

UCC T3 PLUS and UCC S3 CMM controller installation guide

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Documentation part number: H-1000-2118-03-E



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UCC T3 PLUS and UCC S3 general information

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 ORIGINAL LANGUAGE VERSION

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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, please contact your local waste disposal service or Renishaw distributor.

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.

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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

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UCC T3 PLUS and UCC S3 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.
-

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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.



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UCC T3 PLUS and UCC S3 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 T3 PLUS or UCC S3 controller is only warranted and approved for use with the provided PSU - Cincon TRG70A240-02E02.

PSU electrical ratings	
Supply voltage	100 V to 240 Vac \pm 10%
Frequency range	50 Hz to 60 Hz
Power consumption	3 A
Output voltage	24 Vdc
Transient voltages	Installation category II

The UCC T3 PLUS or UCC S3 is isolated from the 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 any applicable national wiring regulations for the country of installation.

The UCC T3 PLUS or UCC S3 is provided with an equipotential bonding point which must be used to connect it to the rest of the installation's grounded structures.



WARNING: Switching off or isolating the UCC T3 PLUS or UCC S3 may NOT prevent unexpected machine movement. The user is advised to isolate the machine from the electricity supply, compressed air or other energy sources and ensure the machine is at rest and in accordance with the machine manufacturer's instructions before entering the danger zone or performing any maintenance operations.

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UCC T3 PLUS and UCC S3 environmental conditions

Indoor use	IP10* (BS EN60529:1992)
Altitude	Up to 2000 m
Operating temperature	+5 °C to +50 °C
Storage temperature	-25 °C to +70 °C
Relative humidity	80% maximum (non-condensing) for temperatures up to +31 °C Linear decrease to 50% at +50 °C
Transient voltages	Installation category II
Pollution degree	2



* **NOTE:** It may be necessary to house UCC T3 PLUS / UCC S3 in a suitable enclosure according to the installation's environmental conditions to obtain a higher IP rating.

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UCC T3 PLUS and UCC S3 references and associated documents

It is recommended that the following documentation is referenced when installing the UCC T3 PLUS or UCC S3:

Renishaw documents

Title	Document number
Installation and user's guide: PH10 PLUS	H-1000-7592
Installation guide: SPA3-2	H-1000-5364
Installation and user's guide: MCU	H-1000-5182
UCCassist-2 help	Found within UCCassist-2
User's guide: TP200 and SCR200 probe system	H-1000-5014
Installation guide: PI 200-3	H-1000-7542
Installation, integration and user's guide: SP25M	H-1000-5104
Installation guide: PICS	H-1000-5000
User's guide: AM1	H-1000-4010
Data sheet: AM2	H-1000-2051
Installation and integration guide: SP600, SCR600 and AC1, AC2	H-1000-5175

External documents

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

EN 292-2:1991 (Safety of machinery - Basic concepts, general principles for design - Part 2: Technical principles and specifications).

EN (IEC) 60204-1:1997 (Safety of machinery - Electrical equipment of machines - Part 1: General requirements).

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UCC T3 PLUS and UCC S3 introduction

The UCC T3 PLUS / UCC S3 are the latest generation Renishaw CMM controller products. They support the complete range of Renishaw two wire touch-trigger probes along with the high performance SP25M and SP600 (UCC S3 only) . Support for conventional contact, strain-gauge sensors (TP200), motorised probe heads, stylus changers and temperature compensation are all built into these controllers.



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Key	Description
1	Machine motors
2	Machine scales and readheads
3	Probe head - manual or CNC (PH10 PLUS) - connects to the UCC T3 PLUS / UCC S3 via the machine cabling
4	UCCassist-2 commissioning software and application software
5	UCC T3 PLUS / UCC S3 and power amplifier SPA3-2 - these connect to the machine cabling
6	MCU joystick - MCULite-2, MCU5-2 or MCU W-2 - connects to SPA3-2
7	PC - connects to UCC T3 PLUS / UCC S3 via an ethernet cable
8	MCR20 rack

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The UCC T3 PLUS / UCC S3 is a controller in a 19 inch rack-mountable enclosure. It is coupled to the CMM host computer by an ethernet link and to the CMM via external cable interface connectors.

The UCC T3 PLUS / UCC S3 controllers in conjunction with the SPA3-2 have the capability of:

- controlling three axes of a CMM (accepting digital readhead signals and generating three axes of motor drive signals)
- accepting input signals from emergency stop, air pressure, crash detector, digital SPA, amplifier faults and all axis inner and outer travel limit switches
- accepting two uncommitted general purpose input signals and generating one uncommitted general purpose output signal via SPA3-2
- PH10 and PH10 PLUS interfacing
- directly supporting the TP1, TP2, TP6, TP20 and TP200 touch-trigger probes and SP25 and SP600 scanning probes (UCC S3 only)
- directly supporting the Renishaw TEC (16 channels) and RS232 (Mitutoyo) TEC systems
- providing a +24 V supply for use by the CMM switches
- the UCC T3 PLUS / UCC S3 supports the MCUIlite-2, MCU5-2 and MCU W-2 joysticks through the SPA3-2

This guide gives information on physical installation, system connections and communications, as well as assistance in fault finding during the installation of the UCC T3 PLUS or UCC S3.



WARNING: UCC T3 PLUS / UCC S3 are not compatible with PH9, PHS, PH20 and REVO systems. No attempt should be made to connect these system components to the UCC T3 PLUS or UCC S3 as this will result in damage to the product or attached equipment.

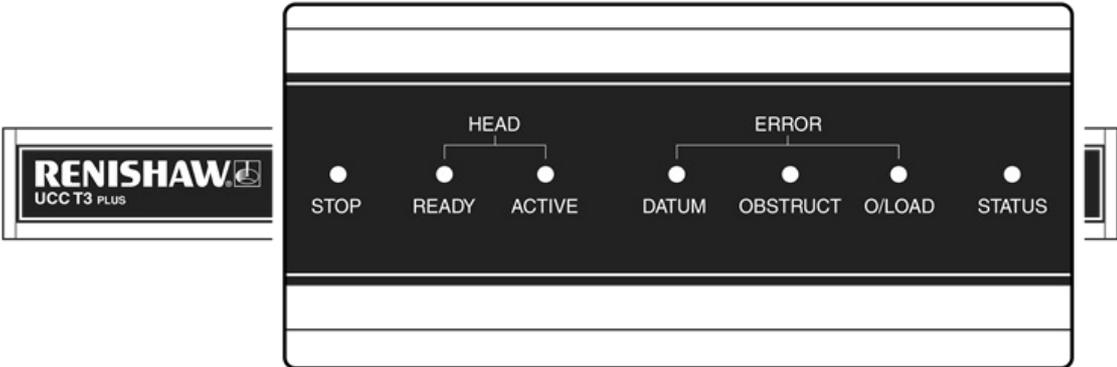
Please use this guide in conjunction with the PH10, TP200 and SP25M user's guide in order to fully understand the system's features, capabilities and operation.

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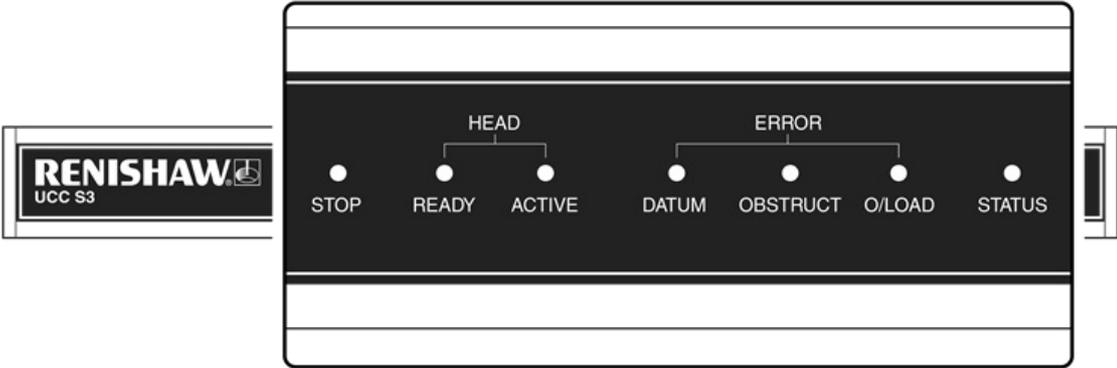
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Front panels

UCC T3 PLUS



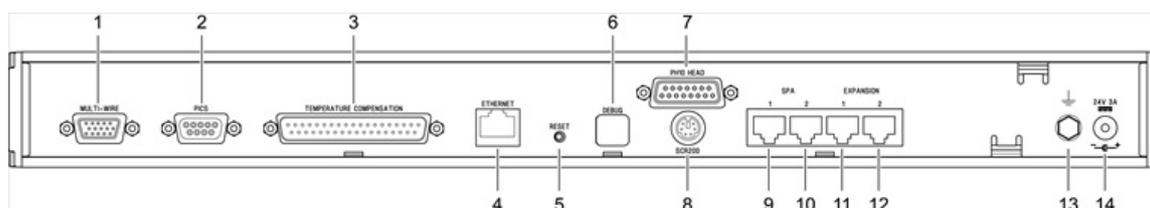
UCC S3



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Rear panel layout



Key	Description	Connector polarity
1	Multiwire connection	SOCKET
2	PICS	SOCKET
3	Temperature compensation connector	PLUG
4	Ethernet communications connector to CMM computer	SOCKET
5	Reset button / IP configure button	
6	Reserved - do not connect	
7	PH10 head connector	SOCKET
8	SCR200 rack input (TP200)	SOCKET
9	RJ45 connector to SPA3-2	SOCKET
10	RJ45 connector to second SPA3-2	SOCKET
11	Reserved	
12	Reserved	
13	Equipotential bond point	BOLT
14	DC power jack 24 V	SOCKET

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Connecting the UCC T3 PLUS or UCC S3 to the host PC

Hardware connection

The host PC must have a dedicated ethernet connection to the CMM controller. It is recommended that this is not a USB plug-in adapter because of the reduction in speed these devices can produce.

If the host PC is connected to a network, it is necessary to install additional hardware to allow a dedicated connection for UCC T3 PLUS or UCC S3 communication. For details on how to install additional hardware on the host PC, please refer to the manufacturer user's guide.

A 5 m ethernet cable is provided for this link as part of the CMM controller kit. The cable included is a CAT 5E, cross-over type. Other lengths may be used, but the maximum length is determined by the generic specification for ethernet connections.

It is recommended that a shielded ethernet cable is used if there is a likelihood of EMC disruption due to the environment or location of the routed cable.

It is recommended that the cross-over cable is labelled to avoid being mistaken for a non cross-over cable.

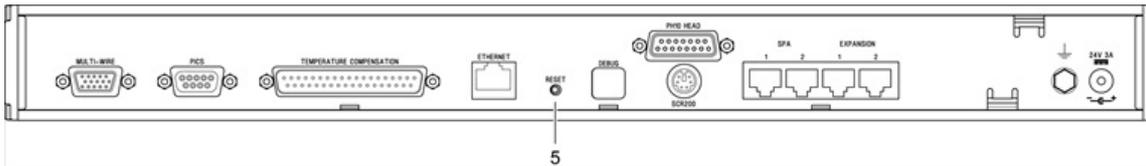
Software installation

UCCsuite 4.7 or newer software must be installed on the host PC prior to connection of the UCC T3 PLUS or UCC S3. The UCC software suite can be downloaded from the [Renishaw website](#). After the software has been installed, run UCCassist-2 to set up and configure the CMM controller.

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IP configure / reset button



Number 5 on the rear panel is the reset button which has two different functions. The function depends on the operational state of the controller.

1. Pressing and releasing the reset button within fifteen seconds of switching on or rebooting the unit will force the controller into IP configuration state.
2. Pressing and releasing the reset button after the download or whilst operating will cause the unit to restart.

To enter IP configuration state when the unit is already powered, press and release the reset button twice.

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Installation and connection details

Dimensions

Width	Depth	Height	Weight
440 mm (17.3 in)	180 mm (7.1 in)	44 mm (1.7 in)	2.1 kg (4 lb 10 oz)

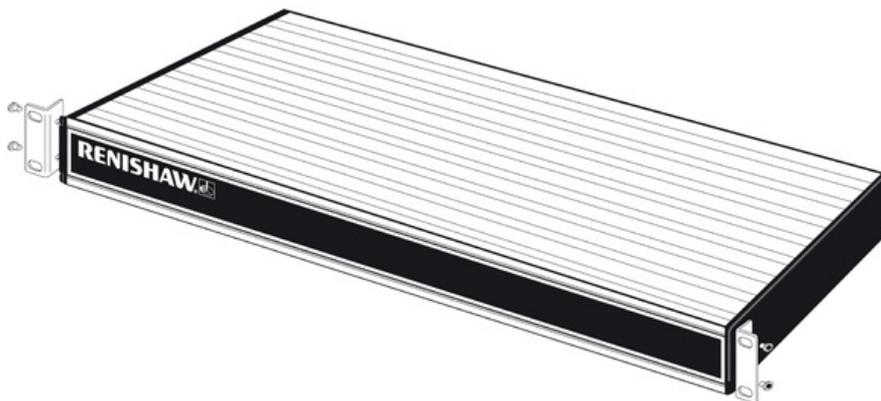
UCC T3 PLUS or UCC S3 (CMM controller) can either be free standing or used in a 19 inch rack system.

Stand-alone installation

The CMM controller 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 potential obstruction.

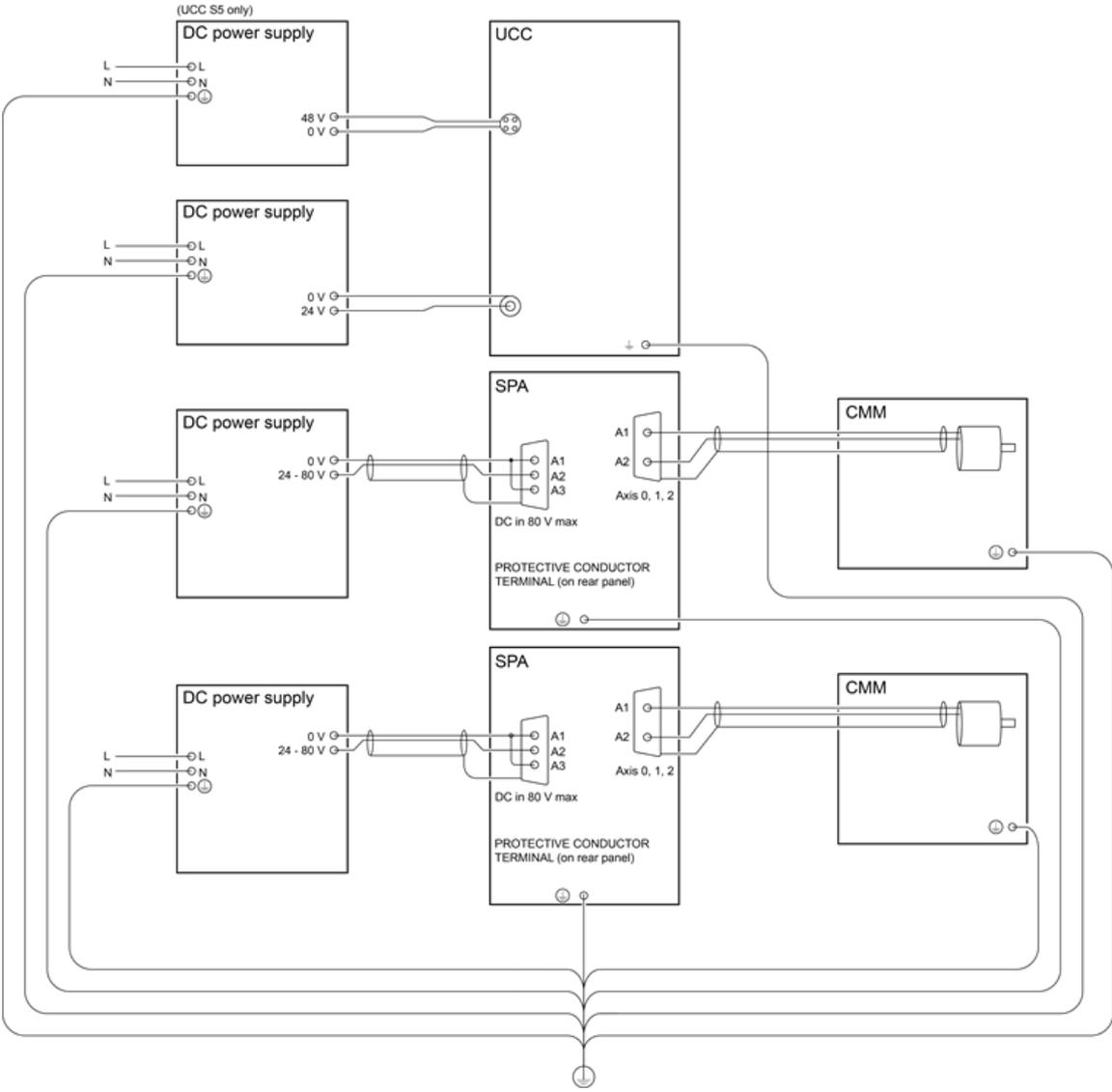
Mounting in a 19 inch rack

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



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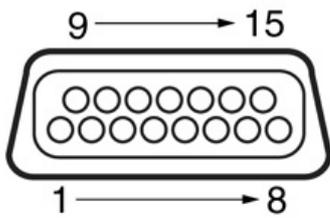
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PH10 head connector (15-way 'D' type socket)



NOTE: For maximum immunity from electrical noise, Renishaw recommends that:



1. Mating shells connectors must be metal bodied.
2. The overall cable screen is continuous and connected to the system ground on the user's equipment through the bodies of the connectors.

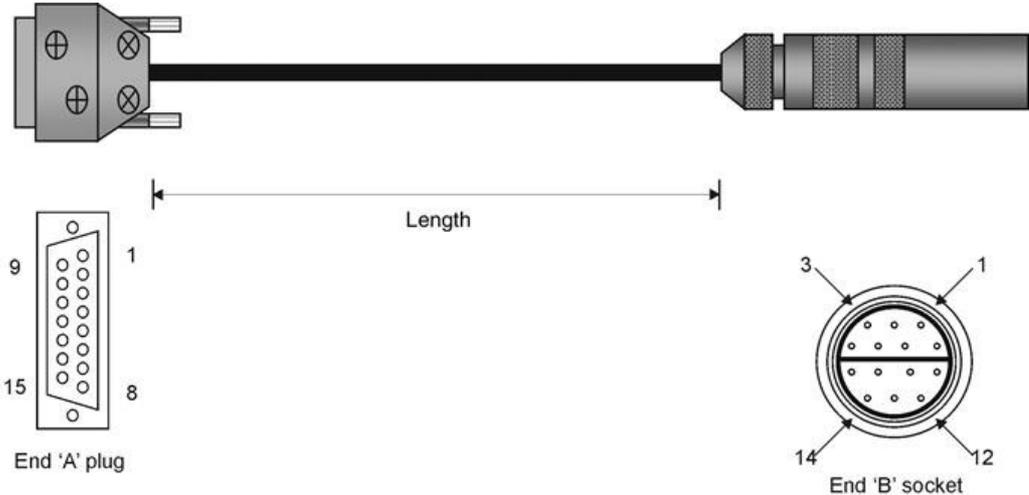


CAUTION: For correct system function, the maximum overall single core resistance between the head and the controller **MUST** be less than 2.5 ohm.

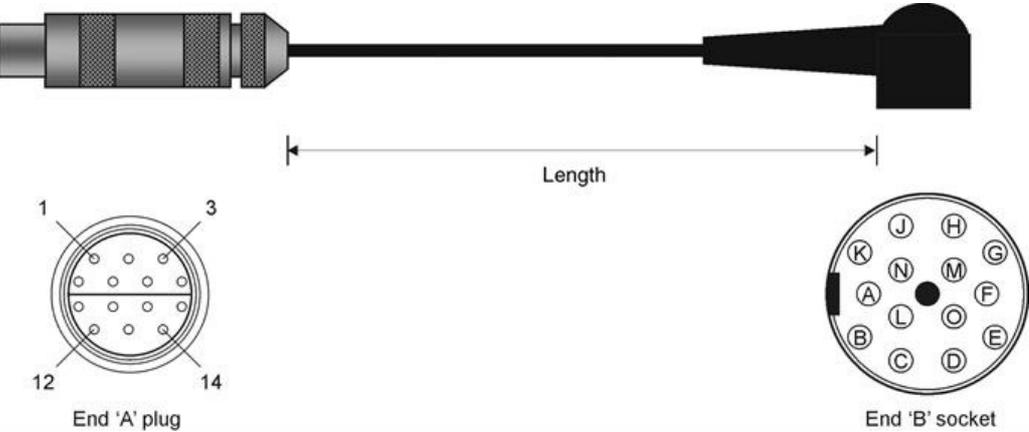
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Machine cable:



Probe head cable:



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	Controller	Controller		Head	Head	Maximum
Signal name	15-way male 'D' type	Cable PLM 6 - 9	14-way LEMO	12-core	14-way	Current
B-axis feedback	14	Black	(F) 1 (M)	Yellow	E	n/a
Ground sense / head present	1	Brown	(F) 2 (M)	Red	D	n/a
DC reference 12 V	6	Violet	(F) 3 (M)	Brown	C	n/a
0 V	4	Green / red	(F) 4 (M)	Grey	M	1000 mA
Locking motor 8 Vdc nominal	10	Green	(F) 5 (M)	White	H	350 mA
A-axis motor 12 Vdc nominal	12	Red	(F) 6 (M)	Green	L	350 mA
Not connected	2	Turquoise	(F) 7 (M)	Not connected	-	-
A-axis motor 12 Vdc nominal	11	White	(F) 8 (M)	Dark blue	F	350 mA
B-axis motor / probe contact	7	Pink	(F) 9 (M)	Violet	A	350 mA
B-axis motor / probe contact	15	Orange	(F) 10 (M)	Black	B	350 mA
Screen	Body	Screen	(F) 11 (M)	Screen	N, O	-
A-axis feedback	3	Yellow	(F) 12 (M)	Orange	G	n/a
LED and datum	8	Blue	(F) 13 (M)	Turquoise	J	15 mA
Motor / probe switch	5	Grey	(F) 14 (M)	Pink	K	40 mA



NOTE: The male pins numbered 4 and 7 of the 14 way LEMO connector are linked together.

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Renishaw head cables

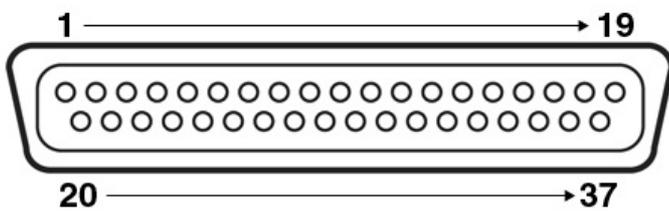
Cable	Name	Part number	Length	Type	Connector	Connects to	Connector	Connects to
Head cable	PL5	A-1016-7672	0.4 m to 0.8 m	Coiled	PH10 type	PH10 head	14-pin LEMO plug	Machine cable
Head cable	PL6	A-1016-7673	0.8 m to 1.6 m	Coiled	PH10 type	PH10 head	14-pin LEMO plug	Machine cable
Head cable	PL12	A-1016-7674	0.1 m	Straight	PH10 type	PH10 head	14-pin LEMO plug	Machine cable
Head cable	PL13	A-1016-7675	0.1 m to 0.2 m	Coiled	PH10 type	PH10 head	14-pin LEMO plug	Machine cable
Machine cable	PLM6	A-1016-7564	6 m	Straight	15-pin D-plug	UCC T3 PLUS / UCC S3	14-pin LEMO socket chassis mount	Head cable
Machine cable	PLM7	A-1016-7563	4 m	Straight	15-pin D-plug	UCC T3 PLUS / UCC S3	14-pin LEMO socket chassis mount	Head cable
Machine cable	PLM8	A-1016-7677	6 m	Straight	15-pin D-plug	UCC T3 PLUS / UCC S3	14-pin LEMO socket	Head cable
Machine cable	PLM9	A-1016-7678	4 m	Straight	15-pin D-plug	UCC T3 PLUS / UCC S3	14-pin LEMO socket	Head cable

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Temperature compensation connector (37-way 'D' type plug)

i **NOTE:** Thermal compensation is activated and setup through UCCassist-2.



Pin number	Description	Pin number	Description
1	Channel 1 input	20	Channel 1 return
2	Channel 2 input	21	Channel 2 return
3	Channel 3 input	22	Channel 3 return
4	Channel 4 input	23	Channel 4 return
5	Channel 5 input	24	Channel 5 return
6	Channel 6 input	25	Channel 6 return
7	Channel 7 input	26	Channel 7 return
8	Channel 8 input	27	Channel 8 return
9	Channel 9 input	28	Channel 9 return
10	Channel 10 input	29	Channel 10 return
11	Channel 11 input	30	Channel 11 return
12	Channel 12 input	31	Channel 12 return
13	Channel 13 input	32	Channel 13 return
14	Channel 14 input	33	Channel 14 return
15	Channel 15 input	34	Channel 15 return
16	Channel 16 input	35	Channel 16 return
17	Reserved	36	Reserved
18	Reserved	37	Reserved
19	Reserved	Shell	Screen

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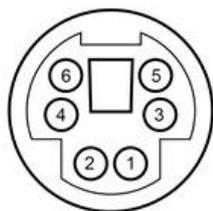
The thermistors for each channel connect between the CH input and CH return pins. The return signals are NOT zero volts and MUST NOT be connected to any zero volt signal, GND or screen. Do not connect the return signals to anything else apart from the thermistor.

i **NOTE:** For more information regarding the set up and usage of axis and work piece sensors, please refer to the TEC installation guide (Renishaw part number H-1000-5105).

Stylus change rack (SCR) connector

The SCR200 stylus change rack is connected to the controller via a 6 pin miniature DIN socket. The pin numbers are illustrated and their functions are shown in the table.

SCR200 connector (view on rear panel)



Pin number	Description	Pin number	Description
1	Reset	4	+5 V
2	Fault	5	0 V
3	Inhibit	6	Reserved
Shell	Screen		

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UCC T3 PLUS / UCC S3 to SPA3-2 connection

The units must be linked by the supplied shielded CAT 5E 300 mm cable(s), no other cables are to be used.

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Ethernet cable link to PC

This is a standard ethernet CAT 5E cable, a 5 m cable is supplied as part of the CMM controller kit. Lengths up to 100 metres can be used.

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PICS interface configuration

Configuration of the PICS (product interconnection system) is via UCCassist-2.

Renishaw's PICS allows a standard method of connection for real-time signals used by current Renishaw products.

Please refer to the PICS installation guide (Renishaw part number H-1000-5000) for further information when interfaces are fitted.



NOTE: TP7 is not supported with this product.

Cable connection

Renishaw supply a short 0.3 m PICS cable (PL25) with the PHC10-3 PLUS and ACC2-3 units. This cable is designed to connect between Renishaw controllers and interfaces.

A 5 m PICS cable (PL24) is available to connect the final output stage of the Renishaw system to the CMM controller.

Both cables are terminated with 9 way 'D' type connectors.

Cable specification

The maximum recommended cable length to interconnect between the Renishaw controllers and interfaces is 0.3 m.

The maximum recommended cable length to connect between the Renishaw system and the CMM controller is 5 m.

If greater lengths are required please discuss this issue with Renishaw.

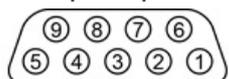
The cable should be a minimum of 9 cores 7/0.2 overall screened.

The screen must be terminated to the body of each connector.

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Output pin connections



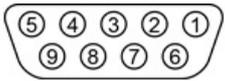
The pin connections for the 9-way 'D' type output socket are:

Pin	Function
1	STOP
2	PPOFF
3	0 V
4	ERROR
5	SYNC
6	HALT
7	PDAMP
8	LED off
9	READ
Screen	Cable screen

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Input pin connections



The pin connections for the 9-way 'D' type input plug are:

Pin	Function
1	STOP
2	PPOFF
3	0 V
4	LED anode *
5	Probe signal (input)
6	STOP 'pull up'
7	PDAMP
8	LED off *
9	Probe signal (return)
Shell	Screen

NOTE: LED OFF



This signal passes through all products and is connected to the LED anode in the probe head or probe head controller. Any product can turn off the LED by connecting LED OFF to 0 V.

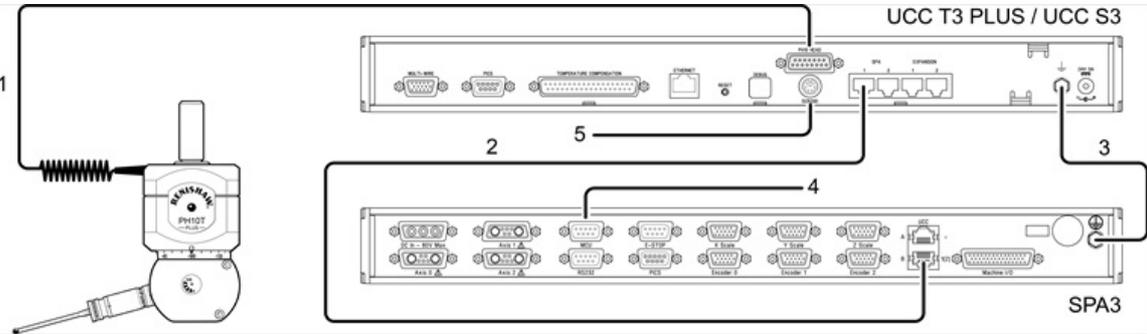
Termination resistors must not be used, but a series current limiting resistor of between 39 Ohms and 56 Ohms is strongly recommended.

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System interconnection diagrams

PH10 PLUS system with standard two wired touch-trigger probes

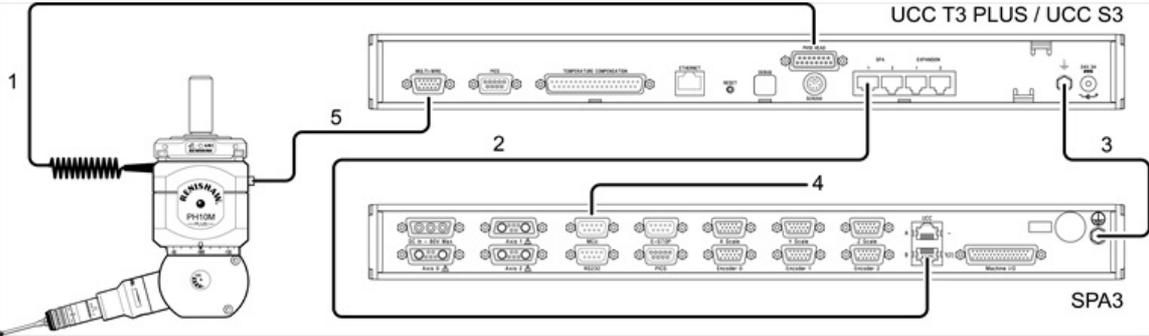


Key	Description
1	Head cable(s)
2	RJ45 cable (supplied)
3	16 / 0.2 mm earth connection
4	MCU connection
5	SCR200 rack connection

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PH10 PLUS system with multiwire scanning probes



Key	Description
1	Head cable(s)
2	RJ45 cable (supplied)
3	16 / 0.2 mm earth connection
4	MCU connection
5	Multiwire cable

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Connecting the UCC controller

Hardware connection

The host PC must have a dedicated ethernet connection to the UCC controller. It is recommended that this is NOT a USB plug-in adapter because of the reduction in speed of operation these devices normally produce.

If the host PC is also to be connected to a network, it is necessary to install additional hardware within the host PC to permit a dedicated connection to be available for UCC controller communication. For details on how to install additional hardware into the host PC, please refer to the PC's installation / users guide.

The UCC controller is capable of using 10 Mbps, 100 Mbps and 1 Gbps ethernet. The selection is determined by the capability of the network adaptor to which it is connected. It is recommended that a 100 Mbps network adaptor is used.

A 5 m CAT 5E cross-over ethernet cable is provided for this link as part of the UCC controller kit. Other lengths may be used, but the maximum is governed by the generic specification for ethernet connections (i.e. a hundred metres) which is sufficient for any CMM installation.

If there are concerns about EMC disruption due to the environment, or the routing of the cable, then the using a shielded cable is recommended.

It is suggested that the cross-over cable is labelled as a cross-over cable looks identical to a normal ethernet cable.

Software installation

The UCCassist-2 software must be installed on the host PC prior to connection of the UCC controller.

The latest version of UCCsuite can be downloaded from the Renishaw website for anyone with a MyRenishaw account. UCCsuite will install UCCassist-2 and UCCserver to enable the hardware set-up.

After the software has been installed, one of the utility sequences available is "IP Configurer" which is used to give the UCC controller an IP address and establishes the pairing of the PC and the UCC controller.

Configuration of IP addresses

This section describes the steps needed to connect the UCC controller to the host PC and configure the ethernet communication link.

 **NOTE:** The examples used in this section are for Windows10 Professional and will vary for other operating systems.

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IP addressing

Choose an IP address for the UCC controller and an IP address for the PC's network adaptor that are of the same class:

class A 1.0.0.1 – 126.255.255.254	For class A networks, a network is defined by the first number.
class B 128.0.0.1 – 191.255.255.254	For class B networks, a network is defined by the first two numbers.
class C 192.0.0.1 – 223.255.255.254	For class C networks, a network is defined by the first three numbers.

NOTE: The last number must not be 0 or 255.

If there is more than one network connection in the PC, choose a network class for the UCC - PC connection that is not currently in use to keep the connections clearly separate. To find out which IP address the other network interfaces use, bring up the command prompt, then type "ipconfig". Its output will look similar to this:

```

C:\> Command Prompt

Ethernet adapter Ethernet:

    Media State . . . . . : Media disconnected
    Connection-specific DNS Suffix . : renishaw.com

Ethernet adapter Ethernet 2:

    Media State . . . . . : Media disconnected
    Connection-specific DNS Suffix . :

Wireless LAN adapter Local Area Connection* 10:

    Media State . . . . . : Media disconnected
    Connection-specific DNS Suffix . :

Wireless LAN adapter WiFi:

    Connection-specific DNS Suffix . : renishaw.com
    IPv4 Address. . . . . : 172.17.1.130
    Subnet Mask . . . . . : 255.255.0.0
    Default Gateway . . . . . : 172.17.0.1

Mobile Broadband adapter Mobile:

    Media State . . . . . : Media disconnected
    Connection-specific DNS Suffix . :

Z:\>
    
```

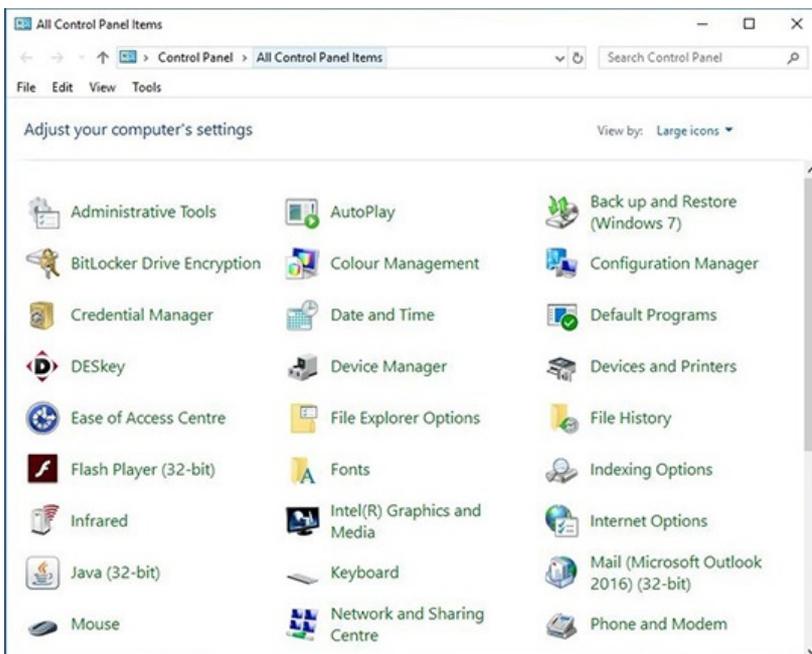
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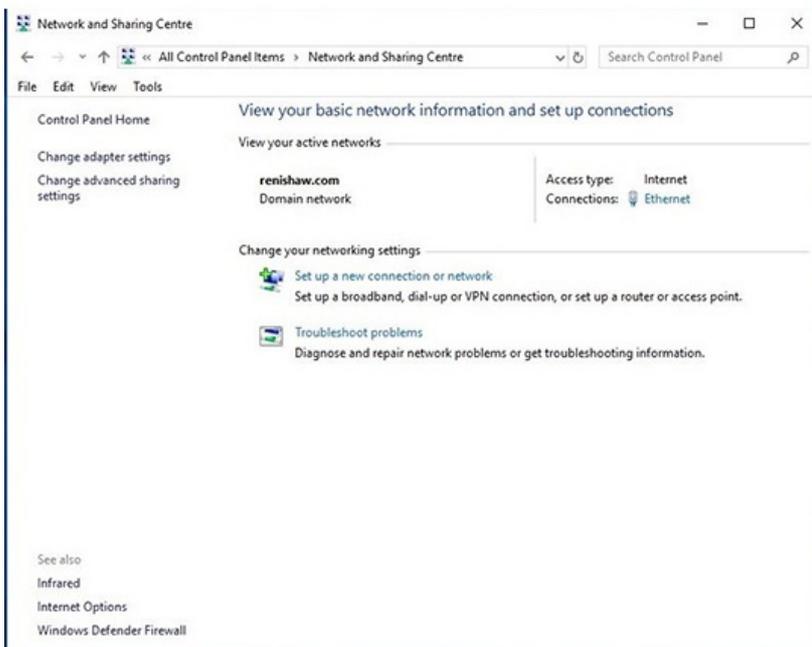
Setting the IP address of the PC

The process to set the IP address on the PC varies with each version of Windows. Administrator rights are needed in order to perform this operation.

a) Navigate to 'Control Panel', then select 'Network and sharing centre':



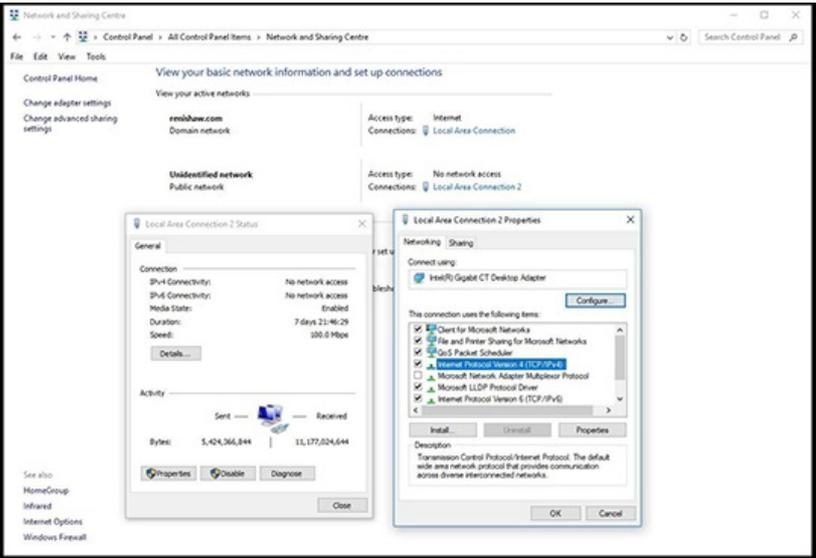
b) Select 'Ethernet' in 'Access type connections':



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c) Click on 'Properties' and select 'Internet Protocol (TCP/IPv4)' and click 'Properties'.

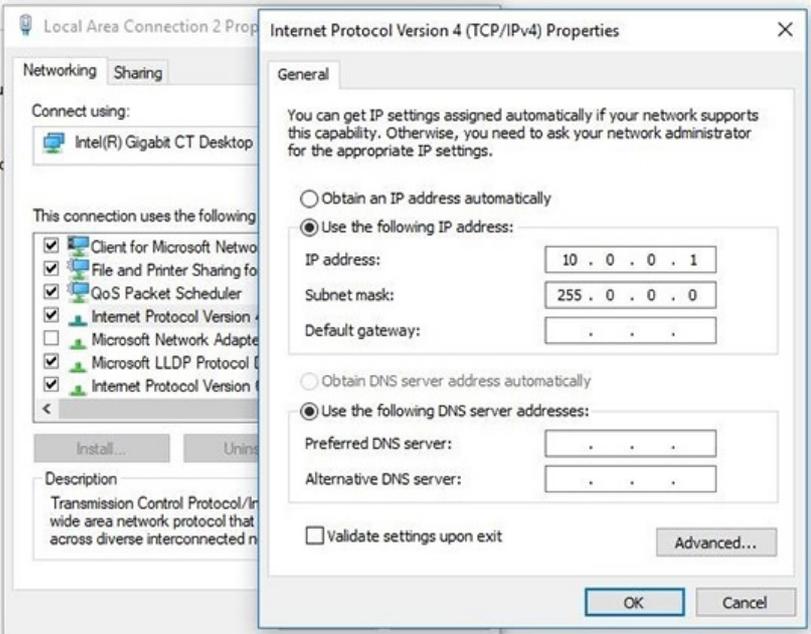


d) Select 'Use the following IP address' and type in the IP address to use for the PC end of the comms link. Click in the Subnet mask field. On Windows10 the Subnet mask will already be filled in. If you have to fill it in for yourself, here are the values:

Class of network IP address belongs to	Subnet mask to use
A	255.0.0.0
B	255.255.0.0
C	255.255.255.0

Leave the 'Default gateway' field blank.

Example:



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e) Click 'OK' and then 'OK' again. On earlier versions of Windows the PC needs to be rebooted.

Setting the IP address of the UCC controller

The UCC controller is not intended to be used on a corporate network. It is extremely important that the setting of the IP address of the UCC controller is on a dedicated connection. It is also important that the connection is not “firewalled” at the PC end. Administrator rights are needed in order to perform this operation.

Turn on the UCC controller and press the reset button (within 15 seconds), then wait for it to boot up.

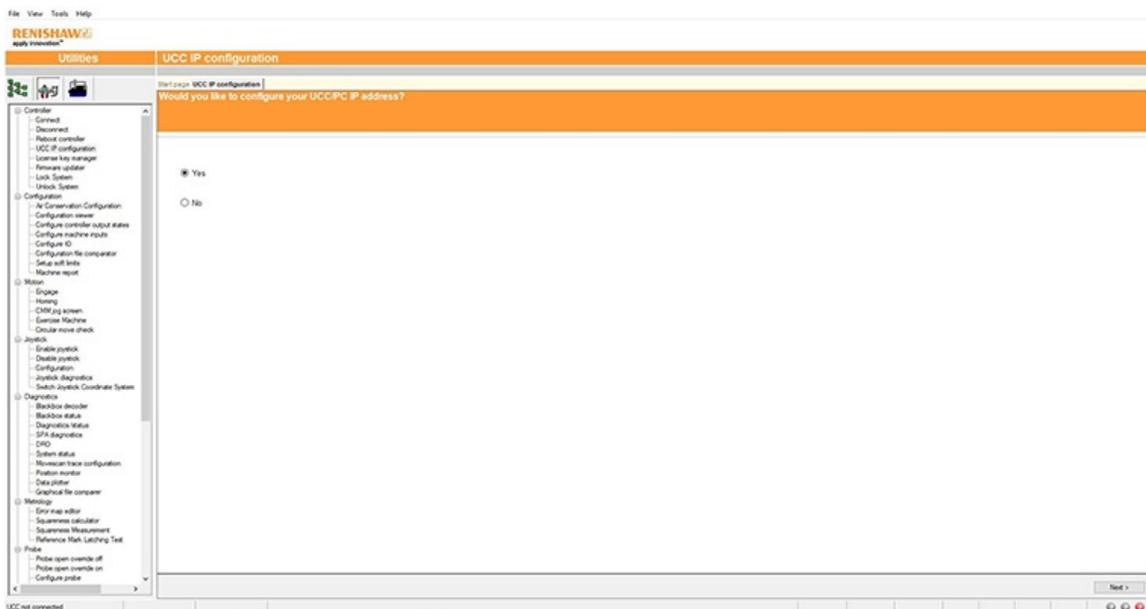


NOTE: This will take about 15 seconds.

It will enter its IP configuration state, shown by the 'Error' LED flashing rapidly.

Now start UCCassist-2 and the UCC IP configuration utility or commissioning sequence on the PC.

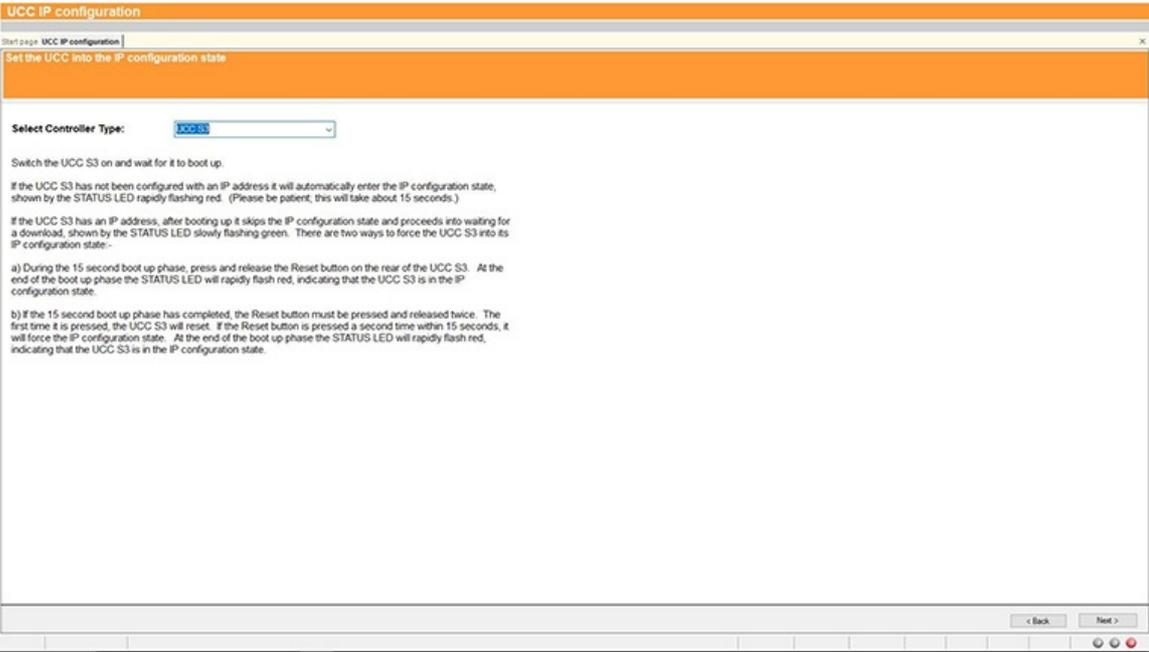
a) Login to UCCassist-2 → Go to 'Utilities bar' → Select 'IP Configure':



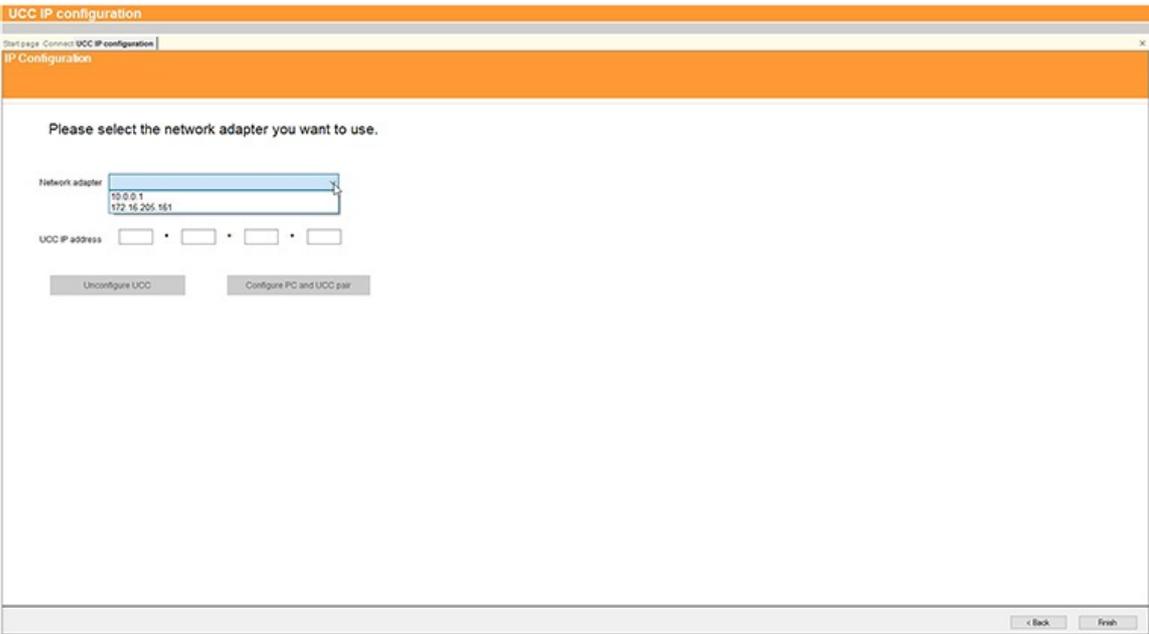
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b) Pressing 'Next' will bring up a screen to allow the specific controller to be selected. It will also give instructions on getting the controller into IP configure mode depending on if it has already been configured or has no current configuration.



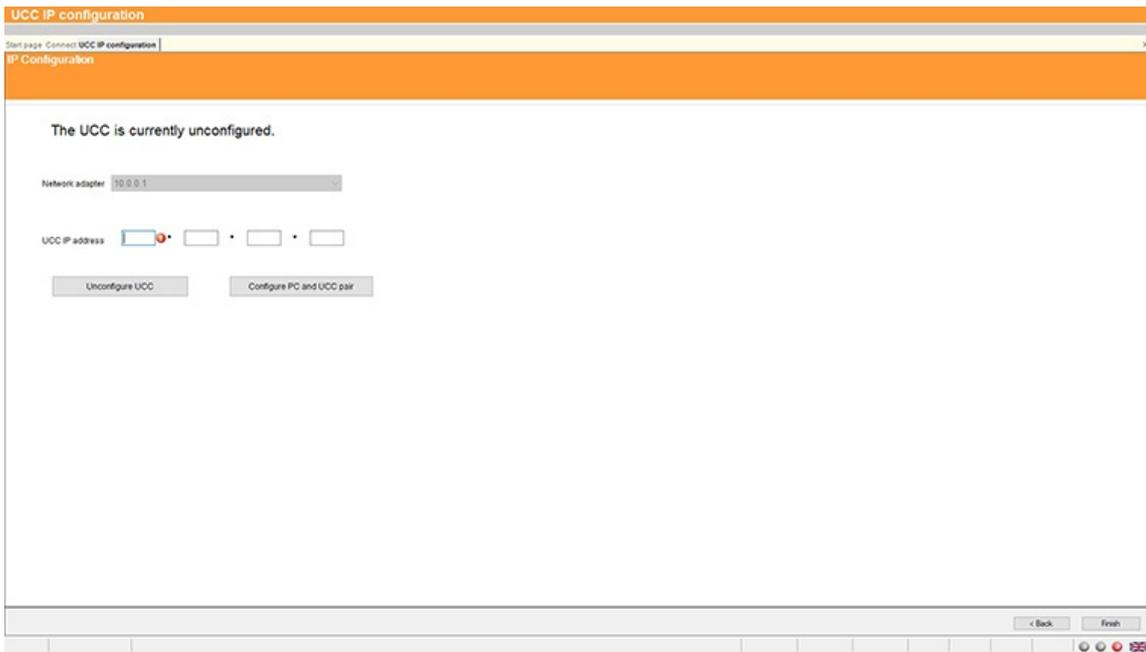
c) Click on the drop-down icon and select the IP address of the network adapter into which the UCC controller is plugged (this should be the one on which the IP address was set in 'Setting the IP address of the PC').



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d) The UCC controller does not have an IP address. Type in the relevant address to match the network adapter in the PC. In the case below this is 10.0.0.1:



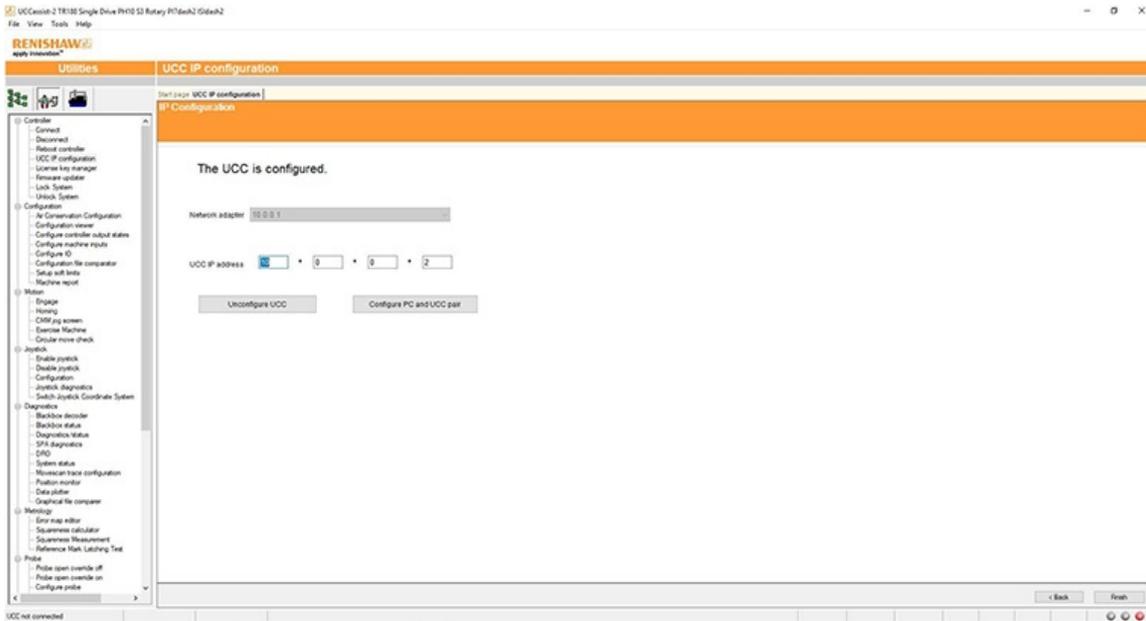
e) Fill in the desired IP address. The IP configuration software has given you a head start by filling in the network part of the address appropriate for the network adapter selected (see section 'IP addressing' for a discussion of the choice and of IP addresses in general).



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f) Click on 'Configure PC and UCC pair'. If all is well this will result in the address being applied to the controller and the IP configure screen will close. If the controller is already configured a dialogue box saying the UCC is configured will open. Click 'Next' to finish.



NOTE: Whenever one of the items in this pairing is changed, e.g. by connecting a different UCC controller to the PC, the UCCassist-2 IP configuration software must be re-run to establish the new UCC controller to the PC system.

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Changing the IP address of the UCC

If the UCC controller already has an IP address, after booting up it skips its IP configuration state and proceeds into waiting for a download, shown by the status LED flashing slowly. There are two ways to force the UCC controller into its IP configuration state:

- a) During the 15 second power up phase, before the error LED comes on, press and release the 'Reset' button on the rear of the UCC controller. At the end of the power up phase the error LED will flash rapidly indicating it is in the IP configuration state.
- b) If the UCC controller has already powered up with the error light flashing slowly, i.e. about once per second, or even if the control software has been downloaded, the reset switch will need to be pressed twice. The first time to reset the controller then a second time, within 15 seconds, to force the IP configuration state.

The UCC controller is now in its IP configuration state, and the UCCassist-2 IP configuration software can be run on the PC, selecting the appropriate network adapter required. The current IP address of the UCC controller will be displayed. Type in the new one and click on 'Configure PC and UCC pair'.

Establishing a new UCC - PC pairing

If a different UCC controller is connected to the PC, or a different PC to the UCC controller or even if the network settings on the PC are modified, ensure that they are a matched pair. To do this, go through the procedure in the 'Setting the IP address of the PC' section, even if you do not wish to change the IP address of the UCC controller (if the IP address is already suitable, then you do not need to re-type it). Clicking on 'Configure PC and UCC pair' will establish the new pairing.

Downloading

The name of the downloadable file is specific to the controller so the correct controller needs to be selected to select the correct downloadable. Other controller downloadables will not work on a different controller. Remember to change the name in any configuration settings appropriate for the front-end.

The UCC controller system should now be established.

UCC T3 PLUS and UCC S3 CMM controller installation guide

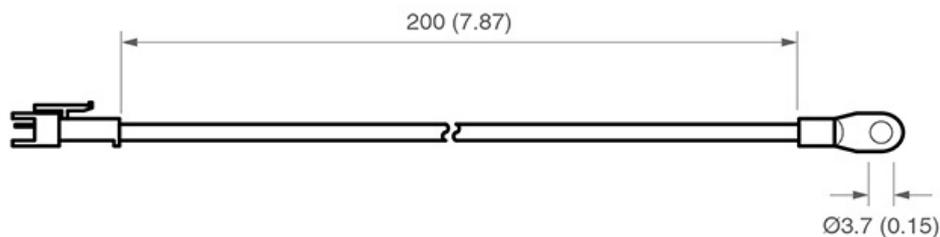
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Temperature compensation

i **NOTE:** Thermal compensation is activated and setup through UCCassist-2.

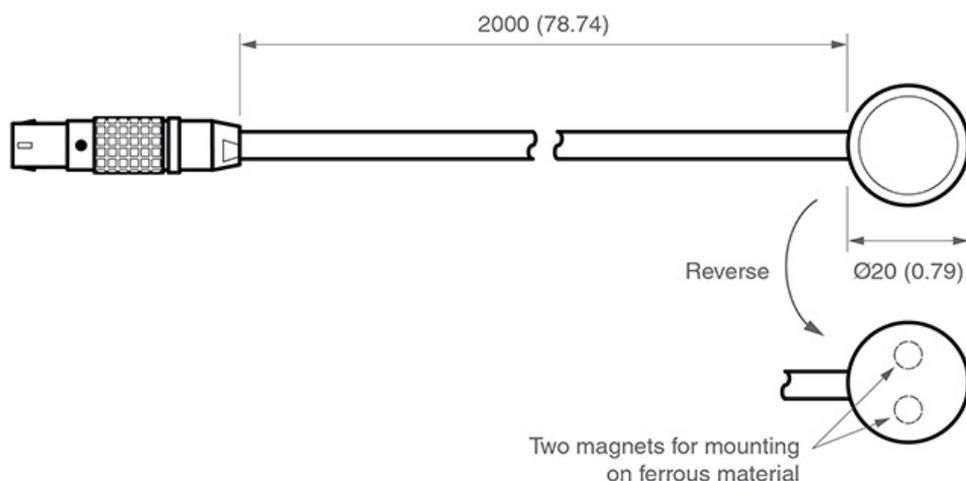
Axis sensors

Axis sensors are required to monitor and compensate for any temperature changes within the CMM's scale. The axis sensor is housed in a potted ring terminal with a $\text{Ø}3.7$ mm hole which can be screwed or glued in position using a thermally conductive glue. The axis sensors are supplied with a 200 mm cable (attached) with a male JST connector fitted to the end. The mating part of the connector is supplied as part of the axis sensor kit.



Workpiece sensors

Workpiece sensors are required to monitor and compensate for any temperature changes of the workpiece material. They can be magnetically mounted or clamped to the workpiece. The sensors are housed in a $\text{Ø}20$ mm aluminium body with a polyacetal sleeve. The sensors should always be handled by the polyacetal sleeve in order to reduce any thermal effects. The sensors are supplied with a cable length of 2000 mm and have a LEMO connector fitted. The mating part of the connector is supplied as part of the workpiece sensor kit in in-line form.

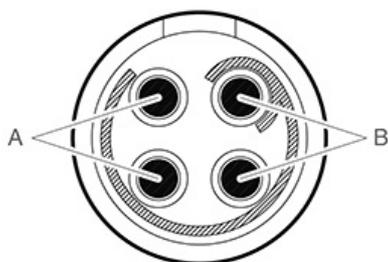


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Pin allocation

With the red dot on the LEMO pointing upwards:



- 'Pair A' - Top left pin and bottom left pin
- 'Pair B' - Top right and bottom right

i **NOTE:** Ensure the sensor is connected to the controller with one pin from 'pair A' and one pin from 'pair B'.

Workpiece sensor

Ensure the workpiece sensor is in full contact with the workpiece.

Aim to position the workpiece sensor in the middle of the workpiece or near where the measurement is taking place.

Electrically ground workpiece prior to using the thermal effect compensation system to avoid electrostatic discharge (ESD) through the workpiece sensor.

Use multiple sensors for large workpieces.

Handle the workpiece sensor by the white sleeve if possible or wait for five minutes once the sensor is in position before proceeding to take a measurement.

Keep the workpiece sensor cabling away from moving sections of the CMM.

i **NOTE:** It is not recommended to run axis thermal compensation without workpiece compensation (where axes and workpiece are at the same temperature) as it is unlikely that reliable results will be obtained.

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Axis sensors

Ensure the sensors are mounted as close as possible to the axis scales

It is recommended to have at least two sensors per axis to account for temperature gradient effects

On large or high specification CMMs, use more than three sensors per axis

Thermally conductive glue should be used when gluing axis sensors to an axis

All axis sensor cabling must be tightly secured to the axis body to prevent it getting trapped during moves

Sensor resistance checks

A resistance check test is recommended:

- During system installation once all sensor cabling has been completed
- After every hardware change to the system (e.g. sensor, cable or switch change)
- Every six months, after the system has been commissioned, to check for any sensor failure or cabling issues

Resistance check procedure

1. Regulate the temperature of the CMM room to a constant temperature between 16 °C and 28 °C.
2. Allow the CMM to stabilise thermally for a minimum of one hour.
3. Measure the sensor resistance from the CMM controller connector. This will ensure all intermediate cable and connections are correct.
4. All workpiece and axis sensor resistance measurements should be within this range; $8.4 \text{ k}\Omega < R < 15.7 \text{ k}\Omega$.

Best practise for using the thermal compensation system

- Ensure the CMM is not subjected to unnecessary changes in temperature (fans blowing, close to radiator, in direct sunlight or any other powerful radiant sources)
- Excessive humidity should be avoided
- Use the system as close as possible to the calibrated temperature
- Renishaw recommends that workpiece and axis sensors are verified at six month intervals

System accuracy and calibration

The TEC system can be used without calibration. The system accuracy is $\pm 0.2 \text{ }^\circ\text{C}$.

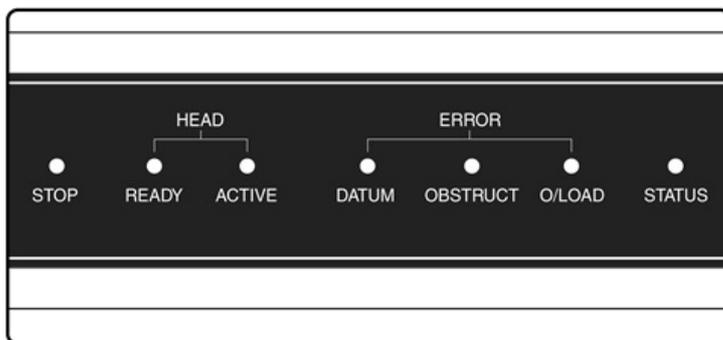
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UCC T3 PLUS and UCC S3 troubleshooting

Front panel LEDs

UCC T3 PLUS or UCC S3 visual diagnostics



LED status key:

LED	Description
	LED on
	LED flashing off / on
	LED flashing green / red
	LED off
	LED flashing red / blue

Name	LED colour	Function
STOP		PHC10-3 PLUS asserting PICS STOP when lit
STOP		PI 200 asserting PICS STOP
HEAD READY		Head ready for use when lit
HEAD ACTIVE		Head indexing when lit
DATUM ERROR		Head datum error when lit
OBSTRUCT ERROR		Head obstruct error when lit
O/LOAD ERROR		Head overload error when lit

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Name	LED colour	Function
STATUS	⊖	No LED - no power to UCC T3 PLUS / UCC S3 or downloadable unable to start, power cycle and try again
STATUS	●	Continuous LED - problem with comms link - reboot UCC T3 PLUS or UCC S3 and configure IP
STATUS	⦿	Slow flash - waiting for download
STATUS	●	Continuous light - download successful
STATUS	⦿	Fast flash (5 Hz) - IP configuration mode
STATUS	⦿ ⦿ ⊖ ⦿ ⦿ ⊖	Dual flash - controller booting
STATUS	⦿ ⊖ ⊖ ⦿ ⊖ ⊖ ⦿	Internal timeout - reboot UCC T3 PLUS or UCC S3
STATUS	⦿	Fast flash (5 Hz) - communications error - reboot required
STATUS	⦿ ⦿	Slow flash - scale error - reboot required
STATUS	⦿ ⦿	Slow flash - problem with download - reboot required (check the file type is valid)
STATUS	●	Continuous LED - UCC T3 PLUS or UCC S3 overheated
STATUS	⦿	Slow flash - unit does not have controller ID - return to Renishaw
STATUS	⦿	Fast flash (5 Hz) - no controller ID in IP configuration mode - return to Renishaw



NOTE: A scale error will cause the UCC T3 PLUS or UCC S3 to enter an error state which is not recoverable within a metrology application environment. If a scale error occurs it will be necessary to reinitialise the installation due to the possibility of lost scale counts and metrology being effected.

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This section on troubleshooting is a guide to problems associated with the installation and integration of the PH10 system only. Refer to the 'PH10 PLUS installation and user's guide' (Renishaw part number H-1000-5070) regarding problems associated with normal operation of the PH10 system.

The UCC T3 PLUS or UCC S3 will assert PICS STOP under the following conditions:

Condition	Notes
Overload error	Head has been overloaded when locked, causing it to unlock.
Obstruct error	Head has been obstructed when moving to requested position or is unable to lock into it.
Head disconnect	Head removed, cables disconnected, cable break
Datum error	The head has failed to lock up correctly.

Pressing and releasing the E-STOP button will clear the PICS STOP providing the cause has been addressed.

Use the tables below to identify problems you are experiencing with your PH10 PLUS system. If you experience problems which you are not able to identify or solve satisfactorily, please contact Renishaw for further advice.

No head movement in automatic mode:

Possible cause	Solution
Cable / connection fault	Check connection and integrity of cabling between head and controller.

No probe signal from PH10 PLUS:

Possible cause	Solution
Cable / connection fault	Check connection and integrity of cabling between head and controller.
Multiwire bypass connector not fitted	Fit a multiwire bypass connector which will permit a standard touch-trigger probe signal to reach controller.
Multiwired probe in use (SP25M)	Check that the multiwire cable is correctly fitted to the head. Check that the trigger output to the CMM controller is connected to the multiwired probe interface.

Poor measurement performance associated with the PH10 PLUS:

Possible cause	Solution
Loose mounting of head	Ensure all mounting screws are tight and mounting to CMM is secure.
Probe damping enabled during measurement	Ensure probe damping is not enabled during measurement moves.
Stylus is too close to the surface before taking point	Increase standoff distance in program.

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UCC T3 PLUS and UCC S3 maintenance



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.

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.

Advisory

It is recommended that periodical metrology tests are performed in order to identify any faults in subsystems eg air bearings, structure, cables, software etc.

Cleaning

Cleaning should be carried out with a lint free cloth on outer surfaces only as the unit is not sealed against liquid.

Filter replacement

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

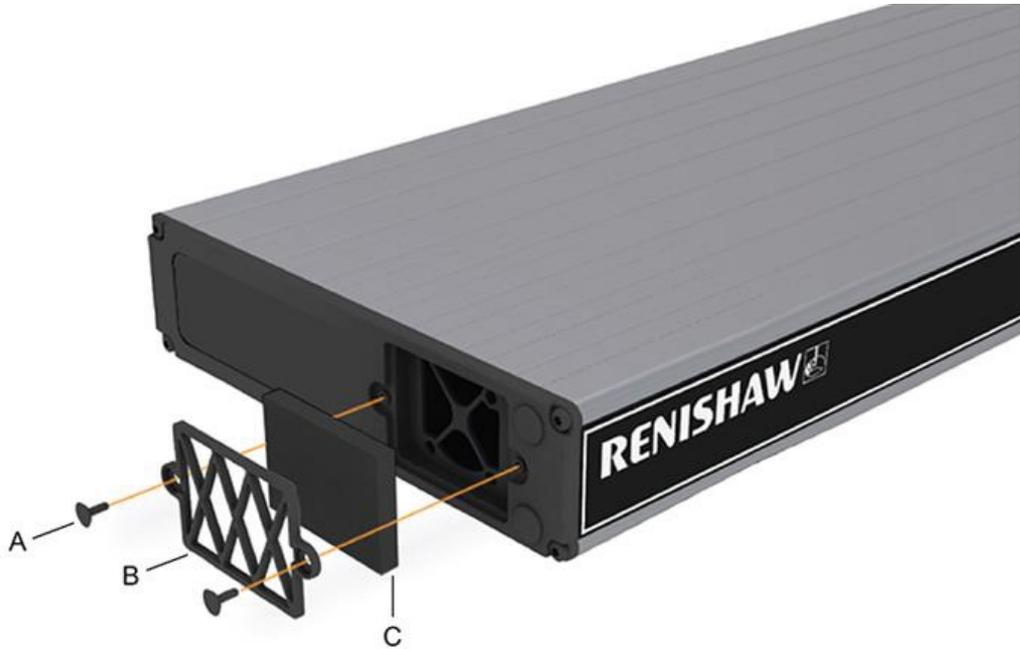
Exchanging / removing the air filter

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

1. Isolate the controller via the ac power.
2. Remove the 19 inch rack mounting brackets (if fitted) by removing the two fixing screws on each side.
3. Pull both the filter retaining clips [A] away from the unit, this should permit the external filter cover [B] to be removed.
4. Remove the filter material [C] from the filter recess (replacement part number of filter is A-5518-0011).
5. Refit the filter cover and mounting brackets in the reverse order above.

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

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