

UCC T5 PH20 CMM controller installation guide

<http://www.renishaw.com>

UCC T5 PH20 CMM controller installation guide

Documentation part number: H-1000-7573-03-A



UCC T5 PH20 CMM controller installation guide

<http://www.renishaw.com>

General information

© 2013 - 2016 Renishaw plc. All rights reserved.

This document may not be copied or reproduced in whole or in part, or transferred to any other media or language, by any means, without the prior written permission of Renishaw.

The publication of material within this document does not imply freedom from the patent rights of Renishaw plc.

Disclaimer

RENISHAW HAS MADE CONSIDERABLE EFFORTS TO ENSURE THE CONTENT OF THIS DOCUMENT IS CORRECT AT THE DATE OF PUBLICATION BUT MAKES NO WARRANTIES OR REPRESENTATIONS REGARDING THE CONTENT. RENISHAW EXCLUDES LIABILITY, HOWSOEVER ARISING, FOR ANY INACCURACIES IN THIS DOCUMENT.

Trademarks

RENISHAW® and the probe emblem used in the **RENISHAW** logo are registered trademarks of Renishaw plc in the UK and other countries.

apply innovation is a trademark of Renishaw plc.

All brand names and product names used in this document are trade names, service marks, trademarks, or registered trademarks of their respective owners.

Windows XP, Windows 2000, Vista and Windows 7 are registered trade names of the Microsoft Corporation.

All trademarks and trade names are acknowledged.

WEEE



The use of this symbol on Renishaw products and/or accompanying documentation indicates that the product should not be mixed with the 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 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

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.

Claims under warranty must be made from authorised service centres only, which may be advised by the supplier or distributor.

UCC T5 PH20 CMM controller installation guide

<http://www.renishaw.com>

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.

UCC T5 PH20 CMM controller installation guide

<http://www.renishaw.com>

EC declaration of conformity

Renishaw plc hereby declare that the UCC T5 controller is in compliance with the relevant provisions of directive 2004/108/EC .

Contact Renishaw plc or visit www.renishaw.com/knowledgebase for the full EC declaration.

UCC T5 PH20 CMM controller installation guide

<http://www.renishaw.com>

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.

Equipment label (47CFR section 15.19)

This device complies with part 15 of the FCC rules. Operation is subject to the following two conditions:

1. This device may not cause harmful interference
2. This device must accept any interference received, including interference that may cause undesired operation.

UCC T5 PH20 CMM controller installation guide

<http://www.renishaw.com>

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 T5 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 +10%,-10%
Frequency range	50 Hz to 60 Hz
Output current	3 A
Output voltage	24 V
Transient voltages	Installation category II

The UCC T5 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 any applicable national wiring regulations for the country of installation.

The UCC T5 is provided with an equipotential bonding point which must be used to connect it to the rest of the installations ground structures.

⚠ WARNING: Switching off or isolating the UCC T5 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.

⚠ WARNING: The system can accelerate quickly during operation. It is recommended that eye protection is worn if the user enters the working volume of the CMM.

UCC T5 PH20 CMM controller installation guide

<http://www.renishaw.com>

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	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

i * **NOTE:** It may be necessary to house UCC T5 in a suitable enclosure according to the installation's environmental conditions to obtain a higher IP rating.

UCC T5 PH20 CMM controller installation guide

<http://www.renishaw.com>

References and associated documents

It is recommended that the following documentation is referenced when installing the UCC T5:

Renishaw documents

Title	Document number
Installation guide: PH20	H-1000-5209
Installation guide: SPA3	H-1000-7566
Installation and user's guide: MCU	H-1000-5182
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 (IEC) 60204-1:2006 (Safety of machinery - Electrical equipment of machines - Part 1: General requirements).

UCC T5 PH20 CMM controller installation guide

<http://www.renishaw.com>

Introduction

The UCC T5 is the latest addition to the Renishaw CMM controller product range. It replaces the UCC2 and 5-axis card in PH20 applications.



Key	Description
1	Machine motors
2	Machine scales and readheads
3	Probe head - PH20 connects to UCC T5 via the orange machine cabling
4	UCCassist-2 commissioning software and application software
5	UCC T5 and power amplifier SPA3 - these connect to the machine cabling
6	MCU joystick - MCUlite-2, MCU5 or MCU W - connects to SPA3
7	PC - connects to UCC T5 via an Ethernet cable

UCC T5 PH20 CMM controller installation guide

<http://www.renishaw.com>

The UCC T5 comprises of 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 T5 controller has the capability to:

- control three axes of a CMM (accepting digital readhead signals and generating three axes drive motor control signals)
- accept input signals from emergency stop, air pressure, crash detector, digital SPA, amplifier faults and all axis inner and outer travel limit switches
- accept two uncommitted general purpose input signals and generate one uncommitted general purpose output signal
- interface PH20
- directly support the Renishaw SPA3 servo power amplifier
- directly support the Renishaw TEC (16 channels) and RS232 (Mitutoyo) TEC systems
- provide a +24 V supply for use by the CMM switches

The UCC T5 supports the MCULite-2, MCU5 and MCU W joysticks through the SPA3.

This guide gives information on physical installation, system connections and communications, as well as assistance in fault finding during the installation of the UCC T5.

⚠ WARNING: UCC T5 is not compatible with PH9, PHS, PH10 and REVO systems. No attempt should be made to connect these system components to the UCC T5 as this will result in damage to the product or attached equipment.

Please use this guide in conjunction with the PH20 user's guide in order to fully understand the system's features, capabilities and operation.

The UCC T5 must be used in conjunction with a Renishaw SPA3. Setup and commissioning should be completed through Renishaw's UCCassist-2 software.

The UCC T5 has replaced the UCC2-2 and 5-axis daughtercard. It also replaces the TEC card and provides support for 16 channels of temperature compensation.

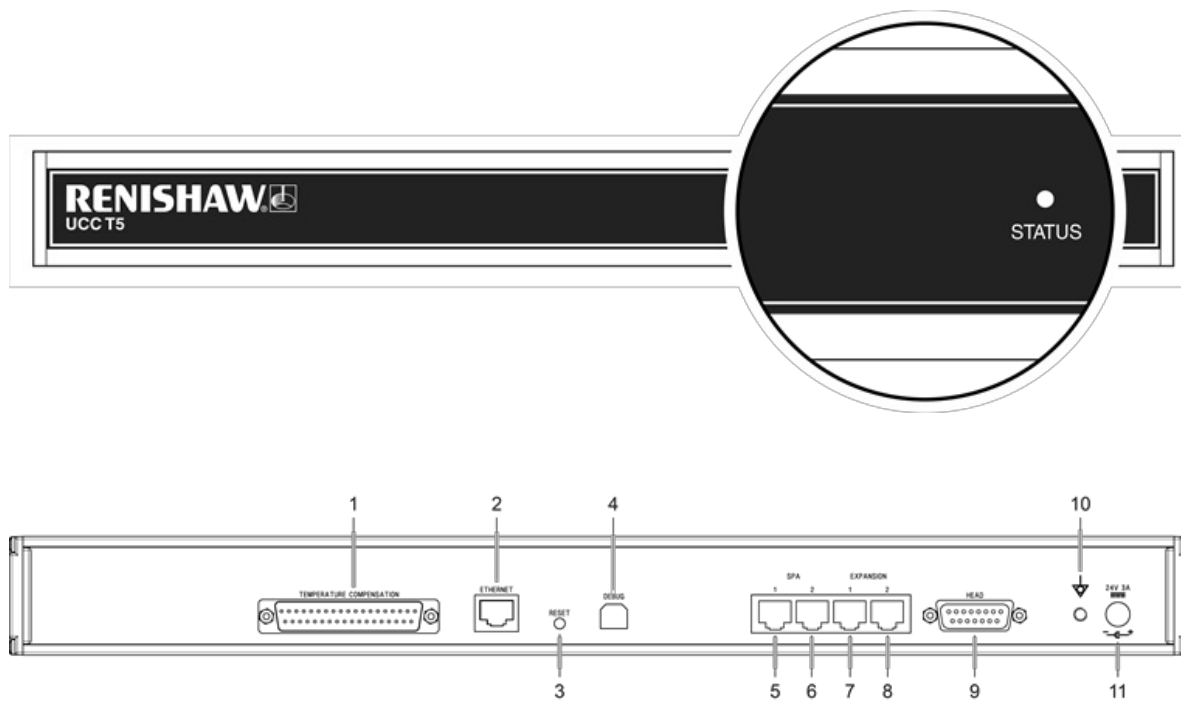
The UCC T5 uses an external power supply and manages full control of the PH20 head, CMM and probe signals and communicates with the CMM's computer.

UCC T5 PH20 CMM controller installation guide

<http://www.renishaw.com>

Front panel

UCC T5



Rear panel layout

Key	Description	Key	Description
1	37 way D-type plug for temperature compensation	7	Reserved
2	Ethernet communications connector to CMM computer	8	Reserved
3	Reset button	9	15 way D-type socket for PH20 connection
4	Reserved - (USB type B socket)	10	Equipment bond point
5	RJ45 connector to SPA3	11	DC power jack
6	RJ45 connector to second SPA3 (not implemented at this time)		

UCC T5 PH20 CMM controller installation guide

<http://www.renishaw.com>

Installation

Dimensions

Width: 440 mm (17.3 in)

Depth: 180 mm (7.1 in)

Height: 44 mm (1.7 in)

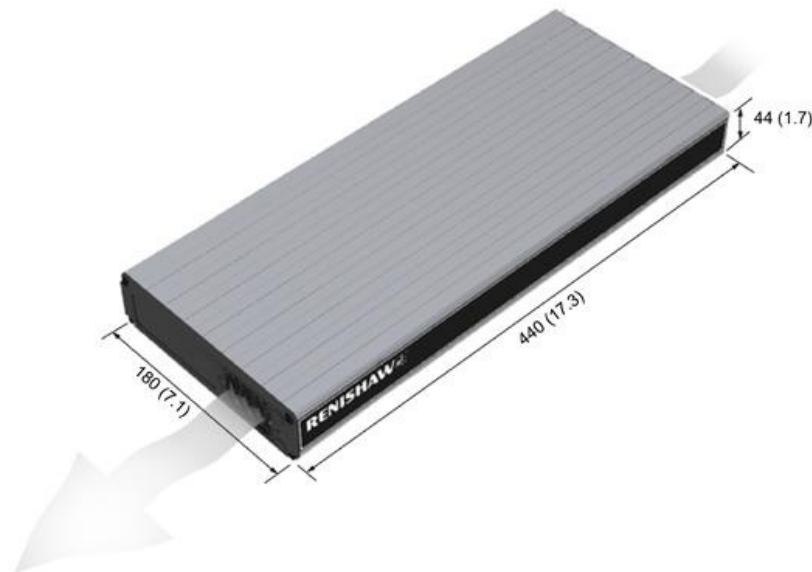
Weight: 2.1 kg (4 lb 10 oz)

UCC T5 can either be free standing or used in a 19 inch rack system.

CAUTION: Ensure the controller is disconnected from the mains supply during installation.

Stand-alone installation

The UCC T5 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.

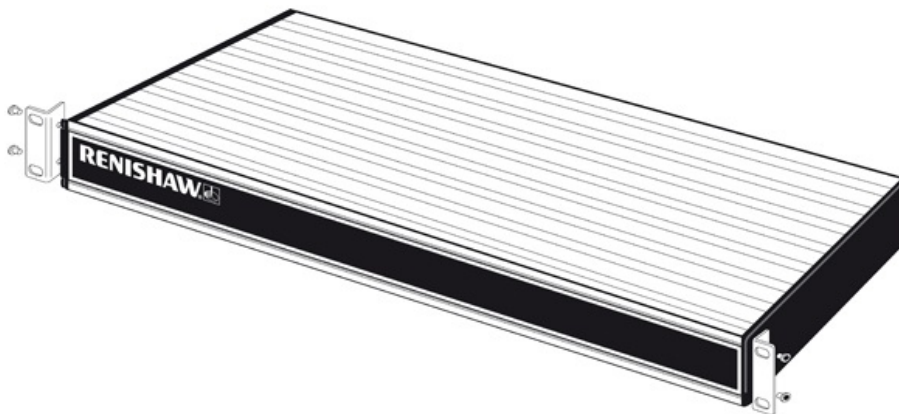


UCC T5 PH20 CMM controller installation guide

<http://www.renishaw.com>

Mounting in a 19 inch rack (optional)

The rack mounting kit (part number A-1018-0189) contains two brackets and four M5 × 6 mm screws. Assemble the brackets to the UCC T5 as shown below:



Cable lengths

UCC T5 to SPA3 connection

The units are linked via a CAT 5 or STP/ FTP cable. 300 mm cables are supplied with the UCC T5 kits. It is not recommended to use a cable over 400 mm.

Ethernet cable link to PC

This is a standard ethernet CAT 5 cross-over cable and a 5 m cable is supplied as part of the UCC T5 kit. Lengths up to a maximum of 20 metres can be used.

UCC T5 PH20 CMM controller installation guide

<http://www.renishaw.com>

General wiring standards

To achieve reliable operation of the UCC T5 and the CMM's host computer, the following points should be observed:

- All signal cables **MUST** be screened and all cable screens must be connected electrically to the metal shells of the cable connectors
- It is recommended that cable screens should only be connected to the protective earth (via the connector shell) of the UCC T5 and SPA3
- To avoid earth loops, cable screens should not be directly attached to the CMM's protective earth
- The protective grounding must be continuous between the controller and all other equipment in the installation
- All cable connectors should be secured to the UCC T5 and SPA3 by the connector jack screws

i NOTE: The UCC T5 and SPA3 electronic zero volt rails are connected to their respective ground planes at star points within the UCC T5, the SPA3 and also to the protective ground of the ac supply.

UCC T5 PH20 CMM controller installation guide

<http://www.renishaw.com>

Reset button

The rear panel reset button 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 the unit will force the controller into IP configuration state.
2. Pressing and releasing the reset button after fifteen seconds of switching on the unit will cause the unit to restart.

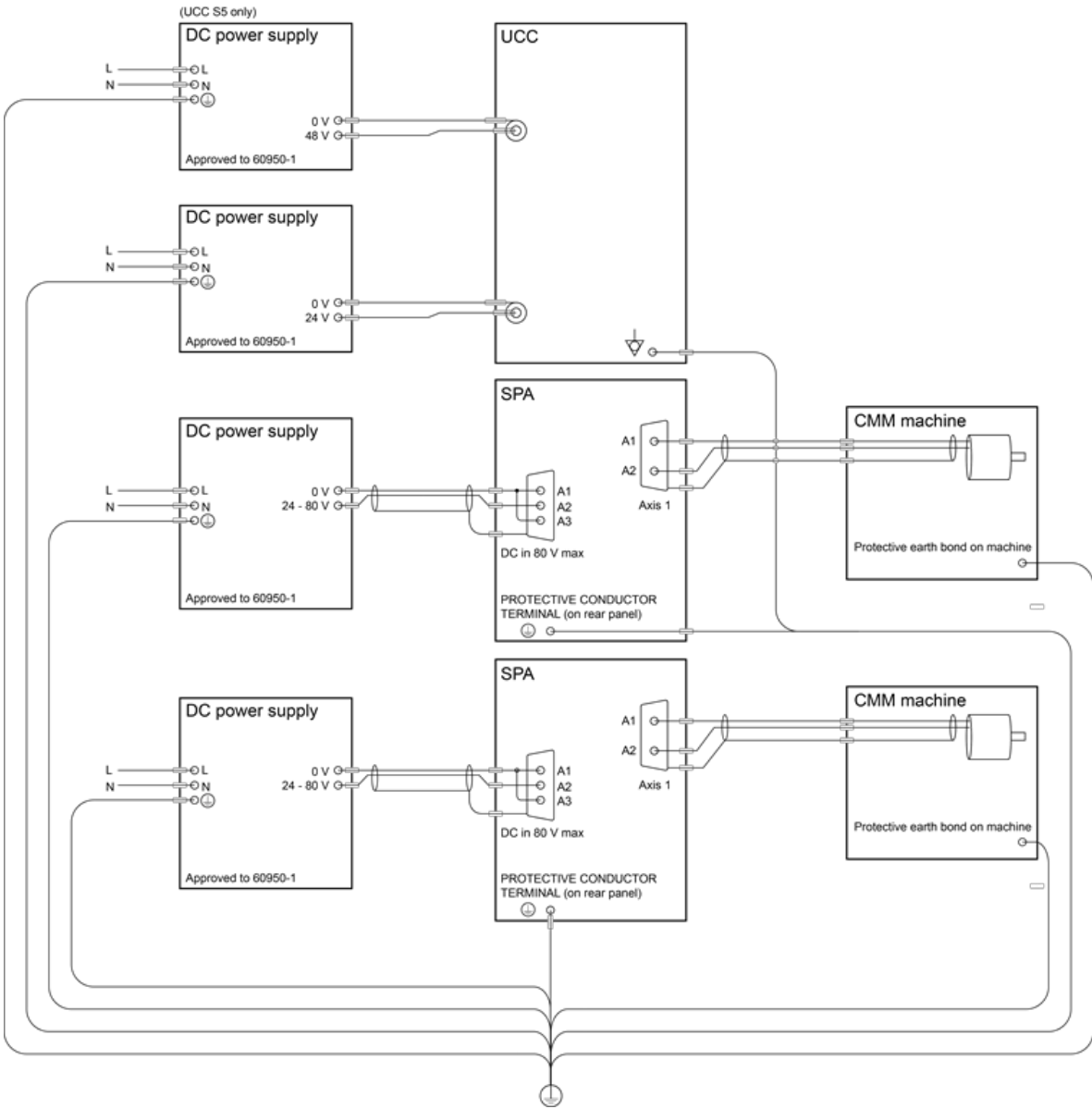
To enter IP configuration state when the unit is already running the control software, press and release the reset button twice.

UCC T5 PH20 CMM controller installation guide

<http://www.renishaw.com>

System connection

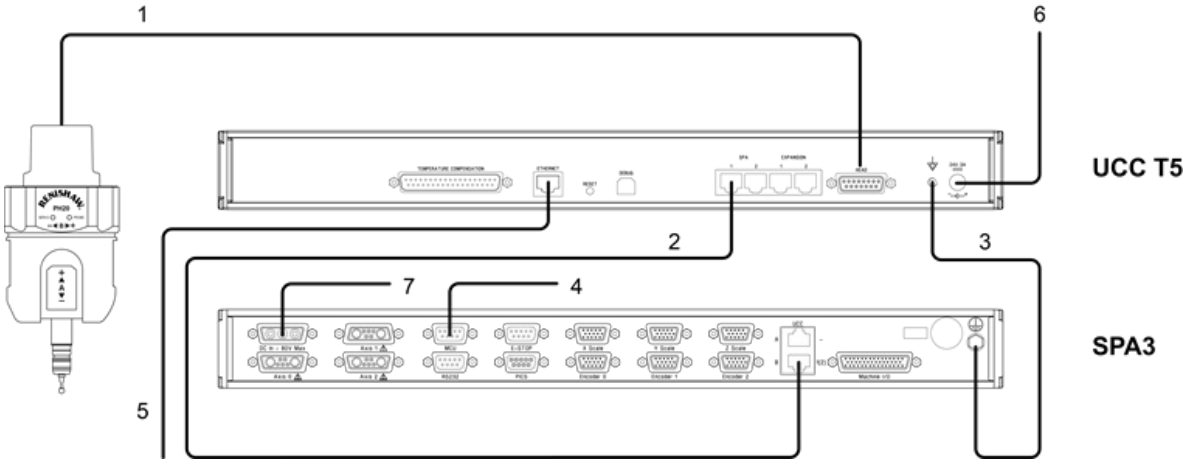
Earth bonding scheme



UCC T5 PH20 CMM controller installation guide

<http://www.renishaw.com>

PH20 interconnection diagram



Key	Description	Key	Description
1	PH20 orange head cable	4	MCU connection
2	CAT 5 300 mm cable (supplied)	5	CAT 5 ethernet cable (5 m cross-over cable supplied)
3	16 / 0.2 mm earth connection	6	Power supply (supplied)

UCC T5 PH20 CMM controller installation guide

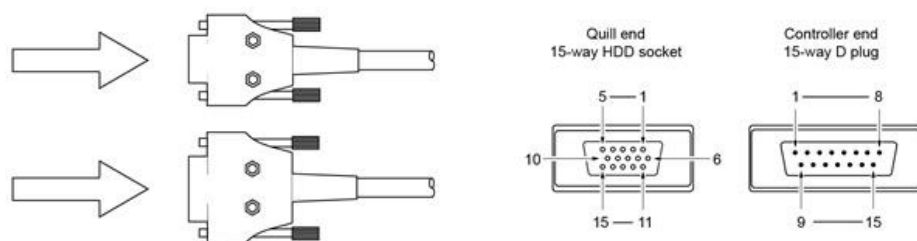
<http://www.renishaw.com>

Cable connections

The cable connection to the head uses a standard 15-way high-density D connector. The cable should be connected and terminated as detailed below. It is mandatory that the Renishaw universal machine cable is used.

Various lengths of cable are available and include pre-cripped options for ease of installation.

The following image shows the pin numbers for each connector end view of the Renishaw universal machine cable.



15-way HDD socket pin number (quill)	Function	Core colour	15-way D plug pin number (controller)
11	Comms D+	Green	1
2	0 V	Black	2
1	Comms U+	Orange	3
7	0 V	White	4
13	Motor B0	Blue	5
3	+20 V	Red	6
4	Motor A2	Grey	7
10	Motor A0	Pink	8
9	0 V	Inner screen *	9
12	Comms D-	Green / black	10
6	Comms U-	Orange / black	11
8	+20 V	Clear	12
14	Motor B1	Violet	13
15	Motor B2	Yellow	14
5	Motor A1	Brown	15
Shell		Outer screen	Shell

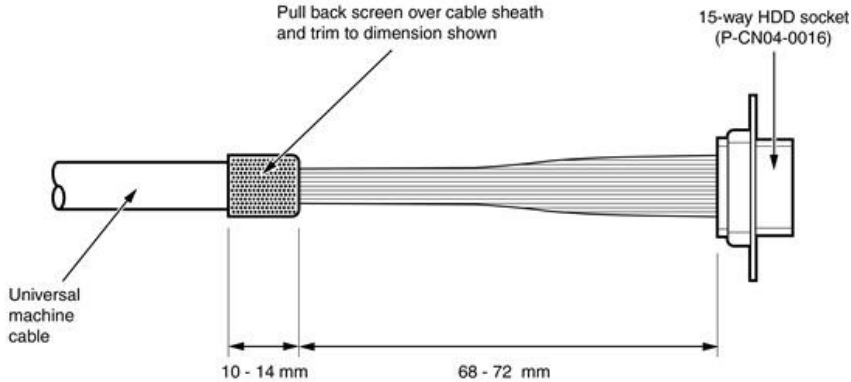
i * NOTE: In pre-cripped cables this will be yellow / green.

Ensure that the inner screen is not shorted to the outer screen at either end of the cable. A short can be prevented by using a small piece of heatshrink or other suitable method.

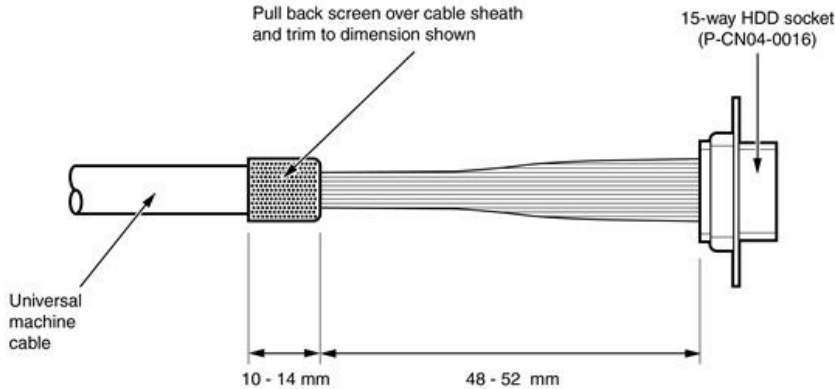
UCC T5 PH20 CMM controller installation guide

<http://www.renishaw.com>

Preparation of Renishaw universal machine cable for quill mounted systems



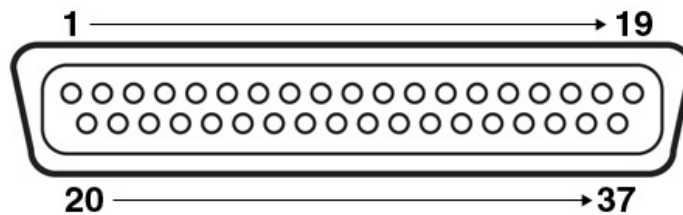
Preparation of Renishaw universal machine cable for shank mounted systems



UCC T5 PH20 CMM controller installation guide

<http://www.renishaw.com>

Temperature compensation connector



Pin number	Channel	Pin number	Channel
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	GND

The thermistors for each channel connects between the CH input and CH return numbers. The return signals are NOT zero volts and MUST NOT be connected to any zero volt signal, GND or screen.

NOTE: For more information regarding the set up and usage of axis and work piece sensors, please read the temperature compensation page of this installation guide.

UCC T5 PH20 CMM controller installation guide

<http://www.renishaw.com>

Connecting the UCC T5 to the host PC

Hardware connection

The host PC must have a dedicated ethernet connection to the UCC T5. It is recommended that this is not a USB plug-in adapter because of the reduction in speed these devices normally produce.

If the host PC is connected to a network, it is necessary to install additional hardware to allow a dedicated connection for UCC T5 communication. For details on how to install additional hardware on the host PC, please refer to the manufacturer user's guide.

The UCC T5 is capable of using 1 Gbps ethernet (with appropriate cable).

A 5 m ethernet cable is provided for this link as part of the UCC T5 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 which are sufficient for any CMM installation.

It is recommended that a shielded cross-over 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 T5. 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.

UCC T5 PH20 CMM controller installation guide

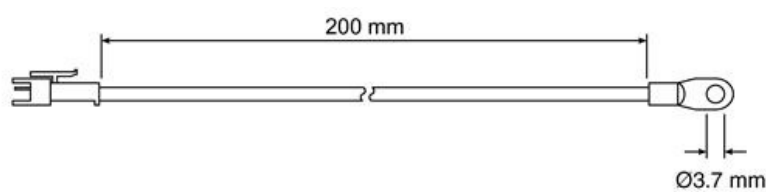
<http://www.renishaw.com>

Temperature compensation

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

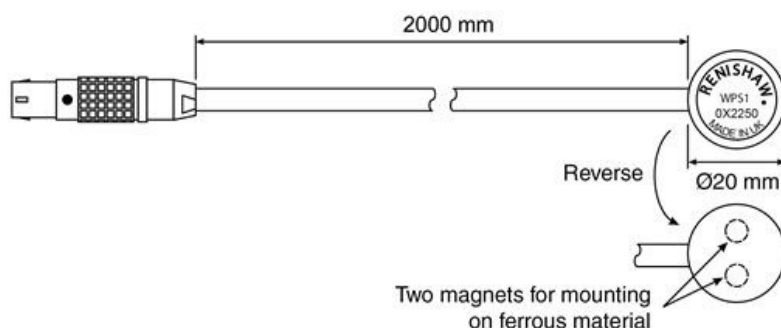
Axis sensors

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 either panel mount or in-line form.



UCC T5 PH20 CMM controller installation guide

<http://www.renishaw.com>

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

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

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

Regulate the temperature of the CMM room to a constant temperature between 16 °C and 28 °C

Allow the CMM to stabilise thermally for a minimum of one hour

Measure the sensor resistance from the 37-way D-type socket that the sensors are wired into. This is the resistance that the UCC measures (cable plus sensor resistance).

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

UCC T5 PH20 CMM controller installation guide

<http://www.renishaw.com>

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

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.

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

System accuracy and calibration

The TEC system can be used without calibration. The system accuracy is ± 0.2 °C.

UCC T5 PH20 CMM controller installation guide

<http://www.renishaw.com>

Testing and verification

The machine manufacturer or the installer of the UCC T5 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

i 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.

System performance

Advisory

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

UCC T5 PH20 CMM controller installation guide

<http://www.renishaw.com>

Troubleshooting


















UCC T5 visual diagnostics

A visual indication of the system status is provided by a multicoloured LED on the front panel. The LED provides assistance in diagnosing system faults.



UCC T5 PH20 CMM controller installation guide

<http://www.renishaw.com>

	LED	Description
⊖	No LED	No power to unit.
	Continuous blue	Unit has overheated.
	Continuous red	Issue with comms link. Reboot unit and configure IP.
	Continuous green	Normal operation.
	Slow green flash	Unit waiting for download.
	Slow blue flash	Unit waiting for download.
	Slow red and blue flash	Reboot the unit.
	Slow blue and green flash	An excess of 48 V is being supplied. Use correct power supply and reboot.
	Slow green and red flashes	Scale issue, reboot unit.
	Fast blue flash	Contact your nearest Renshaw support office.
	Fast red flash	IP configuration mode.
	Fast green flash	Comms lost to PC. Resync unit.
	One grouped red flash	Contact you nearest Renishaw support office.
	One grouped blue flash	Power supply has begun supplying excess power. Replace power supply and reboot.
	Two grouped red flash	Reboot the unit.
	Two grouped blue flash	An excess of 48 V is being supplied. Use correct power supply and reboot.
	Three grouped red flashes	Contact you nearest Renishaw support office.
	Three grouped blue flashes	PHC10 initialisation failed. Reboot unit.

UCC T5 PH20 CMM controller installation guide

<http://www.renishaw.com>

Fatal faults

Situations can occur that make it inadvisable or dangerous to continue using the CMM servo system. These are known in this document and UCCassist-2 as fatal faults. A list of fatal faults are shown below and will be indicated through the user's software (for example UCCserver);

- 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

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

Motors will not engage / re-engage

Symptoms

Either the servo drives will not engage when the controller has been sent the 'engage' command, or the drives have disengaged automatically and will not re-engage.

Possible causes (or reported causes)

After the unit is switched on and before the system is allowed to engage, it must be configured for motion (i.e. the machine, servo and move parameters must be sent to the controller).

Any of the 'fatal faults' will prevent the system from engaging. In addition, the following will disengage the servo motors;

- A reported failure from a servo power amplifier (amplifier feedback signal)
- The absence of the feedback signal from the motor contactor
- The following list can also inhibit drive engagement or re-engagement
- The probe being deflected
- Any outer limit switch being operated or a soft limit exceeded

Tests / cures

UCCassist-2 can be used for further help with this by displaying the system status, the status bytes and signals.

The amplifier and motor contactor feedback signals can also be examined using the 'input signals' window in UCCassist-2.

NOTE: A scale error will cause the UCC T5 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 affected.

UCC T5 PH20 CMM controller installation guide

<http://www.renishaw.com>

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.

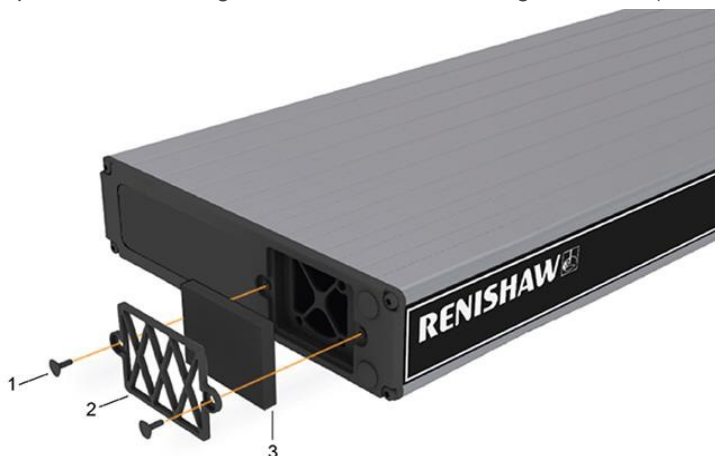
Remove dust from the external surfaces with a clean dry cloth as the unit is not sealed against liquid.

Filter replacement

UCC T5 has a positive, internal air flow 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.

The following procedure is recommended when replacing the air filter:

- Remove power from the controller
- Remove the 19 inch rack mounting brackets (if fitted) by removing the two fixing screws (not shown)
- Pull the head of both the filter retaining clips away from the unit so they disengage (1)
- Pull away the external filter cover (2)
- Remove the filter material from the filter recess (3)
- Replace the filter using the reverse of the method given above (the replacement filter part number is A-5518-0011)



Renishaw plc
New Mills, Wotton-under-Edge,
Gloucestershire, GL12 8JR
United Kingdom

T +44 (0)1453 524524
F +44 (0)1453 524901
www.renishaw.com/cmmsupport

RENISHAW 
apply innovation™

**For worldwide contact details,
please visit our main website at
www.renishaw.com/contact**