y leer las instrucciones de seguridad en su propio idioma antes de abrir e instalar este producto.

**ET - HOIATUSED:** Nüüd peate vaatama 1. lisa ja enne selle toote lahtipakkimist ja paigaldamist lugema läbi ohutusjuhendi oma keeles.

**FI - TURVALLISUUTTA:** Ennen tämän tuotteen pakkauksen avaamista ja asentamista lue liitteessä 1 olevat omalla kielelläsi kirjoitetut turvaohjeet.

**FR - SECURITE:** Vous devez à présent consulter l'annexe 1 et les instructions de sécurité dans votre propre langue avant de déballer et d'installer ce produit.

**HU - FIGYELMEZTETÉS:** Lapozzon a 1. függelékhez és olvassa el a biztonsági előírásokat az Ön saját nyelvén mielőtt kicsomagolná és beüzemelné a terméket.

**IT - SICUREZZA:** Prima di aprire ed installare questo prodotto dovete leggere le istruzioni di sicurezza nella Vostra Lingua riportate nell'Appendice 1.

**LT - ĮSPĖJIMAI:** Prieš išpakuojant ir įdiegiant produktą jums reikia grįžti prie 1 priedo ir perskaityti nurodymus dėl saugos savo kalba.

**LV - BRĪDINĀJUMS:** Pirms šī izstrādājuma izsaiņošanas un uzstādīšanas jums jāiepazīstas ar 1. pielikuma drošības instrukcijām savā valodā.

**MT - TWISSIJIET:** Issa għandek tmur f'appendiċi 1 sabiex taqra l-istruzzjonijiet tas-sigurtà fil-lingwa tiegħek qabel ma tispakkja u tinstalla dan il-prodott.

**NL - VELIGHEID:** Ga nu naar Appendix 1 en lees de veiligheidsinstructies, in uw eigen taal, voordat u dit product uitpakt en installeert.

**PL - BEZPIECZEŃSTWO:** Przed rozpakowaniem i instalacja produktu nalezy przeczytac zalacznik nr 1 i zapoznac sie z zasadami bezpieczenstwa w jezyku uzytkownika.

**PT - SEGURANÇA:** Você deve retornar ao Apêndice 1 e ler as instruções de segurança em seu idioma antes de desembalar e instalar este produto.

**SK - VÝSTRAHY:** Pred rozbalením a inštaláciou tohto produktu si musíte pozrieť prílohu 1 a prečítať bezpečnostné pokyny vo vašom jazyku.

**SL - OPOZORILA:** Sedaj morate v prilogi 1 prebrati varnostne napotke v svojem jeziku, preden odpakirate in namestite produkt.

**SV - SÄKERHETSFÖRESKRIFTER:** Du måste nu gå till bilaga 1 och läsa säkerhetsinstruktionerna på ditt eget språk innan du packar upp och installerar denna produkt.

# Environmental conditions

The following environmental conditions comply with (or exceed) BSEN61010-1:1993:

| | |
|---|---|
| **Indoor use** | IP30 (no protection against water) |
| **Altitude** | Up to 2000 m |
| **Operating temperature** | +10 °C to +40 °C |
| **Storage temperature** | -10 °C to +70 °C |
| **Relative humidity** | 80% maximum for temperatures up to +31 °C linear decrease to 50% at +40 °C |
| **Transient overvoltages** | Installation category II |
| **Pollution degree** | 1 |

# Introduction

The Renishaw servo positioning head (PHS1) is a two-axis motorised head with ±184° servo drive enabling the probe configuration to be positioned at almost any angle. This makes the head ideal for use in restricted spaces and enables styli to be angled normal to a surface or aligned to the axis of a hole.

The head can carry multiple probing types and very long extensions, making it highly suitable for measurement of large complex parts.

Movement and positioning of the head is co-ordinated directly by the CMM controller, allowing the motion of the head to be synchronised with the motion of the machine's axes for maximum component accessibility and minimum cycle time.

Further sections of this guide give general descriptions of the PHS1 system components.

## Two-axis servo positioning head

The two servo axes (D and E) are functionally identical and feature:

- Backlash-free motor/gearbox units
- Precision mechanical bearings
- High-accuracy, high-resolution angular measurement system for positional feedback
- Reference marks to give axis position on start-up
- Velocity control loops that keep the angular velocity of the axis constant at the commanded value regardless of load
- A high-speed serial link that receives commands from, and transmits status information back to, the interface card

During measurement cycles the head does not drive to a locked, repeatable position in the same way as an indexing head. Instead the CMM controller drives the probe tip to the desired position. When a probing point is taken, the respective axes of the head and CMM are latched simultaneously to give accurate probe readings.

The head can hold its position or can be used in a continuous mode whereby it is servo driven continuously to follow a pre-programmed path.

Coloured LEDs on the head overtravel cap indicate probe and head status:

- The green LED indicates power is being supplied to the PHS1 probe head
- The red LEDs are positioned on each face of the overtravel cap and indicate when the probe has been triggered

An air supply to the head is required for axis motor cooling to give optimum metrology performance.

## Overtravel protection unit

The PHS1 head includes a built-in spring-loaded overtravel unit for protection of both head and CMM in the event of a collision between the head and workpiece or CMM itself.

The features of this overtravel unit include:

- Optional electronic overtravel signalling - configured by the CMM manufacturer
- Generous overtravel limits allowing machine motion to be stopped before damage is caused - providing electronic stop is configured
- Automatic reset on kinematic locations once any obstruction has been cleared
- Flexible bellows seal

## Probe arms

Probe arms can be exchanged to allow the use of a wide range of different probe types and configurations.

Automatic arm exchange on repeatable kinematic locations is available using the ACR2 autochange rack.

Touch trigger probes can be used to reach up to 750 mm.

Signals are made available to the PC interface card to indicate that an arm is fitted and that the arm is locked safely into position.

## PC interface card

The head is controlled from the PC interface card in the CMM controller, or directly from the CMM controller. This card handles communications and conditions signals between the head and the CMM controller and also provides power supply to the head axis drives.

The PC interface card does not handle probing system signals.

Further information is given in the PHS1 programmer's guide (Renishaw part number H-1000-6005) and the PHS1 installation guide (Renishaw part number H-1000-4044).

## ACR2 autochange rack

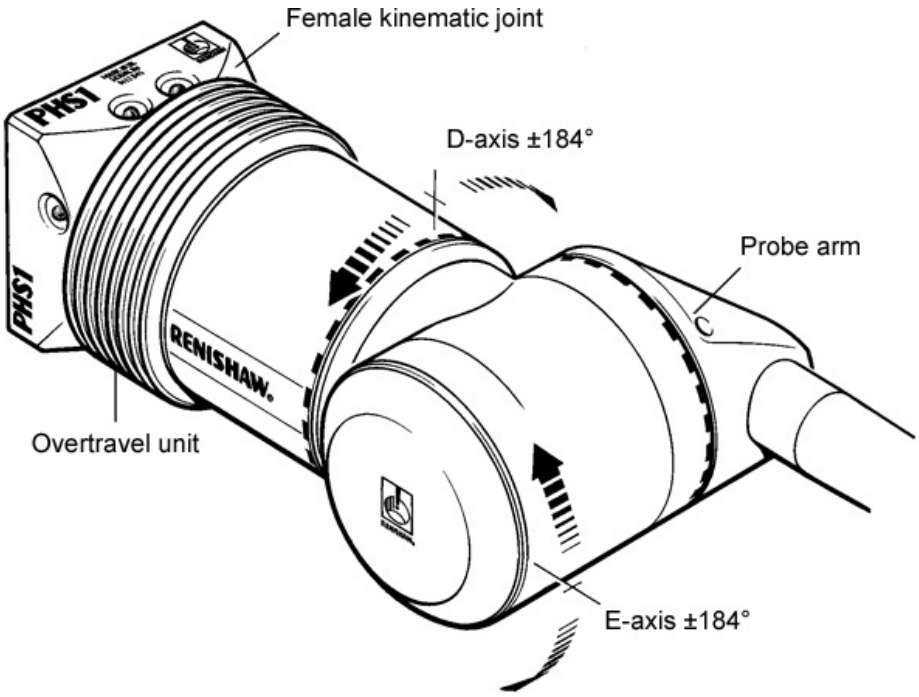
The ACR2 autochange rack is an arm-changing system for the PHS1 servo positioning head system. It allows probe extensions or probe adaptors to be exchanged to suit the probing task required without manual intervention. Its modular construction and simple operation enable any number of racks to be positioned anywhere within the machine volume. Each rack is configured from pairs of rack ports which are mounted to a vertical pillar (not supplied by Renishaw).

Further information is given in the ACR2 installation guide (Renishaw part number H-1000-4045).

Custom versions are available to mount horizontally when PHS is mounted vertically.

# PHS1 probe head specifications

**PHS1 probe head:**




| | |
|---|---|
| **Operating temperature** | +10 °C to +40 °C |
| **Weight** | 3.6 kg |
| **Carrying capability** | Combined probe and arm mass of 1 kg |
| **Torque** | Maximum torque: 2 Nm<br>Mechanical clutch slip: 3 Nm ±0.5 Nm |
| **Movement speed** | Maximum: 150° $s^{-1}$<br>Recommended: 120° $s^{-1}$ |
| **Arm rotation angle** | D-axis: ±184°<br>E-axis: ±184° |
| **Angular resolution** | 0.2 arc sec<br>Equivalent to 0.1 µm at 100 mm radius |
| **Collision protection** | Overtravel signal combined with >10 mm travel in all directions<br>Axis drive protection bu mechanical slipping clutches |

See the following section for information on head dimensions.

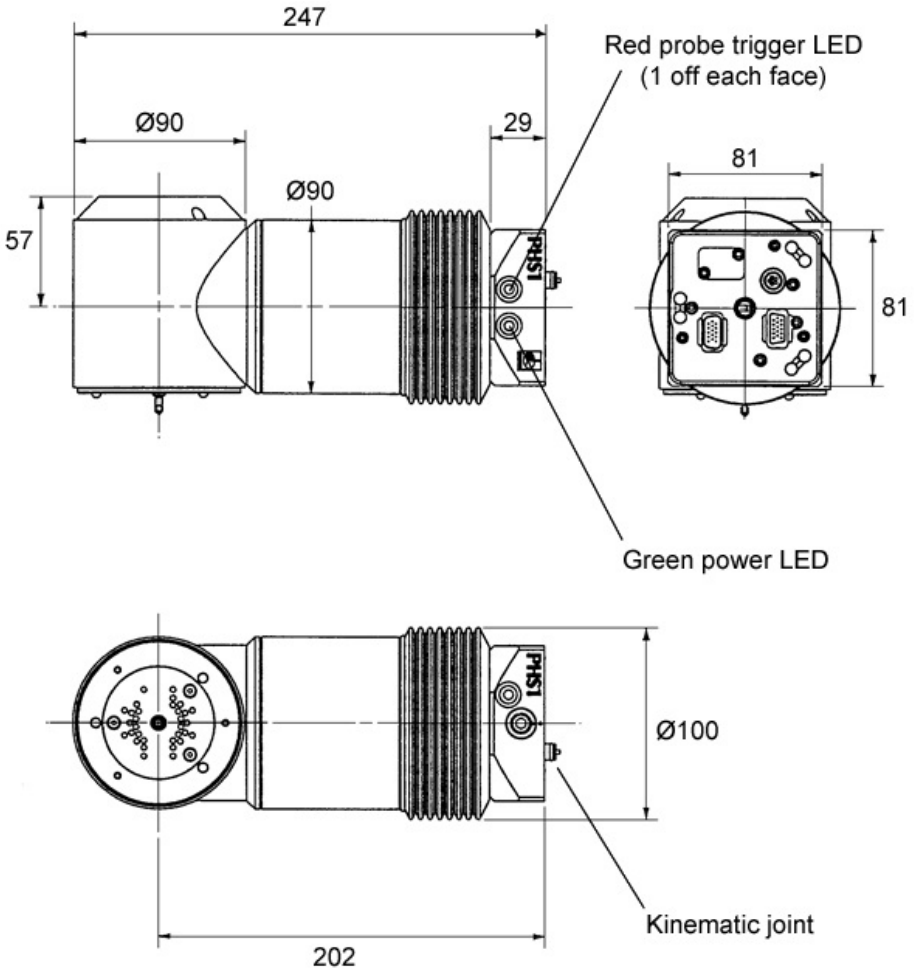
# PHS1 dimensions

The dimensions of the PHS1 servo positioning head are shown below. All dimensions are in millimetres.

The two coloured LEDs serve particular functions.

- The green LED indicates 24 V power is being supplied to the probe head
- The red LEDs are positioned on each face of the overtravel cap and flash when the probe is triggered

**PHS1 probe head dimensions:**



# Air system requirements

A clean, dry air supply to the head is required for axis motor cooling to give optimum metrology performance. This air supply must conform to the specifications laid out in the table below.

**NOTE:** The air supply piping should be suitably fixed to the CMM and secured around the air fixing barb on the rear of the PHS1 male kinematic.

| | |
|---|---|
| **Air fitting** | Single barb diameter 6.1 mm / 6.2 mm.<br>To suit flexible polyurethane tubing 3/16 in ID 1/4 in OD. |
| **Airflow rate** | 0.35 litres/second free air at standard atmospheric conditions. |
| **Pressure at head** | 5 bar (70 psi) to 6 bar gauge at the head. |
| **Pressure sensing switch** | A pressure sensing switch is required to input to the PC card. Switch to open if pressure drops below 3 bar. |
| **Cleanliness:** | |
| **Maximum allowable particle size** | 0.1 µm (as ISO 8573-1 Class 1) |
| **Maximum allowable concentration of particles** | 0.1 mg/m$^3$ at standard atmospheric conditions (as ISO 8573-1 Class 1) |
| **Oil: Maximum allowable concentration of droplets, aerosols and vapours** | 0.01 mg/m$^3$ of the air at standard atmospheric conditions (as ISO 8573-1 Class 1) |

# Overtravel unit

The overtravel unit protects the PHS1 probe head in the event of a collision by deflecting and providing an electrical signal which can be used by the CMM controller to stop machine motion.

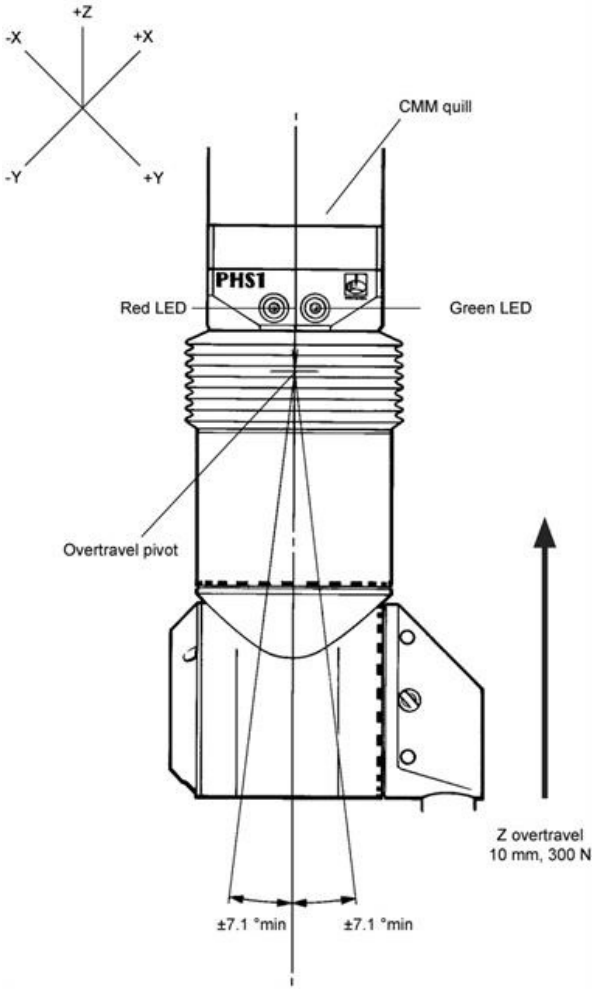
A kinematic joint held in place by a coil spring enables the body to relocate itself once any obstruction has been removed.

> **NOTE:** The head must be re-datumed in the event of overtravel.

Information on the re-datuming procedure is given in the PHS1 programmer's guide (Renishaw part number H-1000-6005).

The following figure shows the location and deflection capability of the overtravel unit:

**Overtravel unit deflection:**



# Head installation

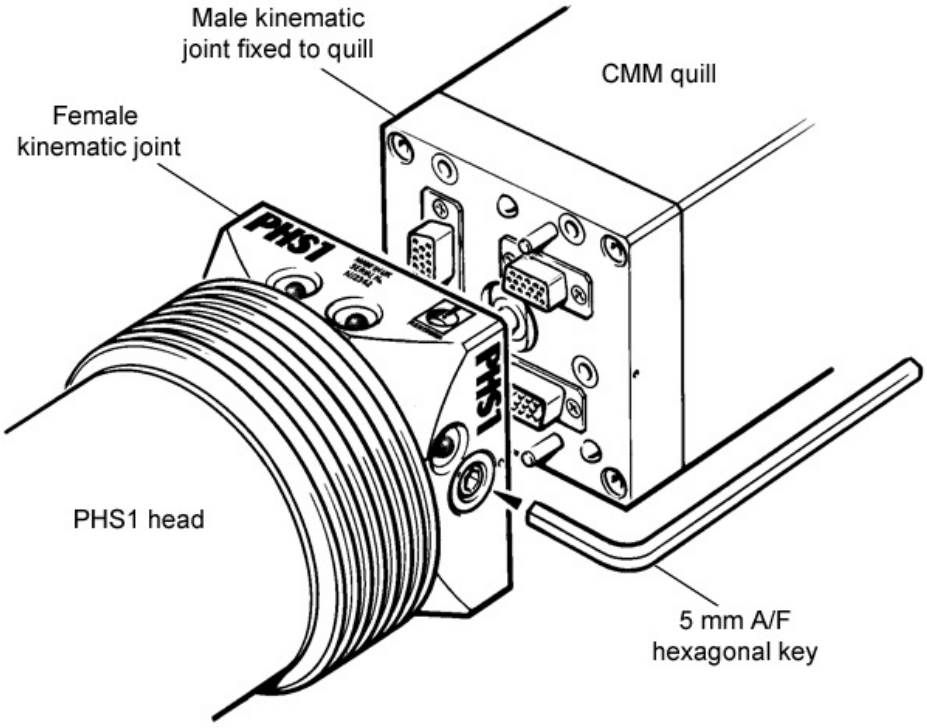
The PHS1 probe head mounts onto the CMM quill via a kinematic mounting plate. This allows for easy exchange of heads and for interchangeability with other Renishaw motorised head systems.

The kinematic joint cam is locked in place using the 5 mm A/F hexagonal key supplied with each kit.

> **NOTE:** The locking cam must be fully rotated when locked in position. The alignment mark on the cam is matched with the alignment mark on the housing when the cam is in its correct locked position.

Failure to ensure that the cam is fully locked could result in the cam unlocking during operation and the head becoming separated from the quill.

**Kinematic joint locking mechanism (shown locked):**



# Reference marks

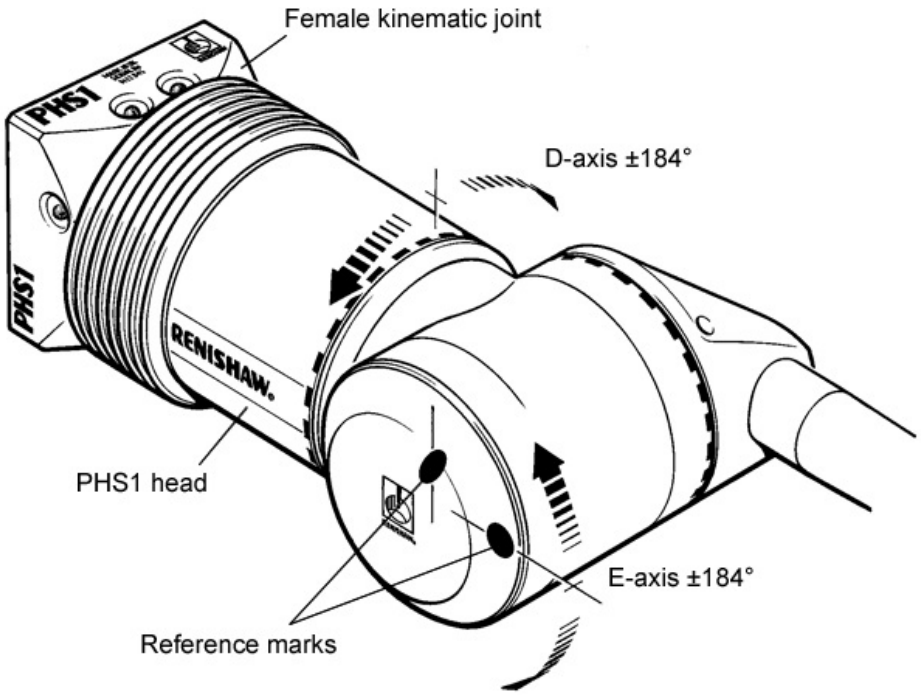
Each axis has a reference mark to enable its zero position to be set. This zero position is nominally at the mid-travel point of the axis - the absolute position of the mark is within ±1.5°.

A microswitch activated by a cam track is used to generate the reference mark; the controller always knows in which direction to travel in order to find the reference point.

To set its zero point, the axis must be driven past the reference mark in a negative direction - see note.

**NOTE:** A specific procedure must be followed in order for the probe's orientation to be determined. Details of this procedure are given in the PHS1 programmer's guide (Renishaw part number H-1000-6005).

**Probe orientation with reference marks nominally at zero:**




## Axis rotational alignment

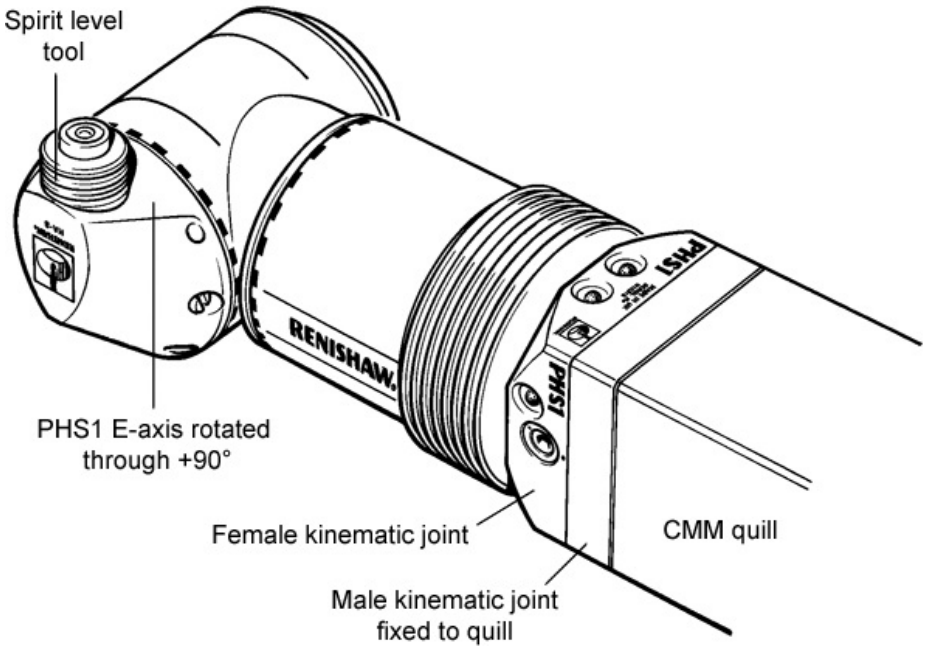
Rotational alignment of the head axes can be found by using the spirit level tool (part number A-2150-1070). The spirit level should be screwed into an HA8 PHS1 M8 arm and the arm mounted onto the head.

The following procedure describes the method of calculating the individual axes offsets.

1. Rotate the E-axis through +90°.
2. Small adjustments in the D and E-axes should be made until the bubble indicates the head is level.
3. Once the head axes have been aligned to the CMM axes, the initial rotation of +90° in the E-axis should be subtracted from the E-axis levelled position.

4. These positions are now the angular offsets of each head axis from the datum position.
5. These should now be stored in software for that particular head.

**Calculation of the individual head axis offsets:**



# Probe arms

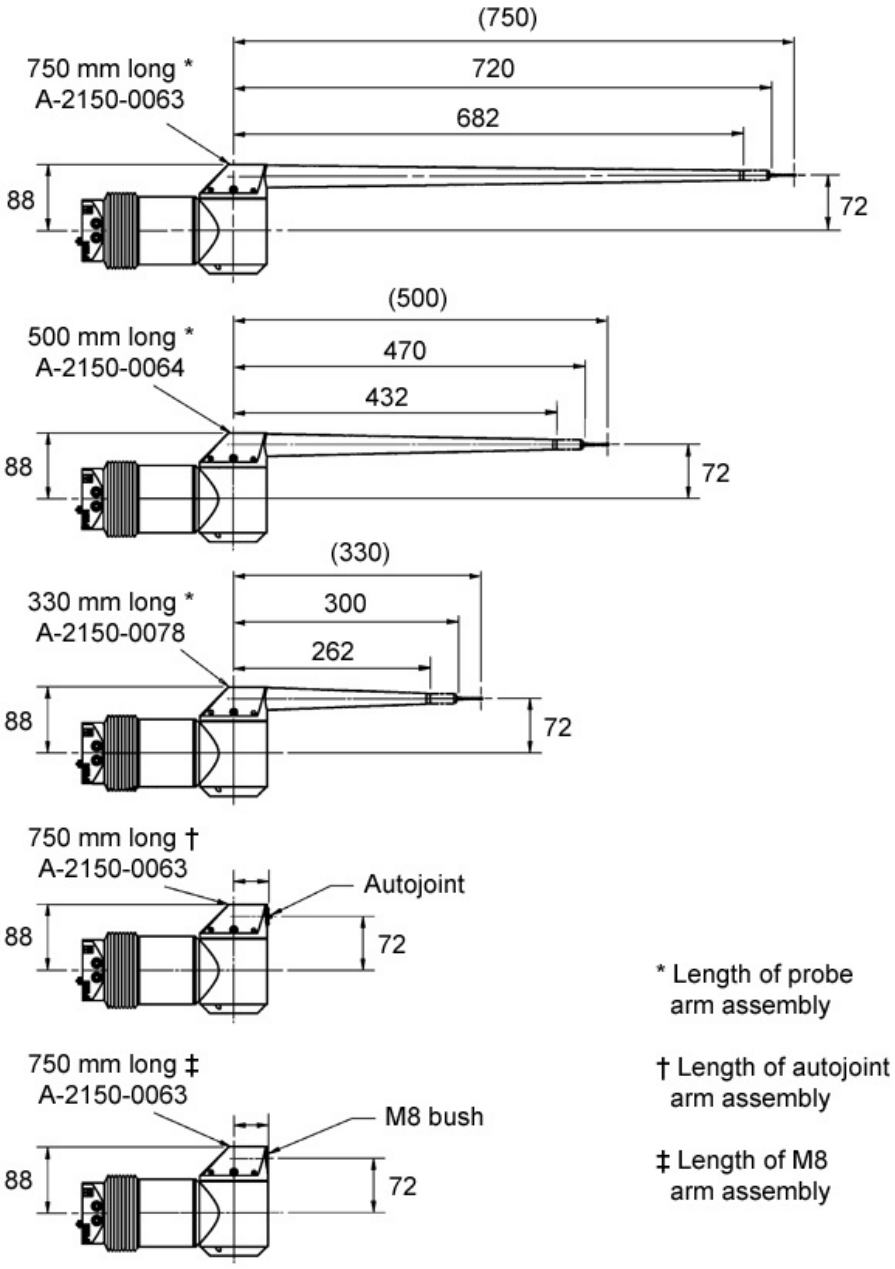
**NOTE:** It is advised that probe arms should be changed using the autochange rack. Manual probe arm change should only be used for the initial connection. The probe arm should be exchanged using the autochange rack before an application.

## Specifications

Four types of probe arms are available for the PHS1 system.

| Probe arm | Description |
|---|---|
| HE 750 | Probe arm with integral carbon fibre extension bar and M8 bush to give 750 mm total reach with Renishaw TP20 touch-trigger probe. |
| HE 500 | Probe arm with integral carbon fibre extension bar and M8 bush to give 500 mm total reach with Renishaw TP20 touch-trigger probe. |
| HE 330 | Probe arm with integral carbon fibre extension bar and M8 bush to give 330 mm total reach with Renishaw TP20 touch-trigger probe. |
| HA M | Probe arm with multiwire autojoint adaptor. Suitable for Renishaw multiwire probes amd extensions. |
| HA 8 | Probe arm with M8 bush. |

The following figure gives dimensions with different probe arm assemblies. All dimensions are in millimetres.




## Use of extensions on PHS1 system

The PHS1 has a range of extensions and adaptors.  For the best system accuracy, bear in mind the following guidelines:

- Always use the probe at the minimum radius - only use extensions when necessary and then the shortest needed to reach a feature
- If an extension is necessary, use the lightest probe and extension combination

**Preferred combinations:**

| Extension / adaptor | Radius to probe tip with TP2 or TP20 probe and 30 mm stylus |
|---|---|
| HA8 | 114 mm |
| HA8 + PEL1 | 164 mm |
| HA8 + PEL2 | 214 mm |
| HA8 + PEL3 | 314 mm |
| HE330 | 330 mm |
| HE500 | 500 mm |
| HE750 | 750 mm |

**NOTE:** When using extensions it is recommended that two C-spanners should be used to fit the probe.

# ACR2 autochange rack

The ACR2 autochange rack is an arm-changing system for the PHS1 servo positioning head. It allows probe extensions or probe adaptors to be exchanged to suit the probing task required.

Arms are locked or unlocked from the head by motion of the machine itself. The head engages a rack port and the machine drives the port up to unlock an arm or down to lock it in position.

No power connections or signal connectors are necessary to the rack, making installation very simple.

The ACR2 is supplied as pairs of rack ports which are mounted onto a suitable fixture supplied by the OEM. The system is modular and any number of port pairs can be used anywhere on the CMM.

## System features

| | |
|---|---|
| **Modular construction** | Ports can be positioned in pairs anywhere on the machine. |
| **Simple concept** | The change cycle is operated by CMM motion. No power connections are needed and all sensing and overtravel protection is contained within the PHS1 servo positioning head itself; no motors, switches or sensors within the rack. |
| **Expandable concept** | Any number of racks can be fitted anywhere on the machine, for example a four port rack at one end and a two port rack at the other. |
| **Versatile probing** | ACR2 ports can accommodate touch-trigger, analogue contact or laser scanning probes, with or without extension bars. |
| **Safe operation** | Sensors on the PHS1 servo positioning head detect collisions and check whether arms are correctly and safely locked in position after a change cycle. The PHS1 also incorporates an overtravel mechanism to protect against collisions. |
| **Sealed arm locations** | Covers with effective seals protect electrical contacts and kinematic locations when not in use. |

## System description

The ACR2 rack consists of pairs of ports that store arms. The arms are either head adaptors (HA) or head extensions (HE).

The ports allow arms stored in them to be automatically locked and unlocked onto a PHS1 servo positioning head.

To change probe arms automatically, the CMM must be programmed to complete a series of movements using positions calculated during the port datum routine. These movements cause a mechanism inside the port to rotate a screwdriver which engages a slot on the arm. The slot activates a cam which locks the arm in place when rotated.

Manual fitment of probe arms can be achieved using the S10 autojoint key supplied.

Arms are located in the rack port on two steel pins which pass through holes in the arm. A spring-loaded lid secures the arm in position and seals the spring-loaded electrical contacts and kinematic locations against contamination.

Signals are provided by the servo positioning head to indicate when an arm is present and whether the arm is locked correctly and safely. This ensures that arms are always positively locked on the head.

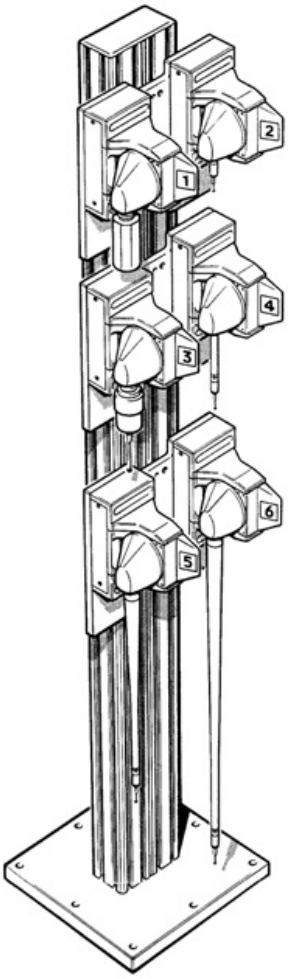
Crash protection is provided by the head overtravel unit. Any machine move errors or mis-programmed moves which cause an unexpected collision will cause the head overtravel to operate, sending a signal to stop the machine.

**NOTE:** The maximum operating speed of the ACR2 autochange rack should not exceed 100 mm/s.

The following figure shows an example of a six-port ACR2 installation.

**NOTE:** The mounting pillar is not supplied by Renishaw.

**Six-port ACR2 installation:**

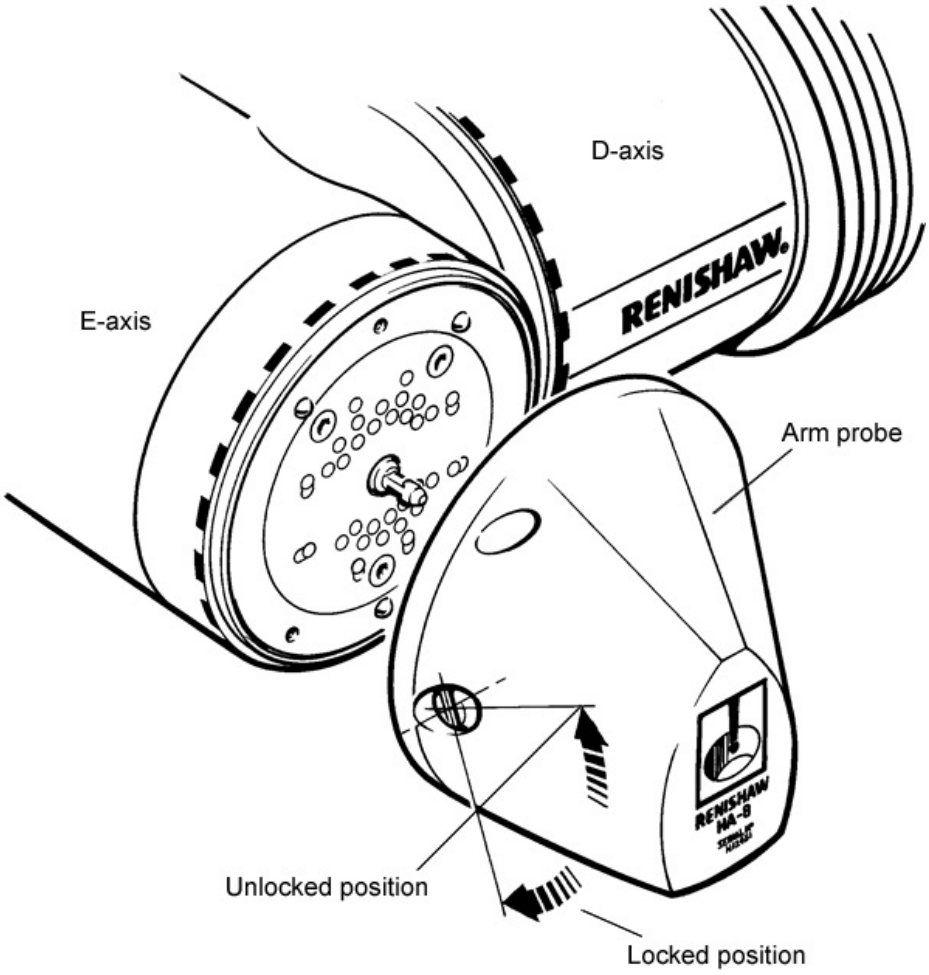


# Manual operation

## To change a probe arm manually

1. Using the autojoint key, ensure that the cam slot which operates the locking mechanism is in the unlocked '1 o'clock' position (see figure below).

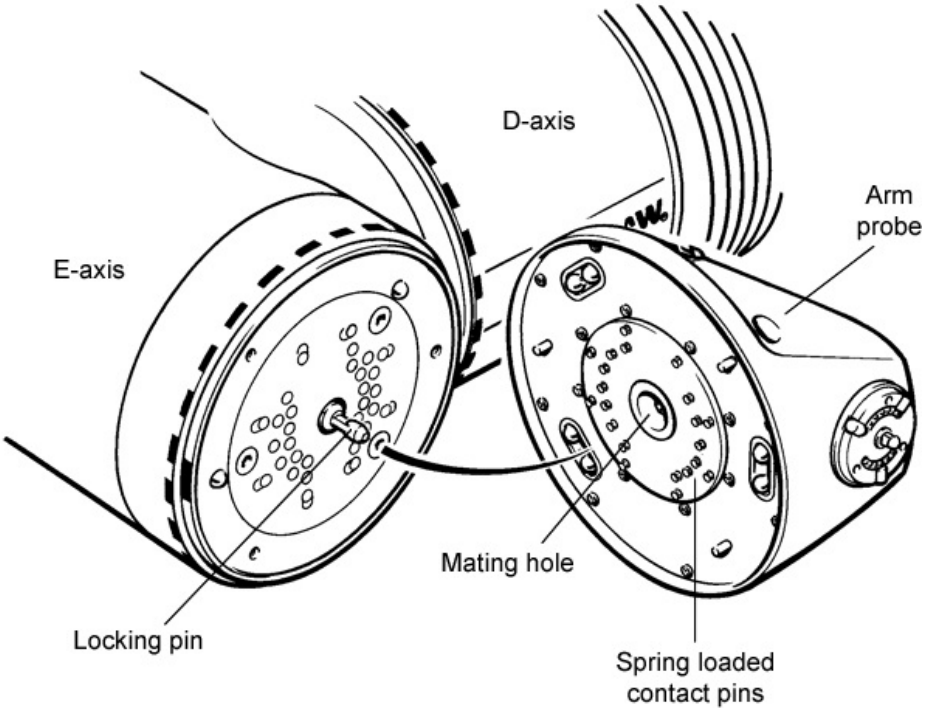
**Cam positions:**




2. Place the probe arm in position, ensuring that the central pin on the head is aligned with the mating hole on the probe arm.

3. The alignment pin in the probe arm will engage and align the kinematic locations (see figure below).

**Probe arm locking mechanism:**




4. Once aligned, turn the key to its locked ‘5 o'clock' position (see 'Cam positions' above).

The arm will not lock in position if the kinematics are not correctly engaged or the arm is in the wrong orientation.

Refer to the ACR2 installation guide (Renishaw part number H-1000-4045) for information on automatic probe exchange.

**NOTE:** For best repeatability, it is recommended that the probe should be unloaded and loaded in the autochange rack before use.

# Automatic operation

This section gives a suggested method for datuming an ACR2 autochange rack port and the recommended CMM movements for change cycles using that datum position.

## Port datum procedure

This method allows datuming of each ACR2 port by taking probing points on one of the location pins.

1. Qualify the PHS1 and probe combination (see following figure).

> **NOTE:** The probe tip must be qualified before the port can be datumed. Refer to the PHS1 calibration guide (Renishaw part number H-1000-4048) for recommended probe calibration procedure.

A typical probe assembly suitable for port datuming would be:

- HA-8 probe arm
- TP20 probe
- PS17R 20 mm stylus

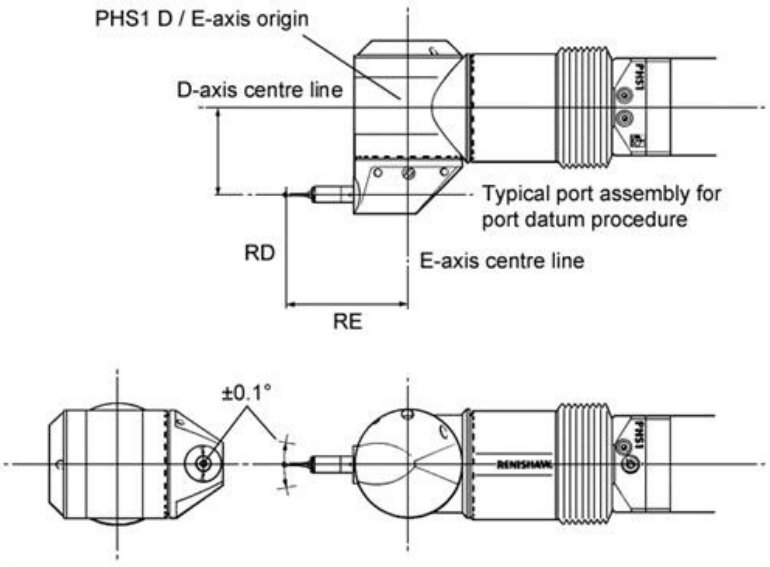
Nominal offset values for this probe assembly are:

- RD 72 mm
- RE 104 mm

The values RD and RE should be established to within ±0.1 mm by the probe qualification procedure.

> **NOTE:** The angular orientation of the D and E axes required for port datuming (D 0°, E 0°). The probe tip should be aligned to the axis origins to within 0.1°.

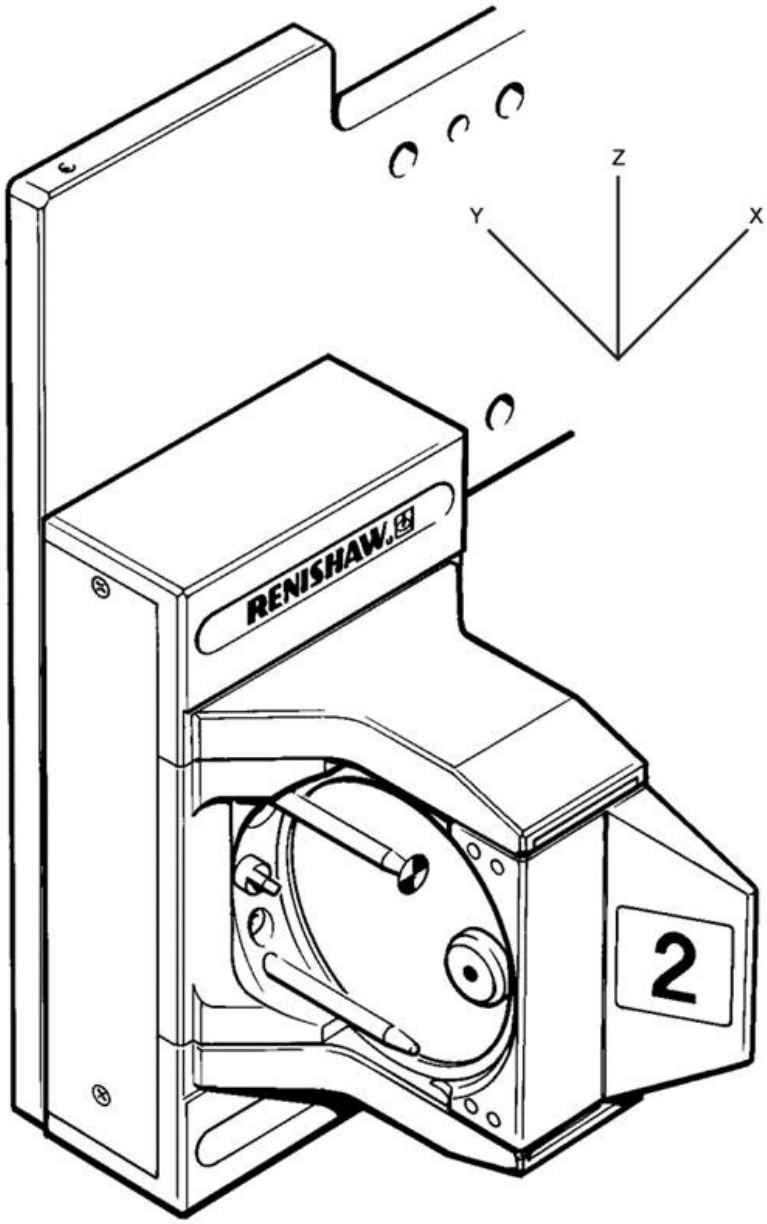
**Probe calibration:**



**NOTE:** Angular orientation of D and E axes required for port datum procedure (D and E 0°).

2. Position the ACR2 port in the lower latched position (see figure below).

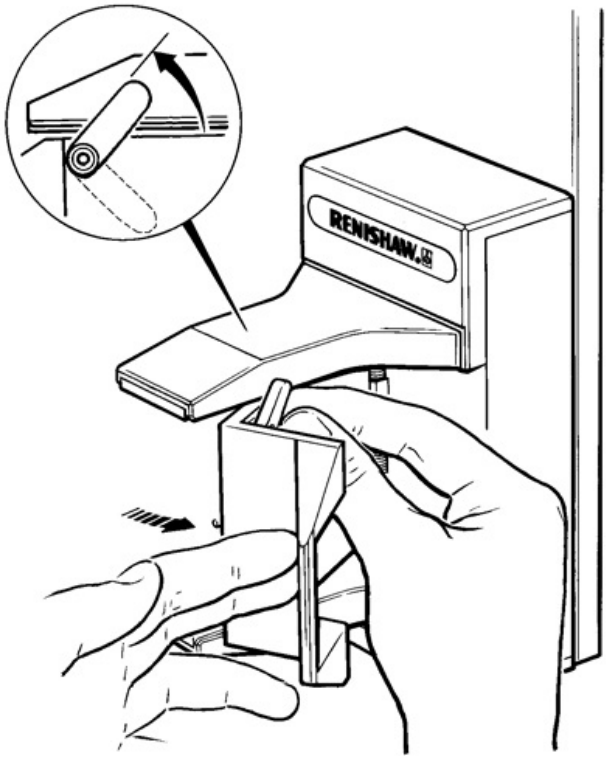
**Port in lower latched position:**




**NOTE:** To move between upper and lower positions manually, the two port pins must be pushed to the left to disengage the motion locks.

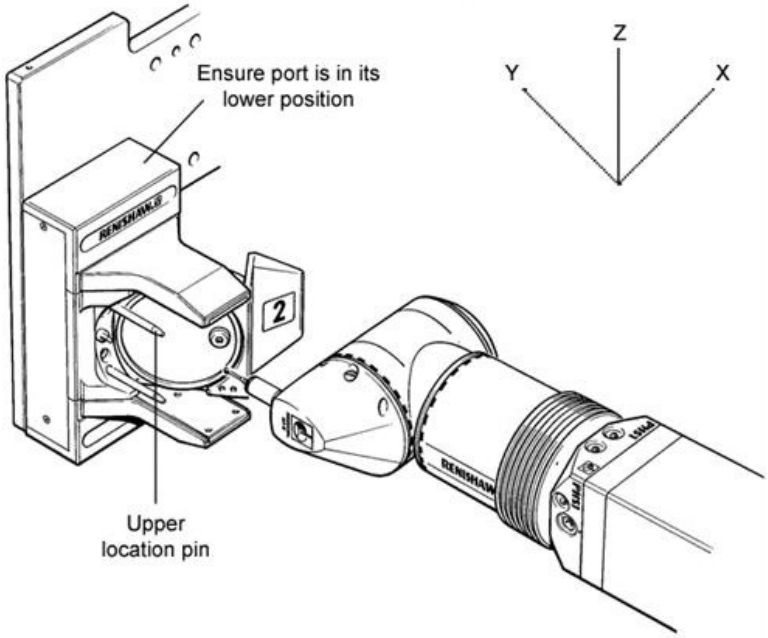
3. Lift the lid retaining clip to hold the latch in an open position (see figure below).

**Lift the lid retaining clip:**




4. Take four points around the full diameter of the upper location pin in the ZX plane (assuming the rack is oriented to the CMM axes as shown).

**ACR port datuming procedure:**



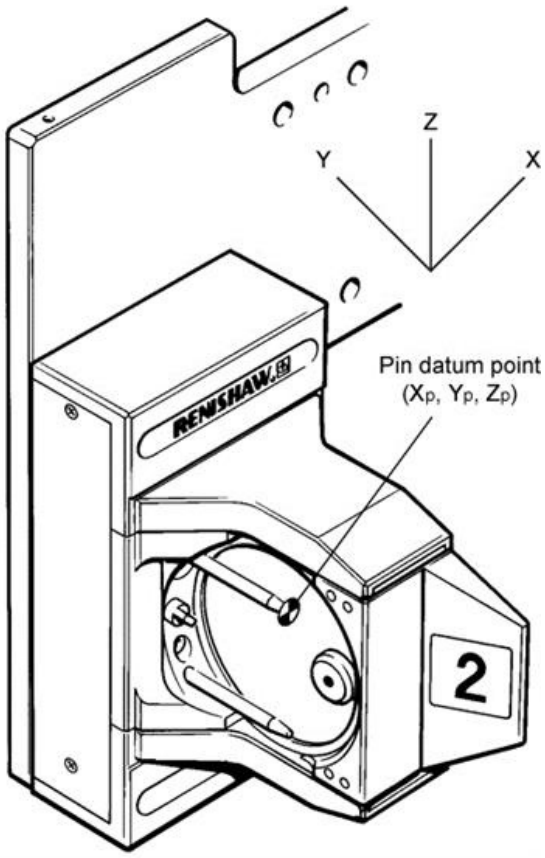
**NOTE:** Only one port is shown for clarity.

5. Use the four points to create a circle.

6. Use the centre point of the circle as the coordinates for the pin datum in the X and Z axes, XP and ZP.

7. Take one point on the end of the upper location pin in the Y axis and use it as the coordinate for the pin datum in the Y axis, YP.

**Pin datum position:**




8. Offset the position XP, YP, ZP to the PHS1 D/E axis origin as shown below. Use this point XD, YD, ZD as the pin datum point.

XD = XP - RD

YD = YP + RE

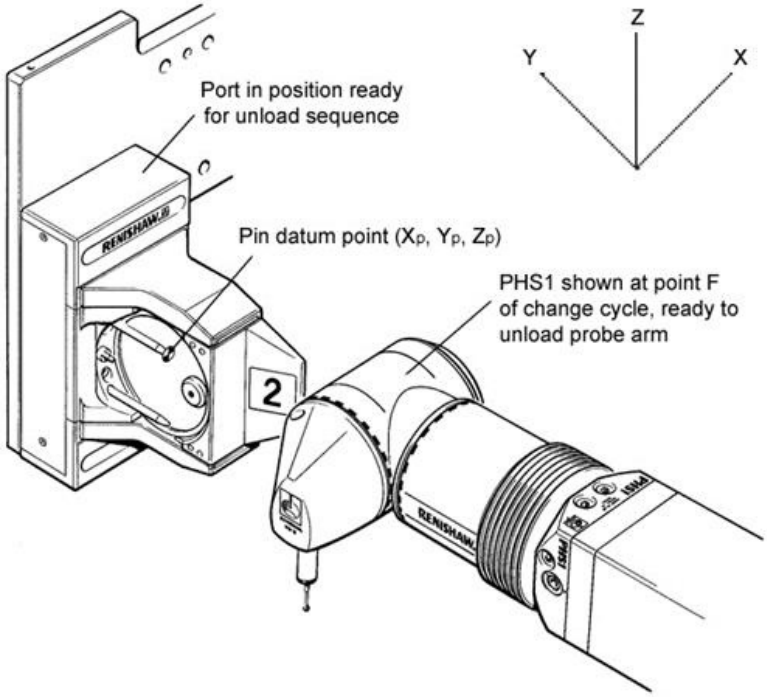
ZD = ZP

# Change cycles

To change probe arms automatically using the ACR2, the CMM must be programmed to complete a series of movements using the positions given in this section. When manually loading the arm into the autochange rack, care must be taken to ensure that the port is locked in the uppermost position.

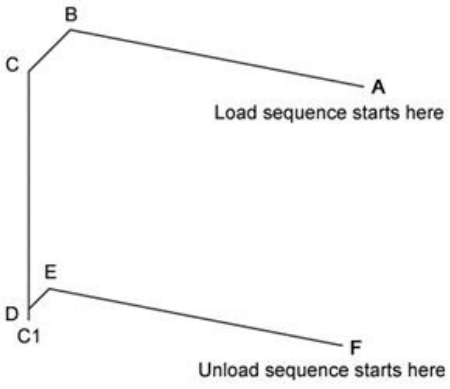
The coordinates of the positions given in this section are relative to the coordinate system defined on the pin datum point XD,YD,ZD calculated in the previous section.

**Change cycle:**

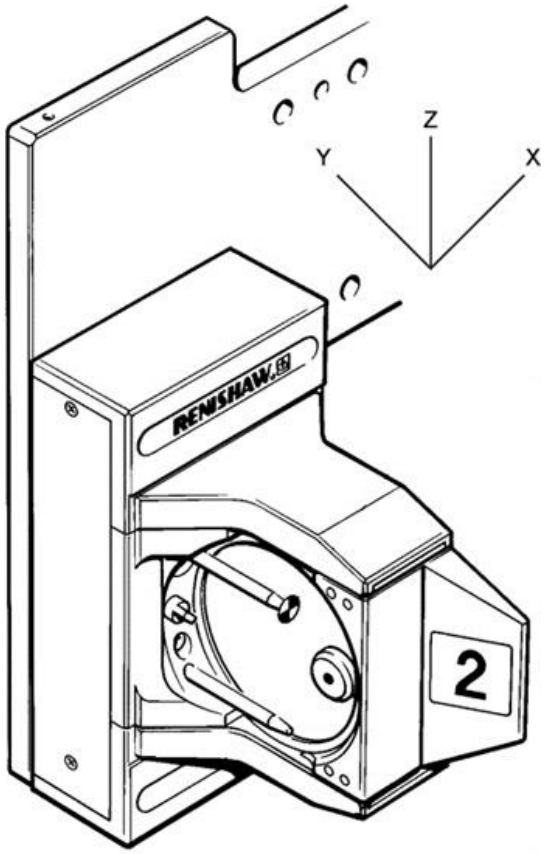



**NOTE:** D and E axes in correct orientation for change cycle (D0, E-90)

**Load sequence:**

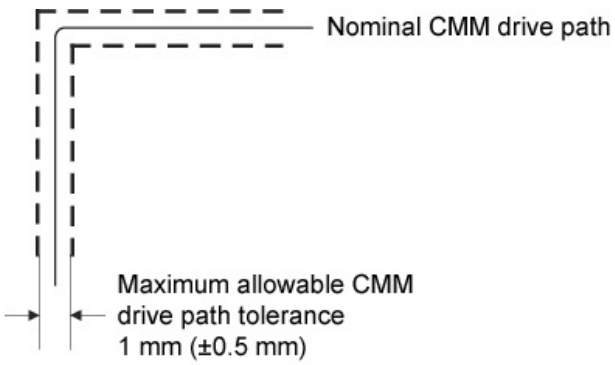


**Axis orientation:**




The following figure shows the maximum tolerance acceptable on the CMM drive path during the automatic change cycle.

**Nominal CMM drive path:**




The table below gives coordinates for the points in the automatic change cycle relative to the pin datum point XD,YD,ZD.

**PHS1 axis origin position relative to pin datum point XD,YD,ZD:**

| Point | X | Y | Z |
|---|---|---|---|
| A | +74 | -135.5 | +68.5 |
| B | +74 | +14.5 | +68.5 |
| C | +50 | +14.5 | +68.5 |
| C1 | +50 | +14.5 | -35.5 |
| D | +50 | +14.5 | -31.5 |
| E | +53.5 | +14.5 | -31.5 |
| F | +53.5 | -135.5 | -31.5 |

The following table gives the incremental values for the moves between points in the automatic change cycle:

**Moves in automatic change cycle:**

| Move | Axis | Incremental value | Function |
|---|---|---|---|
| A to B | Y | +150 | PHS1 moves in (or out of) port without probe arm loaded |
| B to C | X | -24 | PHS1 latches (or unlatches) port with probe arm unlocked |
| C to C1 | Z | -104 | Arm locking move (load cycle only) |
| D to C | Z | 100 | Arm unlocking move (unload cycle only) |
| C1 to D | Z | +4 | Locking mechanism backoff (load cycle only) |
| D to E | X | +3.5 | PHS1 latches (or unlatches) port with probe arm locked |
| E to F | Y | -150 | PHS1 moves in (or out of) port with probe arm locked |

# Unloading a probe arm

- Recall the pin datum XD, YD, ZD set in step 8 of the port datum procedure in the 'Port datum procedure' section
- Ensure the PHS1 has a probe arm fitted
- Ensure the PHS1 is oriented into the correct position to enter the port (D 0°, E -90°)

**Position relative to pin datum XD, YD, ZD:**

| X axis | Y axis | Z axis | Point | Description |
|---|---|---|---|---|
| +53.5 | -135.5 | -31.5 | F | Stand off position.<br>Head is in front of port and has probe arm fitted. Head is orientated to D0°, E-90°. |
| | -114 | | | Transit stage.<br>PHS1 contacts the ACR2 port lid. This may cause a probe trigger so the probing system should be disabled before reaching this point. |
| | -20 | | | Transit stage.<br>Probe arm engages port location pins. Renishaw recommend that servo control of the head axes should be switched off at this point.<br>**NOTE:** Remove only 24 V servo power from the head. Do not remove logic power as this will cause head position loss. |
| +53.5 | +14.5 | -31.5 | E | PHS1 fully located in ACR2 port. |
| +50 | +14.5 | -35.5 | D | ACR2 ready to activate unlock mechanism. |
| +50 | +14.5 | +68.5 | C | Probe arm unlocked from PHS1 head. |
| +74 | +14.5 | +68.5 | B | Move PHS1 head clear of probe arm. |
| | -20 | | | Transit stage.<br>Servo control of the head should be re-enabled.<br>**NOTE:** The position of the head may have changed under gravity and that the head should be help in its current position before returning to the previous orientation. |
| | -114 | | | Transit stage.<br>PHS1 clears the ACR2 port lid. |
| +74 | -135.5 | +68.5 | A | Stand off position.<br>Head is in front of port with no probe arm fitted. |

# Loading a probe arm

- Recall the pin datum XD, YD, ZD set in step 8 of the port datum procedure in the 'Port datum procedure' section
- Ensure the PHS1 does not have a probe arm fitted
- Ensure the PHS1 is oriented into the correct position to enter the port (D 0°, E -90°)

**Position relative to pin datum XD, YD, ZD:**

| X axis | Y axis | Z axis | Point | Description |
|---|---|---|---|---|
| +74 | -135.5 | +68.5 | A | Stand off position.<br>Head is in front of port with no probe arm fitted. Head is oriented to D 0°, E-90°. |
| | -114 | | | Transit stage.<br>PHS1 contacts the ACR2 port lid. |
| | -20 | | | Transit stage.<br>Renishaw recommends that servo control of the head axes should be switched off at this point.<br>**NOTE:** Remove only 24 V servo power from the head. Do not remove logic power as this will cause head position loss. |
| +74 | +14.5 | +68.5 | B | PHS1 located in ACR2 port clear of probe arm. |
| +50 | +14.5 | +68.5 | C | Locate PHS1 head onto probe arm ready for lock sequence. |
| +50 | +14.5 | -35.5 | C1 | Lock probe arm to PHS1 head. |
| +50 | +14.5 | -31.5 | D | Move probe arm lock mechanism to normal position. |
| +53.5 | +14.5 | -31.5 | E | Move ACR2 port into fully locked position. |
| | -20 | | | Transit stage.<br>Probe arm begins to clear port location pins. Servo control of the head should be re-enabled. |
| | -114 | | | Transit stage.<br>PHS1 clears the ACR2 port lid. Probing system can now be enabled. Note that the position of the head may have changed under gravity and that the head should be held in its current position before returning to the previous orientation. |
| -53.5 | -135.5 | -31.5 | F | Stand off position.<br>Head is in front of port with new probe arm fitted. |

# Troubleshooting

**NOTE:** Due to the extent of the CMM manufacturer's system responsibility, the following is only a basic fault diagnosis. For further diagnosis please contact the OEM.

**Fault diagnosis:**

| Observation | Checklist |
|---|---|
| Red LEDs not lit on head. | Check cable connections.<br>Check fitting of PC card.<br>Check secure fitting of head to male kinematic. |
| Green LED will not illuminate. | Check 24 V power supply. |
| No movement of head. | Check fitting and lock of arm probe. |
| Possible overtravel signal when probe changing. | Check alignment of rack ports, |
| Head powers up briefly then dies. | Check resistance of head power supply cables. Refer to PHS1 installation guide (Renishaw part number H-1000-4044). |

# Appendix 1

## CZ - UPOZORNĚNÍ

**POZNÁMKA:** Servo polohovací hlava PHS1 obsahuje předpjaté pružinové prvky, které mohou být nebezpečné, pokud bude učiněn pokus hlavu rozmontovat.

Mezi pohyblivými součástmi a mezi pohyblivými a statickými součástmi hrozí nebezpečí přiskřípnutí. Při přesunování nebo ručním nastavování sondy nedržte snímací hlavici.

Dejte pozor na nečekaný pohyb stroje. Uživatel by měl setrvávat mimo pracovní rozsah stroje, zejména mimo místa pohybu snímací hlavice, prodloužení a sondy.

Při jakékoli práci s obráběcími stroji nebo souřadnicovými měřicími stroji (CMM) je doporučeno používat ochranu očí.

Jisté instalace obsahují externí vzduchové potrubí. Je třeba věnovat pozornost bezpečnému uchycení potrubí k vzduchovým fitinkům.

Pokyny týkající se bezpečného čištění produktů společnosti Renishaw naleznete v části věnované informacím o údržbě v příslušné dokumentaci k produktu.

Před započetím jakékoliv údržby zařízení odpojte napájení.

Přečtěte si provozní pokyny dodavatele příslušného stroje.

**POZNÁMKA:** Systém PHS1 neobsahuje elektřinou napájené jednotky.

Povinností dodavatele stroje je informovat uživatele o nebezpečích spojených s provozem i o nebezpečích zmiňovaných v dokumentaci k produktům společnosti Renishaw a zajistit dostatečné ochranné a bezpečnostní systémy.

Za určitých okolností může signál sondy nesprávně označovat klidový stav sondy. Nevyužívejte signály sondy jako hlavní impuls pro zastavování stroje.

Předpokládaným způsobem nouzového zastavení produktů společnosti Renishaw je odpojení napájení.

## DA - SIKKEREDHED

**SIKKERHEDSBEMÆRKNING:** PHS1-servopositioneringshovedet indeholder forbelastede fjederelementer, som kan være farlige, hvis man forsøget at skille hovedet ad.

Der er risiko for at blive klemt mellem bevægelige dele og mellem bevægelige og statiske dele. Hold ikke i probehovedet under bevægelse eller under manuelle probeskift.

Pas på uventede bevægelser. Brugeren bør holde sig uden for hele probehovedets/forlængerens/probens arbejdsområde.

I alle tilfælde, hvor der anvendes værktøjs- og koordinatmålemaskiner, anbefales det at bære øjenbeskyttelse.

Visse installationer omfatter udvendige rør. Man skal være omhyggelig med at sikre, at rørene fastgøres forsvarligt til alle luftfittings med modhager.

Se afsnittet VEDLIGEHOLDELSE (MAINTENANCE) i produktdokumentationen for at få instruktioner til sikker rengøring af Renishaw-produkter.

Afbryd strømforsyningen, før der foretages vedligeholdelse.

Se maskinleverandørens brugervejledning.

> **BEMÆRKNING:** PHS1-systemet indeholder ingen netstrømsdrevne enheder.

Det er maskinleverandørens ansvar at sikre, at brugeren er bekendt med eventuelle risici i forbindelse med driften, herunder de risici, som er nævnt i Renishaws produktdokumentation, og at sikre, at der er tilstrækkelig afskærmning af sikkerhedsblokeringer.

Under visse omstændigheder kan sondesignalet ved en fejl angive, at sonden står stille Stol ikke på, at sondesignaler stopper maskinens bevægelse.

Den forventede metode til nødstop af Renishaw-produkter er afbrydelse strømforsyningen.

## DE - SICHERHEITSANWEISUNGEN

> **SICHERHEITSHINWEIS:** Der Servopositionierkopf PHS1 enthält vorgespannte Federelemente, die gefährlich sein können, wenn versucht wird, den Kopf auseinanderzunehmen.

Zwischen beweglichen und zwischen beweglichen und statischen Teilen besteht Einklemmgefahr. Den Messtasterkopf nicht anfassen, wenn er sich bewegt oder wenn ein manueller Messtasterwechsel durchgeführt wird.

Auf unerwartete Bewegungen achten Der Anwender sollte sich möglichst nur außerhalb des Messtaster-Arbeitsbereiches aufhalten.

Bei Arbeiten an Werkzeugmaschinen oder Koordinatenmessgeräten wird Augenschutz empfohlen.

Bestimmte Installationen haben externe Luftleitungen. Es sollte Vorsicht walten gelassen werden, um sicherzustellen, daß die Leitungen sicher an allen Druckluftfittings mit Widerhaken befestigt sind.

Anleitungen über die sichere Reinigung von Renishaw-Produkten finden Sie im Kapitel WARTUNG in der Produktdokumentation.

Vor Wartungsarbeiten muss die Stromversorgung getrennt werden.

Beziehen Sie sich auf die Wartungsanleitungen des Lieferanten.

> **HINWEIS:** Das PHS1-System hat keine netzbetriebenen Einheiten.

Es obliegt dem Maschinenlieferanten, den Anwender über alle Gefahren, die sich aus dem Betrieb der Ausrüstung, einschließlich der, die in der Renishaw Produktdokumentation erwähnt sind, zu unterrichten und zu versichern, dass ausreichende Sicherheitsvorrichtungen und Verriegelungen eingebaut sind.

Unter gewissen Umständen könnte das Messtaster Fehlsignale melden (Ausgelenkt). Verlassen sie sich nicht auf das Messtastersignal um die Maschine zu stoppen.

Renishaw-Produkte sollen im Notfall durch Trennen der Stromversorgung gestoppt werden.

## EL - ΑΣΦΑΛΕΙΑ

> **ΣΗΜΕΙΩΣΗ ΑΣΦΑΛΕΙΑΣ:** Η κεφαλή PHS1 με σύστημα υποβοήθησης περιέχει προ-τανυσμένα ελατήρια που είναι δυνατό να αποβούν επικίνδυνα αν επιχειρηθεί η αποσυναρμολόγηση της κεφαλής.

Υπάρχει κίνδυνος πιασίματος μεταξύ των κινούμενων μερών όπως και μεταξύ των κινούμενων και στατικών μερών Δεν πρέπει να κρατάτε την κεφαλή του ανιχνευτή κατά την κίνηση ούτε κατά τη διάρκεια χειροκίνητων αλλαγών του ανιχνευτή.

Προσοχή - κίνδυνος απροσδόκητων κινήσεων. Ο χρήστης πρέπει να παραμένει εκτός του χώρου που επηρεάζεται από όλους τους συνδυασμούς λειτουργίας της κεφαλής του αισθητήρα, της προέκτασης και του αισθητήρα.

Σε όλες τις εφαρμογές που συνεπάγονται τη χρήση εργαλειομηχανών και μηχανών προσδιορισμού συντεταγμένων, συνιστάται να χρησιμοποιείται προστασία ματιών.

Σε ορισμένες εγκαταστάσεις, υπάρχουν εξωτερικοί σωλήνες αέρα. Πρέπει να δοθεί η απαραίτητη προσοχή για να διασφαλιστεί ότι οι σωλήνες είναι γερά στερεωμένοι σε όλα τα ακιδωτά εξαρτήματα σύνδεσης αέρα.

Για οδηγίες σχετικά με τον ασφαλή καθαρισμό των προϊόντων Renishaw, ανατρέξτε στην ενότητα ΣΥΝΤΗΡΗΣΗ του έντυπου συνοδευτικού υλικού του αντίστοιχου προϊόντος.

Αποσυνδέστε το μηχάνημα από το ηλεκτρικό ρεύμα προτού επιχειρήσετε τυχόν εργασίες συντήρησης.

Ανατρέξτε στις οδηγίες λειτουργίας του προμηθευτή του μηχανήματος.

> **ΣΗΜΕΙΩΣΗ:** Στο σύστημα PHS1 δεν περιλαμβάνονται μονάδες που τροφοδοτούνται με ρεύμα δικτύου.

Αποτελεί ευθύνη του προμηθευτή του μηχανήματος να εξασφαλίσει ότι ο χρήστης είναι ενήμερος τυχόν κινδύνων που συνεπάγεται η λειτουργία, συμπεριλαμβανομένων όσων αναφέρονται στο έντυπο συνοδευτικό υλικό των προϊόντων της Renishaw. Είναι επίσης ευθύνη του να εξασφαλίσει ότι υπάρχουν τα απαιτούμενα προστατευτικά καλύμματα και μανδαλώσεις ασφάλειας.

Σε ορισμένες περιπτώσεις το σήμα ανιχνευτή μπορεί να δείξει λανθασμένα ότι ο ανιχνευτής έχει τοποθετηθεί. Μη βασίζεστε στα σήματα ανιχνευτή για θέση της κίνησης του μηχανήματος εκτός λειτουργίας.

Η αναμενόμενη μέθοδος διακοπής έκτακτης ανάγκης για τα προϊόντα Renishaw είναι η αποσύνδεσή τους από το ηλεκτρικό ρεύμα.

## ES - SEGURIDAD

> **OBSERVACIÓN DE SEGURIDAD:** El cabezal de servo colocación PHS1 contiene elementos de resorte pre-cargados que pueden ser peligrosos si se hace algún intento de desmontar el cabezal.

Existe el peligro de atraparse los dedos entre las distintas partes móviles y entre partes móviles e inmoviles. No sujetar la cabeza de la sonda mientras se mueve, ni durante los cambios manuales de la sonda.

Tener cuidado con los movimientos inesperados. El usuario debe quedarse fuera del grupo operativo completo compuesto por la cabeza de sonda/extensión/sonda o cualquier combinación de las mismas.

Se recomienda usar protección para los ojos en todas las aplicaciones que implican el uso de máquinas herramientas y máquinas de medición de coordenadas.

Existen tuberías exteriores de aire en ciertas instalaciones. Debe tenerse cuidado en asegurarse de que las tuberías están sujetas de forma segura a todas las piezas de aire con salientes.

Para instrucciones sobre seguridad a la hora de limpiar los productos Renishaw, remitirse a la sección titulada MANTENIMIENTO (MAINTENANCE) en la documentación sobre el producto.

Quitar la corriente antes de emprender cualquier operación de mantenimiento.

Remitirse a las instrucciones de manejo del proveedor de la máquina.

**OBSERVACIÓN:** No hay unidades con alimentación de la red en el sistema PHS1.

Es responsabilidad del proveedor de la máquina asegurar que el usuario sea informado sobre los peligros relacionados con el funcionamiento, incluidos los peligros mencionados en la documentación de los productos Renishaw, y asegurar que se suministran los dispositivos de protección y seguridad adecuados.

Bajo determinadas circunstancias la señal de la sonda puede indicar erróneamente que la sonda está asentada. No fiarse de las señales de la sonda para parar el movimiento de la máquina.

El método previsto para efectuar una parada de emergencia de los productos Renishaw es el de quitar la corriente.

## ET - HOIATUSED

**MÄRKUS:** PHS1-servopaigutuspea sisaldab eelpingestatud vedrusid, mis võivad pea lahtivõtmisel olla ohtlikud.

Masina liikuvad osad võivad põhjustada muljumisohtu. Ärge hoidke masina liikumise ajal või sondi vahetamise ajal kinni sondipeast.

Arvestage masina ootamatu liikumisega. Kasutaja peab jääma väljapoole sondipea ja sondipikendi tööulatust.

Masina ja materjalidega töötamisel on alati soovitav kanda silmade kaitset.

Teatavatel paigaldistel on välised õhutorud. Hoolitsege selle eest, et torud oleksid õhusüsteemi seadiste küljes kindlalt kinni.

Täpsemad juhised Renishaw toodete ohutuks puhastamiseks leiate vastava toote dokumentide hooldusjuhiste alaosast.

Enne hooldustoimingute teostamist ühendage seade alati vooluvõrgust lahti.

Täpsemad juhised leiate masina tarnija poolt antud kasutusjuhendist.

**MÄRKUS:** PHS1-süsteemis puuduvad võrgutoitega üksused.

Masina tarnija vastutuseks on tagada, et kasutajat teavitatakse masina tööga kaasnevatest ohtudest, kaasa arvatud need ohud, mida on mainitud Renishaw toote dokumentides, ning samuti tagada, et masinaga oleks kaasas korrektsed kaitsepiirded ja turvalukud.

Teatud tingimustel võib sondi signaal ekslikult näidata, nagu oleks sond paigale asetunud. Ärge lähtuge masina liikumise peatamisel sondi signaalidest.

Esmaseks masina hädaseiskamise meetodiks Renishaw toodete puhul on elektritoite katkestamine.

## FI - TURVALLISUUTTA

**TURVALLISUUSTTA KOSKEVA HUOMAUTUS:** PHS1-servo-asetuspää sisältää ennalta kuormitettuja jousielementtejä, jotka voivat osoittautua vaarallisiksi, jos päätä yritetään purkaa.

Liikkuvien osien sekä liikkuvien ja staattisten osien välillä on olemassa puristusvaara. Älä pidä kiinni mittapäästä koneen liikkeiden aikana tai manuaalisen mitta-anturinvaihdon aikana.

Varo odottamatonta liikettä. Käyttäjän tulee pysytellä mittapää/jatke/anturi yhdistelmän toiminta-alueen ulkopuolella.

Kaikkia työstökoneita ja koordinaattimittakoneita (CMM) käytettäessä suositamme silmäsuojuksia.

Tietyillä asennuksilla on ulkopuolisia ilmaputkia. On noudatettava varovaisuutta sen varmistamiseksi, että putket on kiinitetty kunnolla kaikkiin väkäilmavarustuksiin.

Renishaw-tuotteiden turvalliset puhdistusohjeet löytyvät tuoteselosteen HUOLTOA (MAINTENANCE) koskevasta osasta.

Kytke syöttöjännite pois ennen huoltotoimenpiteitä.

Katso koneen toimittajan käyttöohjeita.

> **HUOMAUTUS:** PHS1-järjestelmässä ei ole virtaverkkokytkenteisiä yksikköjä.

Koneen toimittajan vastuulla on että käyttäjä on saanut tiedon mahdollisista käyttöön liittyvistä vaaroista, mukaan lukien Renishaw'n tuoteselosteessa mainitut vaarat. Konetoimittajan tulee myös varmistaa, että suojukset ja turvalukitukset ovat riittävät.

Tietyissä olosuhteissa anturilta tuleva signaali saattaa virheellisesti osoittaa että mitta-anturi on lepotilassa (=ei-kosketuksessa). Älä pysäytä koneen liikettä mittapään signaalien perusteella.

Renishaw-tuotteiden hätäpysäytys tehdään tavallisesti kytkemällä virta pois päältä.

## FR - SECURITE

> **NOTE DE SECURITE:** La tête de servopositionnement PHS1 contient des éléments à ressort accumulateur qui peuvent être dangereux si l'on essaie de la démonter.

L'effet de pincement dû au mouvement des pièces mobiles entre elles ou avec des pièces fixes présente des dangers. Ne pas tenir la tête lorsqu'elle se déplace ou que le palpeur est changé à la main.

Attention aux mouvements brusques. L'utilisateur doit toujours rester en dehors de la zone de sécurité des installations multiples tête/rallonge/palpeur.

Le port de lunettes de protection est recommandé pour toute application sur machine-outil et MMT.

Des tuyaux d'air externes sont présents sur certaines installations. Veiller à ce que les tuyaux soient bien fixés à tous les raccords cannelés.

Les conseils de nettoyage en toute sécurité des produits Renishaw figurent dans la section MAINTENANCE de votre documentation.

Mettre la machine hors tension avant d'entreprendre toute opération de maintenance.

Consulter le mode d'emploi du fournisseur de la machine.

> **NOTE:** Le système PHS1 ne possède aucun dispositif alimenté par le secteur.

Il incombe au fournisseur de la machine d'assurer que l'utilisateur prenne connaissance des dangers d'exploitation, y compris ceux décrits dans la documentation du produit Renishaw, et d'assurer que des protections et verrouillages de sûreté adéquats soient prévus.

Dans certains cas, il est possible que le signal issu du capteur indique à tort que celui-ci est hors matière. Ne pas se fier aux signaux du capteur qui ne garantissent pas toujours l'arrêt de la machine.

La procédure habituelle d'arrêt d'urgence des produits Renishaw est la mise hors tension.

## HU - FIGYELMEZTETÉS

**MEGJEGYZÉS:** A PHS1 szervóhelyzet-állító fej előterhelt rugóelemeket tartalmaz, amelyek veszélyt jelenthetnek, ha megkísérlik szétszerelni a fejet.

Fennáll a veszélye, hogy a keze beszorulhat mozgó alkatrészek valamint mozgó és álló alkatrészek közé. Mozgás közben, vagy a mérőtapintó kézi cserélésekor ne fogja meg a tapintófejet.

Vigyázat! A gép váratlanul elindulhat! Tartózkodjon a tapintófej/hosszabbító/mérőtapintó együttes mozgáskörzetén kívül!

Szerszámgépek és KMG-ek használata során ajánlatos szemvédőt viselni.

Egyes berendezések külsején levegőcsövek vannak. Gondoskodni kell róla, hogy a csövek biztonságosan rá legyenek erősítve a levegőszerelvényekre.

A Renishaw termékek bizonságos tisztításával kapcsolatos útmutatások az illető termék dokumentációjában szereplő karbantartási tudnivalóknál olvashatók.

Mielőtt bármilyen karbantartási művelet végezne, kapcsolja ki a berendezést.

Olvassa el a gép szállítója által adott használati utasítás ide vonatkozó részét.

**MEGJEGYZÉS:** A PHS1 rendszerben nicsenek hálózatról működő egységek.

A gép szállítója felelős azért, hogy felhívja a felhasználó figyelmét az üzemeltetéssel kapcsolatos veszélyforrásokra, ideértve az illető Renishaw termék dokumentációjában ismertetetteket is, és hogy gondoskodjon a megfelelő védőburkolatok és biztonsági reteszelések meglétéről.

Bizonyos körülmények között a mérőtapintó azt jelezheti, hogy a mérőtapintó felfeküdt a mérendő objektumon, noha ez nincs így. Ezért a gép mozgásának leállításakor nem szabad a mérőtapintó jeleire hagyatkozni.

A Renishaw termékek vészleállításának elvárt módszere a berendezés kikapcsolása.

## IT - SICUREZZA

**AVVERTENZE DI SICUREZZA:** Nella testina a posizionamento servo-assistito del sistema PHS1 sono montati componenti precaricati a molla che in caso di un tentativo di smontaggio non autorizzato della testina potrebbero scattare ed essere molto pericolosi.

Esiste pericolo di danno da schiacciamento tra le parti in moto o tra le parti in moto e quelle ferme. Non afferrare alcun componente del sistema quando è in moto o durante il cambio sonda manuale.

Fare attenzione ai movimenti improvvisi e tenersi fuori dal campo operativo delle combinazioni testa/prolunga e barra/sonda. Si raccomanda all'utente di tenersi al di fuori dal campo di lavoro della testa, includendo le varie possibili combinazioni di sonde e prolunghe.

Si raccomanda di indossare occhiali di protezione in qualsiasi applicazione che comporti l'uso di macchine utensili e macchine di misura a coordinate.

Alcuni modelli richiedono l'alimentazione d'aria compressa e sono dotati di flessibili montati esternamente. É essenziale controllare che il collegamento ai raccordi sia effettuato correttamente.

Per le istruzioni relative alla pulizia dei prodotti Renishaw, fare riferimento alla sezione MANUTENZIONE (MAINTENANCE) della documentazione dello specifico prodotto. (questa sezione deve essere stampata solo nella prima sezione del manuale/guida dell'utente).

Prima di effettuare qualsiasi intervento di manutenzione, isolare dall'alimentazione di rete.

Consultare le istruzioni d'uso fornite dal fabbricante della macchina.

> **NOTA:** Il sistema PHS1 non contiene componenti azionati dall'alimentazione di rete.

Il fornitore della macchina ha la responsabilità di avvertire l'utente dei pericoli inerenti al funzionamento della stessa, compresi quelli riportati nelle istruzioni della Renishaw, e di mettere a disposizione i ripari di sicurezza e gli interruttori di esclusione.

È possibile, in certe situazioni, che la sonda emetta erroneamente un segnale di sonda a riposo. Non fare affidamento sugli impulsi trasmessi dalla sonda per arrestare la macchina.

Il metodo corretto di eseguire un'arresto di emergenza per i prodotti Renishaw è l'interruzione dell'alimentazione elettrica.

## LT - ĮSPĖJIMAI

> **PASTABA:** PHS1 pagalbinėje nustatymo galvutėje yra įtempti spyruokliniai elementai, kurie gali būti pavojingi, jei bandysite išmontuoti galvutę.

Tarp judančių detalių bei tarp judančių ir statiškų detalių pakliuvę daiktai gali būti suspausti. Nelaikykite zondo galvutės veikiant įrenginiui ar keisdami zondą rankiniu būdu.

Saugokitės netikėtų judesių. Naudotojui nerekomenduojama atidaryti veikiančios zondo galvutės / ilgintuvo / zondų junginio gaubto.

Dirbant visus darbus, naudojant įrenginio įrankius ar valant ir prižiūrint įrenginį, rekomenduojama užsidėti apsauginius akinius.

Atskiruose modeliuose yra išoriniai oro vamzdžiai. Pasirūpinkite, kad vamzdžiai būtų tinkamai pritvirtinti prie oro jungčių.

Nurodymų dėl saugaus Renishaw prietaisų valymo ieškokite atitinkamo prietaiso techninėje dokumentacijoje apie priežiūrą.

Prieš atlikdami techninę priežiūrą, išjunkite elektros srovės tiekimą.

Laikykitės įrenginio tiekėjo naudojimo nurodymų.

> **PASTABA:** PHS1 sistemoje nėra mazgų, maitinamų iš maitinimo tinklo.

Įrenginio tiekėjas atsako už tai, kad naudotojas būtų įspėtas apie pavojus, susijusius su įrenginio naudojimu, taip pat pavojus, minimus Renishaw prietaiso techninėje dokumentacijoje, ir kad būtų sumontuoti atitinkami apsauginiai įrenginiai bei blokatoriai.

Susiklosčius tam tikroms aplinkybėms, zondo signalas gali neteisingai informuoti, kad jo reikšmės nustatytos į pradinę būseną. Nepasikliaukite zondo signalais ir iš karto nestabdykite įrenginio.

Tinkamiausias būdas sustabdyti Renishaw prietaisą yra nutraukti elektros srovės tiekimą.

## LV - BRĪDINĀJUMS

> **PIEZĪME:** PHS1 servo pozicionēšanas galviņa ietver iepriekš nospriegotas atsperes elementus, kas varētu būt bīstami, ja mēģina izjaukt galviņu.

Starp kustīgajām daļām, kā arī kustīgajām un nekustīgajām daļām iespējams saspiešanas risks.Nepieskarieties ar rokām tausta uzgalim

kustības laikā vai mainot taustu.

Uzmanieties no negaidītas kustības.Lietotājam jāpaliek ārpus tausta/uzgaļa/kontaktmērgalviņas pilna darbības rādiusa.

Pie visiem darbiem, kuros tiek izmantotas darba iekārtas vai koordinātu mērīšanas ierīces, ieteicams aizsargāt acis.

Dažās iekārtās ir uzstādītas ārējas gaisa caurules. Jāpārliecinās, ka caurules ir droši piestiprinātas pie gaisa stiprinājumiem.

Instrukcijas drošai Renishaw izstrādājumu tīrīšanai ir iekļautas apkalpošanas informācijā atbilstošā izstrādājuma dokumentācijā.

Atvienojiet no strāvas pirms jebkuru apkalpošanas darbu veikšanas.

Skatiet iekārtas piegādātāja ekspluatācijas instrukcijas.

> **PIEZĪME:** PHS1 sistēmā nav elektroierīču.

Iekārtas piegādātājs atbild par to, lai lietotājs būtu iepazīstināts ar jebkuriem draudiem, kas saistīti ar tās darbību (ieskaitot tos, kas minēti Renishaw izstrādājuma dokumentācijā), un lai būtu nodrošinātas atbilstošas aizsargierīces un aizsargbloķētāji.

Noteiktos apstākļos tausta signāls var nepareizi norādīt tausta stāvokli.Nepaļaujieties uz tausta signālu, lai apturētu iekārtas kustību.

Tiek pieņemts, ka Renishaw izstrādājumu avārijas apturēšanai lietotājs to atvienos no strāvas.

## MT - TWISSIJIET

> **NOTA:** Ir-ras tal-pożizzjonament tas-servo tal-PHS1 għandha elementi ta' molol mgħobbija minn qabel li jistgħu jkunu perikolużi jekk xi ħadd jipprova jżarma r-ras.

Hemm il-periklu li wieħed jinqaras bejn biċċiet li jiċċaqilqu u bejn biċċiet li jiċċaqilqu u biċċiet statiċi. Iżżommx ir-ras tas-sonda waqt movimenti, jew meta tkun qiegħed/qegħda tbiddel sonda.

Oqgħod attent(a) għal moviment mhux mistenni. L-utent għandu jibqa' barra l-envelopp ta' tħaddim sħiħ tal-kombinazzjonijiet tar-ras tas-sonda/estensjoni/sonda.

Fl-applikazzjonijiet kollha li jinvolvu l-użu ta' għodda tal-makni jew CMMs, il-protezzjoni ta' l-għajnejn hija rrakkommandata.

F'ċerti installazzjonijiet hemm pajpijiet ta' l-arja li jgħaddu minn barra. Għandha tingħata attenzjoni sabiex jiġi żgurat li l-pajpijiet huma mqabbdin sew ma' l-apparat ta' l-arja.

Għal struzzjonijiet dwar it-tindif bla periklu tal-prodotti ta' Renishaw, irreferi għall-informazzjoni tal-manutenzjoni fid-dokumentazzjoni tal-prodott relevanti.

Itfi d-dawl qabel tibda tagħmel xi xogħol ta' manutenzjoni.

Irreferi għall-istruzzjonijiet ta' tħaddim tal-fornitur tal-makna.

> **NOTA:** M'hemmx tagħmir imħaddem bil-provvista ta' l-elettriku fis-sistema PHS1.

Hija r-responsabbiltà tal-fornitur tal-makna li jiżgura li l-utent ikun magħmul konxju ta' kwalunkwe perikli involuti fit-tħaddim, inklużi dawk imsemmija fid-dokumentazzjoni tal-prodott ta' Renishaw, u li jiżgura li hemm provdut l-ilqugħ u l-interlocks ta' sigurtà adegwati.

Taħt ċerti ċirkostanzi s-sinjal tas-sonda jista' b'mod falz jindika kundizzjoni ta' sonda mhux attiva. Tiddependix fuq sinjali tas-sonda sabiex twaqqaf il-moviment tal-makna.

Il-metodu mistenni ta' li jiġi provdut waqfien ta' emerġenza għal prodotti ta' Renishaw huwa li jintefa' d-dawl.

## NL - VELIGHEID

**VEILIGHEIDSMELDING:** De PHS1 servo-positioneerkop bevat veerbelaste onderdelen die gevaarlijk kunnen zijn als men probeert de kop te demonteren.

Er is risico op inklemming tussen de bewegende onderdelen onderling en tussen bewegende en niet bewegende onderdelen. De tasterkop tijdens beweging of tijdens manuele sondeveranderingen niet vasthouden.

Oppassen voor onverwachte beweging. De gebruiker dient buiten het werkende signaalveld van de Tasterkop/Extensie/Taster combinaties te blijven.

Het dragen van oogbescherming wordt tijdens gebruik van Bewerkingsmachines en CMM's aanbevolen.

Bepaalde installaties zijn voorzien van externe luchtleidingen. Men moet ervoor zorgen dat de luchtleidingen stevig zijn aangesloten.

Voor het veilig reinigen van Renishaw produkten wordt verwezen naar het hoofdstuk ONDERHOUD (MAINTENANCE) in de produktendocumentatie.

Voordat u enig onderhoud verricht dient u de stroom uit te schakelen.

Raadpleeg de bedieningsinstructies van de machineleverancier.

**N.B.:** Het PHS1 systeem bevat geen onderdelen die via het lichtnet zijn gevoed.

De leverancier van de machine is ervoor verantwoordelijk dat de gebruiker op de hoogte wordt gesteld van de risico's die verbonden zijn aan bediening, waaronder de risico's die vermeld worden in de produktendocumentatie van Renishaw. De leverancier dient er tevens voor te zorgen dat de machine is voorzien van voldoende beveiligingen en veiligheidsgrendelinrichtingen.

Onder bepaalde omstandigheden kan het tastersignaal een onjuiste tastertoestand aangeven. Vertrouw niet op de tastersignalen voor het stoppen van de machinebeweging.

In geval van nood wordt er verwacht dat het Renishaw product wordt stopgezet door de stroom uit te schakelen.

## PL - BEZPIECZEŃSTWO

**UWAGA:** Głowica PHS1 z napędem zawiera wstępnie obciążone elementy sprężyste, które mogą stanowić zagrożenie w przypadku jakiejkolwiek próby rozłożenia głowicy na części.

Występuje niebezpieczeństwo zakleszczenia pomiędzy częściami ruchomymi oraz częściami ruchomymi i nieruchomymi. Nie wolno trzymać głowicy sondy podczas wykonywania przemieszczeń ani podczas ręcznej zmiany sondy.

Należy wystrzegać się nieskoordynowanych ruchów. Użytkownik powinien pozostawać poza pełnym zasięgiem roboczym zespołu głowica sondy/łącznik przedłużający/sonda.

Podczas obsługi obrabiarek lub maszyn współrzędnościowych zaleca się używanie osłon na oczy.

W pewnych instalacjach występują zewnętrzne przewody rurowe powietrza. Należy zadbać, aby te przewody rurowe były pewnie zamocowane do króćców powietrza.

Aby uzyskać instrukcje dotyczące bezpiecznego wykonywania czyszczenia produktów Renishaw, należy zapoznać się z informacjami dotyczącemi konserwacji w dokumentacji odpowiedniego produktu.

Przed przystąpieniem do jakichkolwiek czynności konserwacyjnych należy odłączyć zasilanie energią elektryczną.

Zapoznać się z instrukcjami obsługi dostarczonymi przez dostawcę urządzeń.

> **UWAGA:** System PHS1 nie zawiera żadnych zespołów o zasilaniu sieciowym.

Na dostawcy obrabiarki spoczywa odpowiedzialność za uprzedzenie użytkownika o wszelkich zagrożeniach związanych z eksploatacją łącznie z tymi, o jakich wspomina się w dokumentacji produktu Renishaw oraz za zapewnienie stosownych osłon i blokad zabezpieczających.

W określonych warunkach sygnał sondy może fałszywie wskazywać stan gotowości sondy. Nie należy zatrzymywać pracy maszyny tylko z powodu fałszywego sygnału sondy.

Zalecaną metodą zapewnienia awaryjnego zatrzymania działania produktów firmy Renishaw jest odłączenie zasilania energią elektryczną.

## PT - SEGURANÇA

> **NOTA DE SEGURANÇA:** A cabeça de posicionamento do servo da PHS1 contém elementos de mola pré-carregada que podem ser perigosos se for feita qualquer tentativa para desmontar a cabeça.

Existe perigo de esmagamento entre as peças móveis/estáticas do equipamento. Não segure o apalpador nem o cabeçote quando a máquina estiver em funcionamento.

Tome cuidado com movimentos inesperados O usuário deve permanecer fora da área de trabalho das combinações do cabeçote/extensão/apalpador.

Em todas as aplicações que envolvam a utilização de Máquinas Operatrizes e Tridimensionais, recomenda-se utilizar proteção para os olhos.

Em certas instalações existem tubos de ar exteriores. Deve ser tomado cuidado para assegurar que os tubos são bem apertados a todas as adaptações de ar de enroscar.

Para instruções relativas à limpeza segura dos produtos Renishaw, consultar a seção MANUTENÇÃO (MAINTENANCE) na documentação do produto.

Desligar a alimentação de energia antes de efetuar qualquer operação de manutenção.

Consultar as instruções de funcionamento do fornecedor da máquina

> **NOTA:** Não há nenhumas unidades accionadas do sector no sistema PHS1.

É da responsabilidade do fornecedor da máquina garantir que o operador esteja consciente dos perigos envolvidos na operação, incluindo os mencionados na documentação dos produtos da Renishaw, e garantir o fornecimento de bloqueios de segurança e proteções adequadas.

Em determinadas circunstâncias, o sinal do apalpador pode indicar incorretamente uma condição de toque. Não confie nos sinais do apalpador para parar o movimento da máquina.

O método sugerido para uma parada de emergência de produtos Renishaw é desligar a alimentação de energia.

## SK - VÝSTRAHY

**POZNÁMKA:** Hlavica systému PHS1 s polohovacím servopohonom obsahuje predpäté pružinové prvky, ktoré môžu byť nebezpečné v prípade pokusu o demontáž hlavice.

Medzi pohyblivými časťami a medzi pohyblivými a statickými časťami vzniká riziko pomliaždenia. Snímaciu hlavicu počas pohybu alebo pri ručnej výmene sondy nechytajte.

Dávajte si pozor na neočakávaný pohyb. Používateľ by mal zostať mimo celej pracovnej dráhy zostavy snímacej hlavice, ramena a sondy.

Vo všetkých aplikáciách zahŕňajúcich používanie obrábacích strojov alebo súradnicových meracích prístrojov sa odporúča ochrana očí.

Niektoré inštalácie obsahujú externé vzduchové potrubia. Treba dávať pozor, aby sa zaručilo bezpečné pripevnenie potrubí k vzduchovým armatúram.

Pokyny týkajúce sa bezpečného čistenia produktov spoločnosti Renishaw získate v informáciách o údržbe uvedených v dokumentácii k príslušnému produktu.

Pred každým vykonávaním údržby odpojte napájanie.

Pozrite si prevádzkové pokyny dodávateľa stroja.

**POZNÁMKA:** V systéme PHS1 sa nenachádzajú žiadne jednotky napájané zo siete.

Zodpovednosťou dodávateľa stroja je zaručiť oboznámenie používateľa so všetkými rizikami súvisiacimi s prevádzkou, vrátane tých, ktoré sú uvedené v dokumentácii k produktu spoločnosti Renishaw, a zaručiť poskytnutie adekvátnych zábran a bezpečnostných blokovaní.

Signál sondy môže za určitých okolností nesprávne indikovať parkovaciu polohu sondy. Pri zastavovaní pohybov stroja sa nespoliehajte na signály sondy.

Predpokladaný spôsob núdzového zastavenia zariadení spoločnosti Renishaw spočíva v odpojení napájania.

## SL - OPOZORILA

**OPOMBA:** V servo merilni glavi PHS1 se nahajajo vnaprej napeti vzmetni elementi, ki so lahko pri kakršnemkoli poskusu odpiranja glave nevarni.

Pazite, da se ne uscipnete med gibajocimi deli ter med gibajocimi in staticnimi deli. Ne drzite glave sonde med premiki ali med rocno zamenjavo sonde.

Bodite pozorni na nepricakovane premike. Uporabnik naj se zadrzuje zunaj delovnega obmocja kombinacij glava sonde/podaljsek/sonda.

Pri vseh vrstah uporabe strojnih orodij ali KMM se priporoca uporaba zascite za oci.

Nekatere inštalacije imajo zunanje cevi. Paziti je potrebno, da so cevi varno nameščene na priključke za zrak.

Za navodila glede varnega ciscenja Renishaw-ovih izdelkov glejte informacije o vzdrzevanju v ustrezni produktni dokumentaciji.

Pred kakrsnimkoli vzdrzevanjem odklopite napajanje.

Glejte navodila za upravljanje dobavitelja stroja.

**OPOMBA:** Nobeden izmed delov sistema PHS1 ni namenjen napajanju iz električnega omrežja.

Odgovornost dobavitelja stroja je, da uporabnika opozori na vse nevarnosti, ki nastopajo med delovanjem, vkljucno s tistimi, ki so omenjene v Renishaw-ovi produktni dokumentaciji, in da zagotovi, da so dobavljene vse potrebne zascite in varnostne zapore.

Pod dolocenimi pogoji lahko signal sonde napacno nakazuje, da je sonda v lezecem polozaju. Ne zanasajte se na signale sonde za ustavitev premikanja stroja.

Pricakovana metoda za zaustavitev v sili za Renishaw-ove izdelke je odvzem napajanja.

## SV - SÄKERHETSFÖRESKRIFTER

**SÄKERHETSANVISNING:** Servoinställningshuvud PHS1 innehåller förspända fjäderelement, som kan utgöra en fara vid försök att ta isär huvudet.

Risk för klämning existerar mellan rörliga delar och mellan rörliga och stillastående delar. Håll ej i sondens huvud under rörelse eller under manuella sondbyten.

Se upp för plötsliga rörelser. Användaren bör befinna sig utanför arbetsområdet för sondhuvudet/förlängningen/sond-kombinationerna.

Ögonskydd rekommenderas för alla tillämpningar som involverar bruket av maskinverktyg och CMM.

Vissa installationer har utanpåliggande luftrör. Var noga med att kontrollera att rören är ordentligt anslutna till samtliga hullingluftförbindningar.

För instruktioner angående säker rengöring av Renishaws produkter, se avsnittet UNDERHÅLL (MAINTENANCE) i produktdokumentationen.

Koppla bort strömmen innan underhåll utförs.

Se maskintillverkarens bruksanvisning.

**OBS:** PHS1-systemet innefattar inga enheter som drivs med nätström.

Maskinleverantören ansvarar för att användaren informeras om de risker som drift innebär, inklusive de som nämns i Renishaws produktdokumentation, samt att tillräckligt goda skydd och säkerhetsförreglingar tillhandahålls.

Under vissa omständigheter kan sondens signal falskt ange att en sond är monterad. Lita ej på sondsignaler för att stoppa maskinens rörelse.

Metoden för nödstopp för Renishaws produkter förutsätter att strömmen kopplas bort.

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