UCC PI 80 installation guide

Documentation part number: H-1000-7608-04-C

General information

ORIGINAL LANGUAGE VERSION

Disclaimer

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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.

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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.

Company registration details

Renishaw plc. Registered in England and Wales. Company no: 1106260. Registered office: New Mills, Wotton-under-Edge, Gloucestershire, GL12 8JR, UK.

Packaging

To aid end user recycling and disposal the materials used in the different components of the packaging are stated here:

Packaging component	Material	94/62/EC code	94/62/EC number
Outer box	Cardboard - 70% recycled content	PAP	20
Packing foam	Polyurethane	PU	7
Packing foam	Cross-linked polyethylene	LDPE	4
Plastic bags	Low density polyethylene bag	LDPE	4

Product compliance

EU declaration of conformity

Contact Renishaw plc or visit www.renishaw.com/EUCMM for the full EU declaration.

UK declaration of conformity

Contact Renishaw plc or visit www.renishaw.com/UKCMM for the full UK declaration.

EMC conformity

This equipment must be installed and used in accordance with this installation guide. This product is intended for industrial use only and should not be used in a residential area or connected to a low voltage power supply network which supplies buildings used for residential purposes.

FCC (USA only)

Information to user (47 CFR 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 (47 CFR 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.

Equipment label (47 CFR 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.
2. This device must accept any interference received, including interference that may cause undesired operation.

ICES-001 (Canada only)

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.

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

China RoHS

Contact Renishaw plc or visit www.renishaw.com/ChinaRoHSCMM for the full China RoHS tabulation.

Safety

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

There are no user serviceable parts inside the equipment.

The UCC PI 80 controller is only warranted and approved for use with the provided PSU.

The UCC PI 80 is isolated from ac power by disconnection of the IEC mains connector from the supplied PSU. If any additional means of isolation is required, it must be specified and fitted by the machine manufacturer or installer of the product. The isolator / disconnection device must be sited within easy reach of the operator and comply with IEC61010 and any applicable national wiring regulations for the country of installation.

WARNING: Earthing of the UCC PI 80 is required. It is the responsibility of the OEM or installer to apply the earth bonding scheme provided by Renishaw in this installation guide.

WARNING: The system can accelerate quickly during operation. The user must not enter the working volume of the CMM until all power is removed. When within the working volume of the CMM, the user should wear eye protection.

WARNING: UCC PI 80 is isolated from ac power by disconnection of the IEC mains connector from the supplied PSU.

WARNING: Switching off or isolating the UCC PI 80 may NOT prevent unexpected machine movement. The user is advised to isolate the machine from the electricity supply, compressed air or other energy sources in accordance with the machine manufacturer's instructions before entering the danger zone or performing any maintenance operations.

CAUTION: It is strongly recommended that the CMM manufacturer or retrofitter includes in their maintenance instructions a periodic test of the emergency stop and, if fitted, the associated reset switch.

Environmental conditions

Indoor use	IP30 (BS EN60529:1992)
Altitude	Up to 2000 m
Operating temperature	+5 °C to +50 °C
Storage temperature	-25 °C to +70 °C
Relative humidity for storage	90% maximum (non-condensing) for temperatures up to +42 °C
Pollution degree	2

NOTE: If the UCC PI 80 is to be used in an environment where a higher IP rating is required, then the UCC PI 80 will need to be housed in a suitable enclosure.

NOTE: The electrical input requirements to the provided PSU can be found on the PSU label.

References and associated documents

It is recommended that the following documentation is referenced when installing the UCC PI 80:

Renishaw documents

Title	Document number
Installation guide: SP80	H-1000-5212
Installation guide: UCC BI	H-1000-7602
Installation guide: UCC AI	H-1000-7611
Installation guide: UCC T3 PLUS and UCC S3	H-1000-2118
Installation guide: UCC T3-2	H-1000-5254
Installation guide: UCC T5	H-1000-7573
Installation guide: UCC S5	H-1000-7598
Installation guide: SPA2-2	H-1000-5247
Installation guide: SPA3	H-1000-7566
Installation and user's guide: MCU	H-1000-5182
Installation and user's guide: MCU5-2 and MCU W-2	H-1000-5280
Guide: Product interconnection system (PICS)	H-1000-5000
UCCassist-2 help	Found within UCCassist-2

External documents

National and international standards including the following may be applicable to the finished machine or installation:

- EN 60204-1:2006/A1:2009 (Safety of machinery - Electrical equipment of machines - Part 1: General requirements)
- BS EN 61010-1:2010 (Safety requirements for electrical equipment for measurement, control and laboratory use. General requirements)
- BS EN ISO 13849-1:2015 and BS EN ISO 13849-2:2008 (Safety of machinery. Safety-related parts of control systems)
- BS EN ISO 12100:2010 (Safety of machinery - General principles for design - Risk assessment and risk reduction)

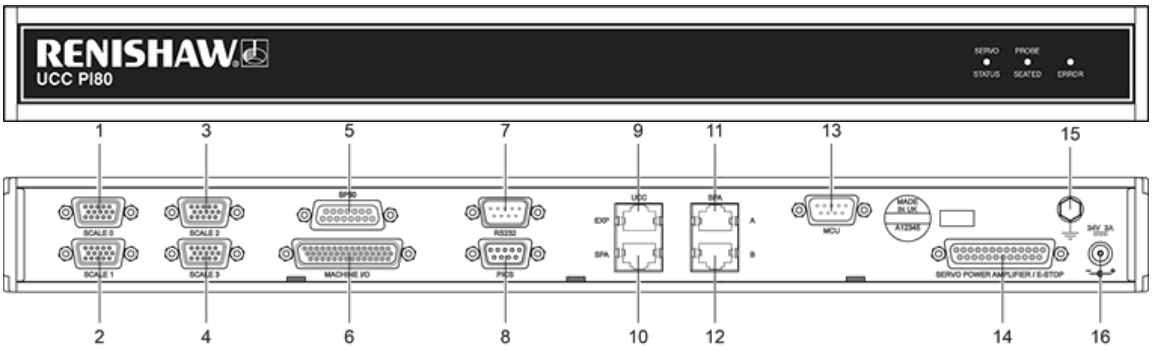
It is the responsibility of the OEM or installer to ensure that the finished installation complies with applicable national regulations for the country of installation.

Introduction

The UCC PI 80 is required for CMM systems which are fitted with Renishaw's SP80 scanning probe and facilitates the use of the UCC S3 as the machine controller.

If the CMM system uses brushless motors, then the UCC PI 80 may be connected to a Renishaw SPA2-2 which provides power. Please see the UCC BI user guide (Renishaw part number H-1000-7602) for configuration instructions.

If the CMM system uses motors which are not supported by Renishaw SPA products (e.g. above 80 V or 10 A), then the UCC PI 80 may be connected to a third party analogue amplifier to provide power. Please see the UCC AI installation guide for configuration instructions.



Key	Description	Key	Description
1	Scale 0 interface (15W HDD socket) *	9	UCC - EXP (RJ45 socket)
2	Scale 1 interface (15W HDD socket) *	10	UCC - SPA (RJ45 socket) *
3	Scale 2 interface (15W HDD socket) *	11	SPA - A (RJ45 socket) **
4	Scale 3 interface (15W HDD socket) *	12	SPA - B (RJ45 socket) **
5	SP80 interface (15W D socket)	13	MCU (9W D plug) *
6	Machine I/O (44W HDD socket) *	14	Servo power amplifier / E-STOP (25W D socket) *
7	RS232 (9W D plug) *	15	Earth terminal
8	PICS (9W D socket) *	16	UCC PI 80 power jack (6.3 mm socket)

UCC PI 80 installation guide

*** NOTE:** Only to be used when interfacing to an SPA2-2 (see the UCC BI installation guide, Renishaw part number H-1000-7602) or when using a third party amplifier (see the UCC AI installation guide, Renishaw part number H-1000-7611), otherwise the SPA3 / SPA3-2 connections should be used.

**** NOTE:** Only to be used when interfacing to an SPA2-2 (see UCC BI installation guide, Renishaw part number H-1000-7602).

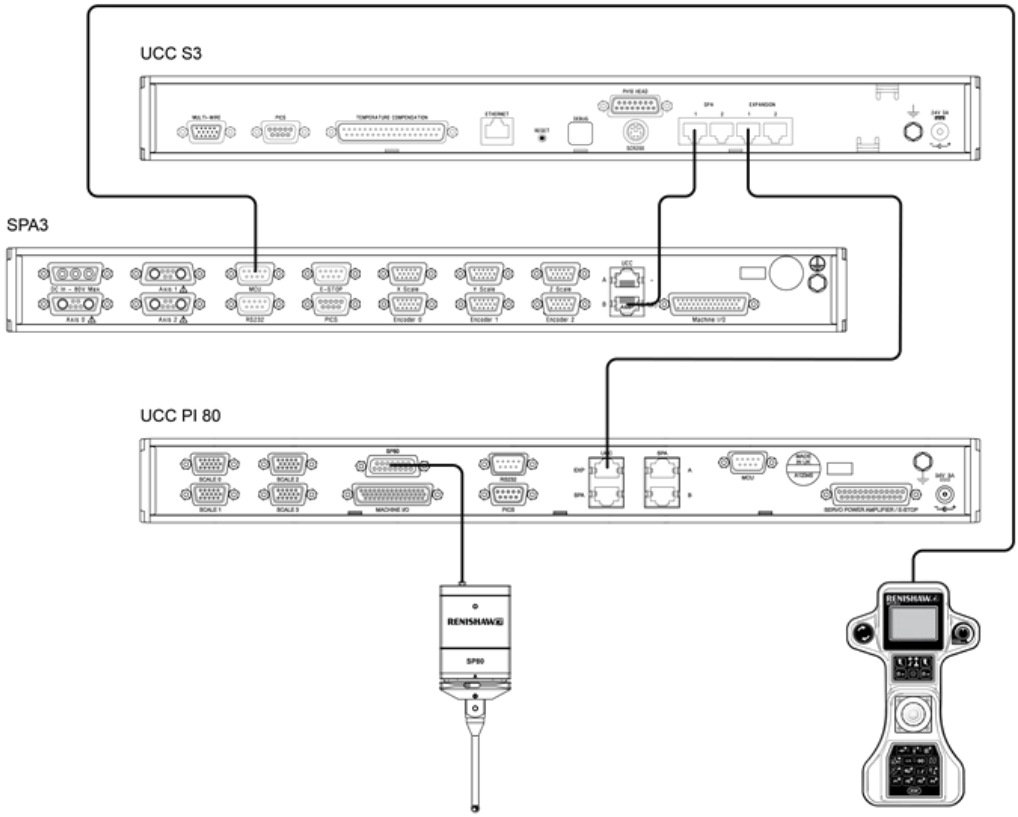
WARNING: The capability to connect the UCC PI 80 to a third party analogue amplifier requires UCCsuite v5.3 or newer.

Connectivity

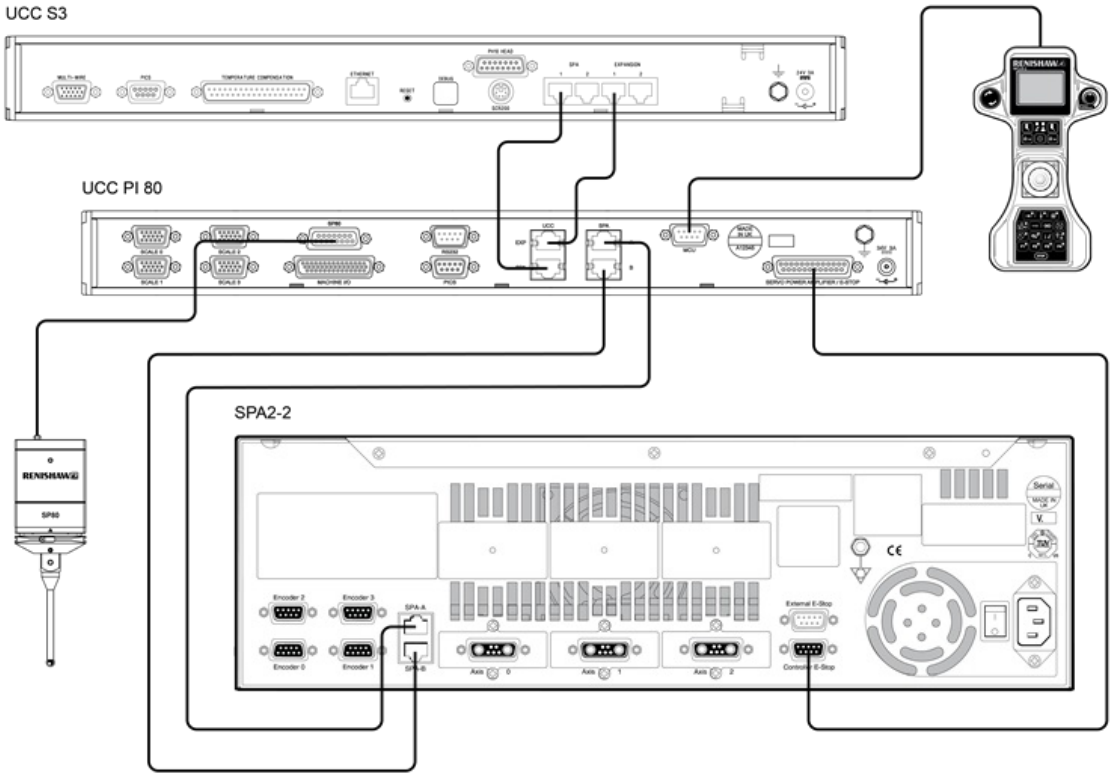
The UCC PI 80 has different configuration layouts to provide an interface to CMM systems with three, four or five machine axes, whether brushed or brushless motors.

NOTE: The UCC S3 needs to be version V.2 or newer - see label on rear panel (first shipped February 2015).

3-axis CMM with brushed motors

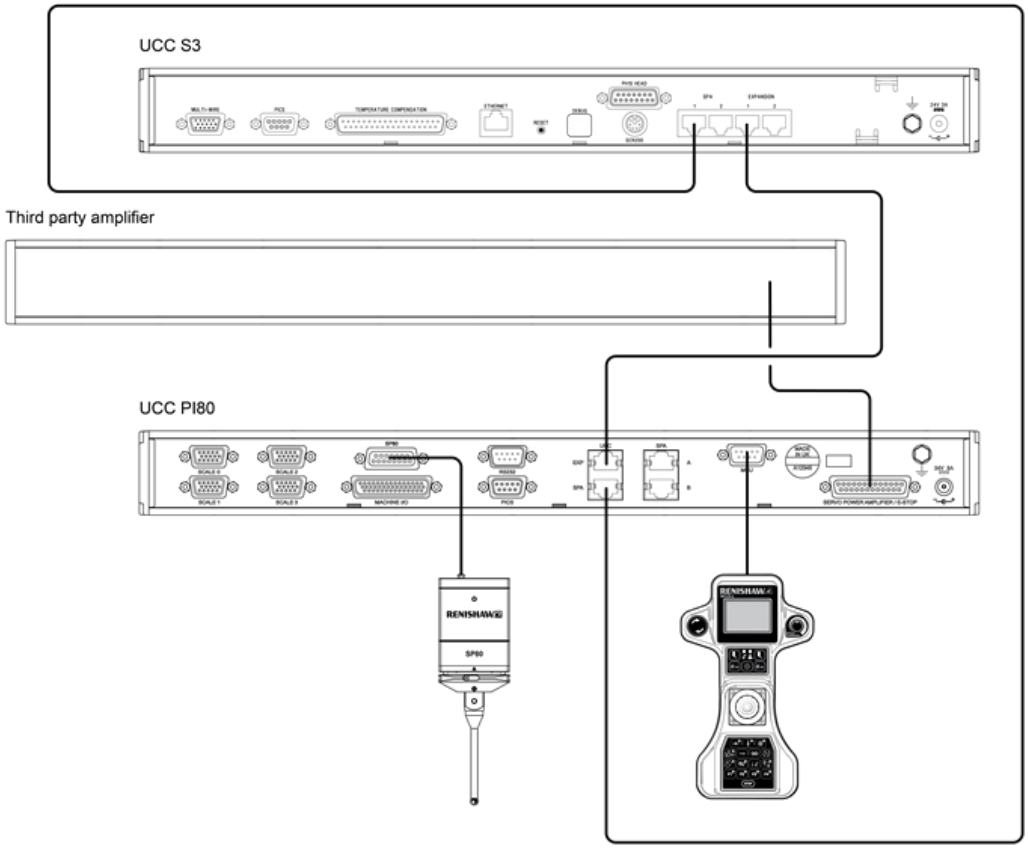


3- or 4-axis CMM with brushless motors



NOTE: See UCC BI installation guide (Renishaw part number H-1000-7602) for configuration instructions.

3- or 4-axis large CMM with motors requiring an analogue servo power amplifier



System components

The part numbers of the UCC PI 80 kits and upgrades are:

Kit	Part number
SP80 controller kit 1 (contains UCC S3, SPA3, UCC PI 80, MCU5-2, PSU, connector kit)	A-5518-1200
SP80 controller kit 2 (contains UCC S3, SPA3, UCC PI 80, connector kit)	A-5518-1203
SP80 controller kit 3 (contains UCC S3, SPA3, UCC PI 80, MCU5-2, connector kit)	A-5518-1205
SP80 controller kit 4 (contains UCC S3, 2 × SPA3, UCC PI 80, MCU5-2, 2 × PSU, connector kit)	A-5518-1207
Accessories	**Part number**
Connector kit	A-5518-0010
Bracket kit	A-5518-0005

General wiring standards

To achieve reliable operation of the UCC PI 80 the following should be observed:

- All signal cables **MUST** be screened and all cable screens should be connected electrically to the cable connector's metal shells.
- It is recommended that cable screens should only be connected to the functional earth (via the connector shell) of the UCC PI 80. To avoid earth loops, cable screens should not be directly attached to the CMM's functional earth.
- The grounding must be continuous between all equipment in the installation.
- All cable connectors should be secured to the UCC PI 80 and SPA (where present) by the connector jack screws.

NOTE: When used for SP80 only, with an SPA3 and UCC S3, the amplifier ground will be connected to the UCC PI 80 ground through the UCC S3.

Naming convention

Function	Description
signal	active high
/signal/	(active low)
reserved	Do not use. For Renishaw purposes only.
signal +	Positive differential pair
signal -	Negative differential pair

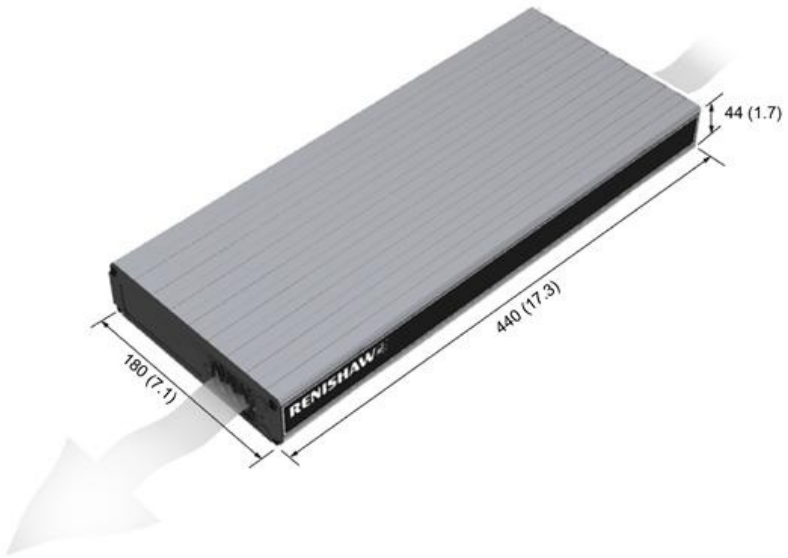
Installation

Dimensions

Width	Depth	Height	Weight
440 mm (17.3 in)	180 mm (7.1 in)	44 mm (1.7 in)	2.4 kg (5 lb 3 oz)

UCC PI 80 can either be free standing or used in a 19 inch rack system.

WARNING: Ensure the UCC PI 80 is disconnected from the mains supply during installation.



Free-standing installation

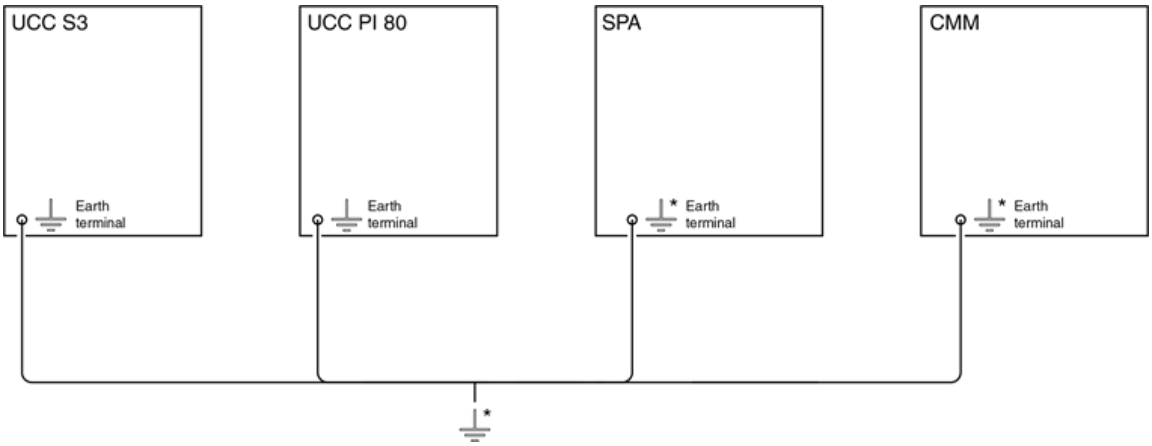
The UCC PI 80 unit draws air from the right hand side when viewed from the front and expels air out of the left hand side. A minimum clearance gap of 10 mm is necessary between the sides of the unit and any obstruction. The dimensions shown on the above drawing are in mm (in).

Mounting in a 19 inch rack (optional)

NOTE: The screws supplied with this kit are M5 × 6 mm countersink type.

The rack mounting kit (Renishaw part number A-5518-0005) contains two brackets and four M5 × 6 mm screws. Assemble the brackets to the UCC PI 80 as shown below:

Earth bonding scheme



*** NOTE:** May be protective earth where appropriate for electrical safety.

CAUTION: The capability to use the UCC PI 80 in a dual SPA system or a system using absolute scales is not yet available, please contact CMM support for further information.

Software installation

Support for the UCC PI 80 is included in UCCsuite version 5.3 and onwards. All recommended updates for any of the system components must be installed for correct operation.

NOTE: The UCC S3 needs to be version V.2 or newer - see label on rear panel (first shipped February 2015).

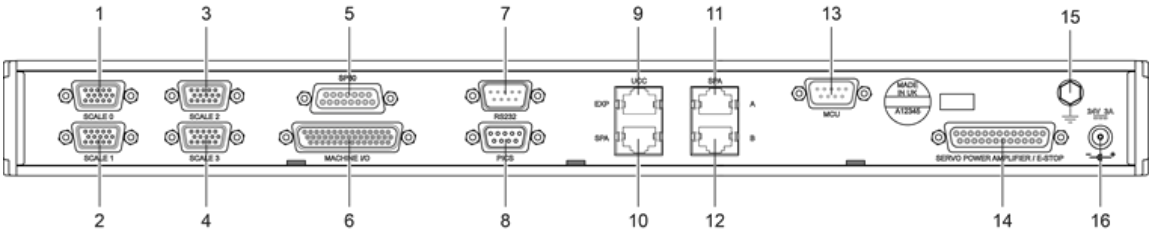
The UCCassist-2 application included in this software release will allow the user to correctly configure the system to use the UCC controller to interface to the UCC PI 80.

The software can be obtained online at www.renishaw.com/cmmsupport or from your local Renishaw supplier. Follow the prompts to install the UCCsuite software.

Connectors and signals

This section contains information on the following UCC PI 80 ports:

- SP80 interface socket (15W D socket)
- UCC - EXP (RJ45 socket)
- UCC PI 80 power socket (6.3 mm socket)



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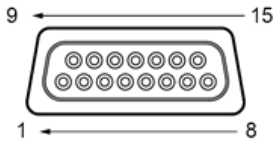
4	Scale 3 interface (15W HDD socket) *	12	SPA - B (RJ45 socket) **
5	SP80 interface (15W D socket)	13	MCU (9W D plug) *
6	Machine I/O (44W HDD socket) *	14	Servo power amplifier / E-STOP (25W D socket) *
7	RS232 (9W D plug) *	15	Earth terminal
8	PICS (9W D socket) *	16	UCC PI 80 power jack (6.3 mm socket)

*** NOTE:** Only to be used when interfacing to an SPA2-2 (see the UCC BI installation guide, Renishaw part number H-1000-7602) or when using a third party amplifier (see the UCC AI installation guide, Renishaw part number H-1000-7611), otherwise the SPA3 / SPA3-2 connections should be used.

**** NOTE:** Only to be used when interfacing to an SPA2-2 (see UCC BI installation guide, Renishaw part number H-1000-7602).

SP80 interface socket (15W D socket)

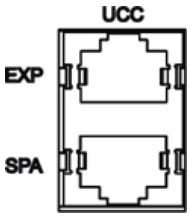
The SP80 input connector is a low density 15-way D-type socket with the following pin-outs:



UCC PI 80 pin no.	Function	SP80 pin no.
1	Cos Y	5
2	Reserved	3
3	Cos Z	4
4	0 V	2
5	/Probe present/ (active low)	9
6	/Green LED off/ (active low)	10
7	Sin Z	12
8	Vref	1
9	Reserved	15
10	/Red LED on/ (active low)	11
11	Cos X	6
12	Sin X	14
13	Reserved	8
14	Sin Y	13
15	Probe power +15 V	7
Shell	Screen	Shell

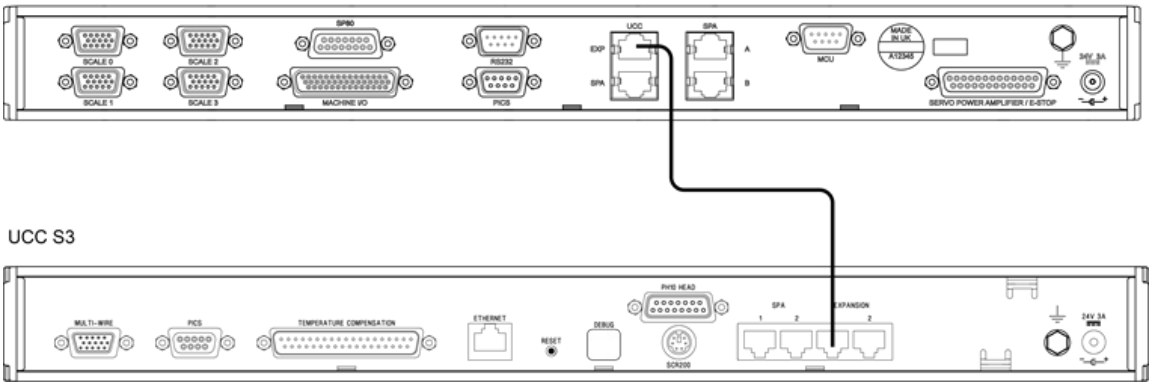
UCC - EXP (RJ45 socket)

The UCC PI 80 should be connected to the UCC S3 controller (as shown below) using the RJ45 cable (P-CA40-0040) provided in the UCC PI 80 kit. Either expansion port on the UCC S3 can be used.



If the provided RJ45 cable is not used then the cable should be no longer than 300 mm in length, CAT 5E and shielded.

UCC PI 80



UCC S3

UCC PI 80 power socket (6.3 mm socket)

The UCC PI 80 must be used with the ac - dc power supply unit (PSU) supplied with the UCC PI 80. The UCC PI 80 controller is only warranted and approved for use with the provided PSU.

The PSU provides the UCC PI 80 with 72 W at +24 Vdc. The UCC PI80 power socket interfaces with a dc jack plug, 2.5 mm inner diameter, 5.5 mm outer diameter, centre positive.

CAUTION: The user must comply with the PSU electrical input information provided on the PSU label.

Testing and verification

The machine manufacturer or the installer of the UCC PI 80 is responsible for ensuring that the following testing and verification is performed to the appropriate standard:

- Verification that the electrical equipment is in compliance with the technical documentation
- Continuity testing of the protective bonding circuit
- Insulation resistance tests
- Functional tests, particularly those related to safety and safeguarding

NOTE: It is strongly recommended that any measuring equipment is regularly checked for accuracy. An initial 'pass off' test should be performed prior to normal use.

NOTE: It is recommended that metrology tests should be performed after any update.

Maintenance

NOTE: There are no user serviceable parts inside this unit.

Periodically check that all mounting screws and electrical connectors are securely tightened. Electrical safety checks should include inspecting the mains cable for damage and the safety of the connections. Periodical safety checks should also include the function of the emergency stop system, including operation of all switches integrated into the system. After operating the emergency stop system, the servo amplifier system should be checked to ensure servo power can be engaged.

Remove dust from the external surfaces with a clean dry cloth as the unit is not sealed against liquid ingress.

WARNING: Maintenance should only be carried out after the machine has been isolated from the electrical supply, compressed air supply or other energy sources in accordance with the machine manufacturer's instructions.

Filter replacement

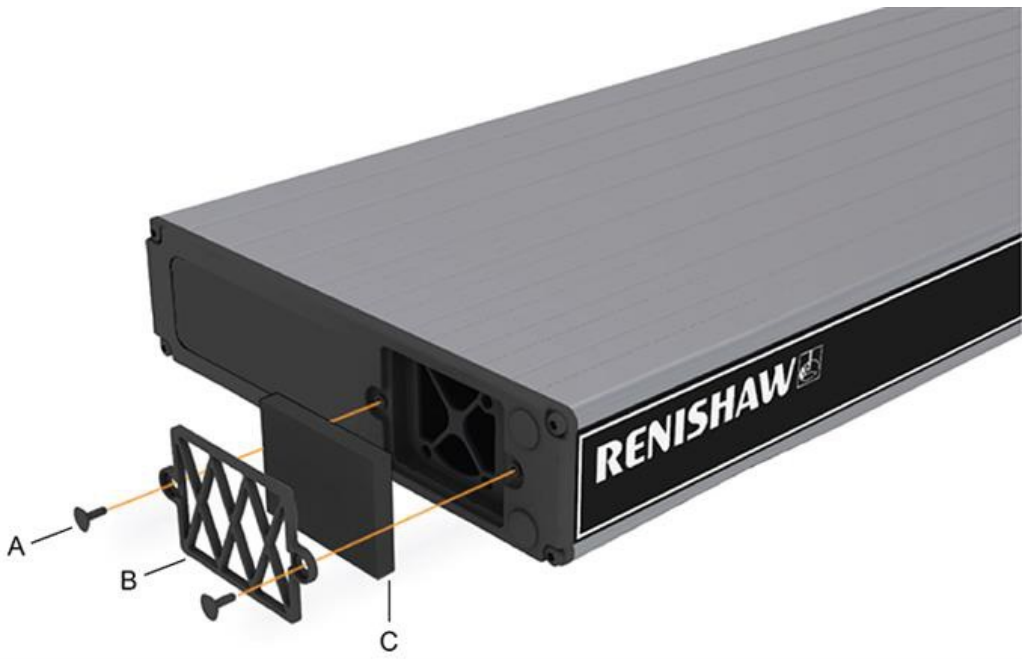
The UCC PI 80 has a positive air flow within its enclosure for cooling purposes. This system has a replaceable filter to protect it from the ingress of dust. The machine operator should check the condition of this filter on a regular basis. It is recommended that this filter is removed and checked / replaced as necessary during the machine installer or retrofitter's regular maintenance routine.

Exchanging / removing the air filter

The following procedure is recommended when exchanging / removing the air filter:

- Remove power from the controller
- Remove the 19 inch rack mounting brackets (if fitted) by removing the two fixing screws
- Pull both the filter retaining clips (1) away from the unit, this should permit the external filter cover (2) to be pulled away
- Remove the filter material (3) from the filter recess (replacement part number of filter is A-5518-0011)
- Replace the filter using the reverse of the method given above

UCC PI 80 installation guide



Troubleshooting

UCC PI 80 visual diagnostics

A visual indication of the system status is provided by three LEDs on the front panel, providing assistance in diagnosing and rectifying system faults.

LED status key

	Description
	LED on, displaying green, amber or red
	Red flash
	Green flash
	LED off
X	Any state

NOTE: The following light patterns apply when using UCCsuite version 5.3 and onwards.

Servo status	Probe seated	Error	Description
⊖	⊖	⊖	No power (note that this pattern is also possible when working normally and the probe is not seated)
⊖	⊖	🔴	Hardware failure
⊖	✳ 🟢	🔴	Security failure (fast green flash)
⊖	✳ 🟢	🔴	Firmware error (intermittent fast green flash)
⊖	✳ 🟢	✳ 🔴	** Controller not connected, waiting for download, download failed, device not recognised by UCC firmware or device not recognised by UCC downloadable software
⊖	⊖ 🟢	⊖	Digital amplifier: Not applicable Analogue amplifier: Amplifier not engaged
🔴	⊖ 🟢	⊖	Digital amplifier: Amplifier not engaged: E-STOP active or power amp fault Analogue amplifier: Not applicable
🟡	⊖ 🟢	⊖	Digital amplifier: Amplifier not engaged: E-STOP not pressed and amplifier has no fault Analogue amplifier: Not applicable
🟢	⊖ 🟢	⊖	Amplifier engaged
X	🟢	⊖	Probe not deflected beyond trigger threshold
X	⊖	⊖	Probe deflected beyond trigger threshold

NOTE: ** A slow flash synchronised with the controller's slow flashing status LED indicates that the UCC PI 80 is correctly connected to the controller and that the controller is waiting for a software download.

Fatal faults

Situations can occur that make it inadvisable or dangerous to continue using the CMM servo system. These are known in UCCsuite as fatal faults.

A list of UCC PI 80 related fatal faults is shown below and will be indicated through the user's software (for example MODUS):

- A report of the emergency stop switch being active
- Air pressure is too low
- Crash switch operated, if fitted
- A scale reading failure
- An indicated overspeed (calculated from the rate of change of position)
- Outer limit switch active
- PICS_STOP

NOTE: Other faults not classed as fatal can prevent the CMM's operation.

If the fatal fault cannot be resolved, please contact your local CMM support centre who can advise.

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