

UCC MMI installation guide

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General information

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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.

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
Plastic bags	Low density polyethylene bag	LDPE	4

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Product compliance

EU declaration of conformity

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



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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 MMI 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
Power consumption	3 A
Output voltage	24 V
Transient voltages	Installation category II

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

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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	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 MMI in a suitable enclosure according to the installation's environmental conditions to obtain a higher IP rating.


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General wiring standards

To achieve reliable operation of the UCC MMI and the CMM host computer, the following should be observed:

- Scale readhead signals, reference marks and error signals should comply with EIA RS-422A. It is recommended that each readhead has its own screened cable and that these cables are kept well away from electrically noisy wiring.
- All opto-isolated inputs and outputs should be separate from other connections to the UCC MMI controller, so that the CMM electrical system is kept isolated from the circuitry within the controller, with the exception of the 0 V reference and protective grounding.
- All signal cables **MUST** be screened and all cable screens should be connected electrically to the cable connector's metal shells. Cable screens should only be connected to the protective earth (via the connector shell) at the UCC MMI end, and not directly connected to the CMM protective earth. This is to avoid earth loops. However, 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 MMI by the connector jack screws.
- See also the installation instructions supplied with other Renishaw components in the system, i.e. probes or probe heads etc. Particular attention should be paid to the screening and earthing methods of the cables carrying signals from probes.

 **NOTE:** The UCC MMI electronics 0 V rail is connected to the overall ground plane at a star point within the UCC MMI.

Preparations

Before beginning the installation of the UCC MMI check the following items:

- Ensure that all connecting cables, test equipment and software are available
- Ensure that the CMM measuring scales / readheads are correctly installed and are functioning
- Ensure that all the CMM status and limit switches etc. are correctly installed and have been function checked
- Ensure that all power has been removed from the CMM and the host computer

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Introduction

The UCC MMI is an interface for use on manual CMMs to interface and connect encoder and probe signals to the PC. The complete range of Renishaw 2-wire kinematic touch-trigger probes are supported.

The UCC MMI is housed in a 1U 19 inch rack-mountable enclosure. It is coupled to the CMM host computer by a USB 1.1 link and to the CMM by external cable interface connectors. A rack mounting kit is available as an optional extra.

The UCC MMI has the capability to:

- Control three axes of a CMM
- Accept input signals from air pressure, contactor feedback and all axis inner and outer travel limit switches
- Accept two uncommitted general purpose input signals and generate one uncommitted general purpose output signal
- Directly support the TP1, TP2, TP6, TP20 touch-trigger probes
- Indirectly support the TP200 via an external PI 200-3 interface
- Provide a +24 V supply for use by the CMM if required.

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UCC MMI features

- Rear panel connectors for the external interface cables to and from the CMM
- Rear panel USB connection for the two-way communication link to the CMM host computer
- Readhead circuitry for CMM digital measuring scales
- Status indicating LEDs
- Control electronics for probes
- X, Y, Z axis data input from the CMM readheads
- Connections for the TP20, TP1, TP2 and TP6 touch-trigger probes
- I/O connections to limit switches, air pressure and other digital inputs and outputs

TTP interface

The UCC MMI unit incorporates the circuitry and software necessary to interface with the Renishaw TP20, TP1, TP2 and TP6 probes.

Power supply unit

The UCC MMI requires an external 24 Vdc 2.5 A power supply.

Dimensions

Height	Depth	Width	Weight
44 mm (1U)	130 mm	435 mm (19 in enclosure)	1.2 kg (without cables)

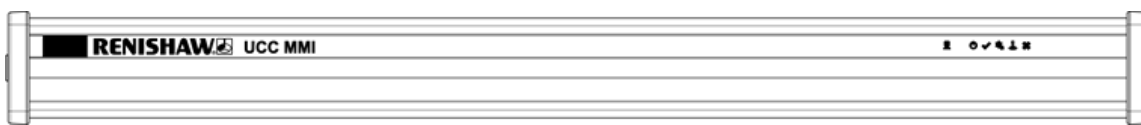
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Front panel LED displays

Front panel LED displays

To aid troubleshooting, the UCC MMI system has six status LEDs which are detailed below.



LED	Description
	Servo
	Power on
	System ready
	Engage
	Probe seated
	Error

UCC MMI power switched ON

Power on LED is on.

If switch-on is successful the UCC MMI proceeds to the initialisation / test sequence.

Initialisation / test

If the initialisation tests fail, then after about 15 seconds several of the above error LED configurations will indicate the reason for the failure.



NOTE: The normal state after switching the unit on is for the power LED to be lit with all other LEDs off. It only indicates failure if it remains for more than 15 seconds.

Try switching the controller off, waiting about 10 seconds, then turning it on again. If the problem persists, the unit needs attention.

If the initialisation tests are successful then the power on LED will remain lit and the error LED will start flashing. The controller is now ready for the system file to be downloaded. System file download occurs via the software connect and configure process in UCCserver.

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System file downloading

During system file downloading, the 'power on' LED is on and the 'error' LED is slowly flashing.

If the system file download fails then the 'power on', 'error' and 'system ready' (flashing) LEDs will be on. In this condition, the UCC MMI waits for a system restart. Switch the controller off and wait approximately 10 seconds to switch it on again.

After a successful download, the system is ready for use and the 'power on' and 'system ready' LEDs will be on.

Probe seated LED

When the probe is not deflected the 'probe seated' LED is on.

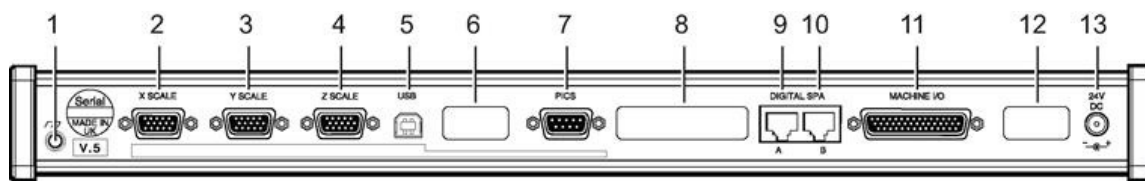
When the probe is deflected the 'probe seated' LED is off.

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Connectors and signals

The connectors on the rear panel of the UCC MMI controller enclosure are shown below:



Key	Description	Connection
1	Equipotential bonding point	-
2	X-axis scale	15-way high-density D
3	Y-axis scale	15-way high-density D
4	Z-axis scale	15-way high-density D
5	PC connection	USB
6	Not used	-
7	PICS	9-way D
8	Blank	-
9	Not used	-
10	Not used	-
11	Machine I/O	44-way high-density D
12	Not used	-
13	24 Vdc power input	-

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Connecting the UCC MMI to a CMM

Switched inputs

Air pressure

The controller monitors the input and will signal to the software if it goes open circuit or high. If not required the input should be connected to the 24 V return line. See 'Generic UCC I/O connector details'.



NOTE: The polarity of this input can be inverted by the UCCassist set up utility. The default condition is a normally closed circuit, opening on the event.

Input blanking

Switching polarity can be adjusted in the software or by using hardware. In UCCassist-2 all inputs can have polarity set to normally open or normally closed.

Pins 13, 14 and 19 - 36 are switchable inputs that are normally open and need to be set to normally closed.

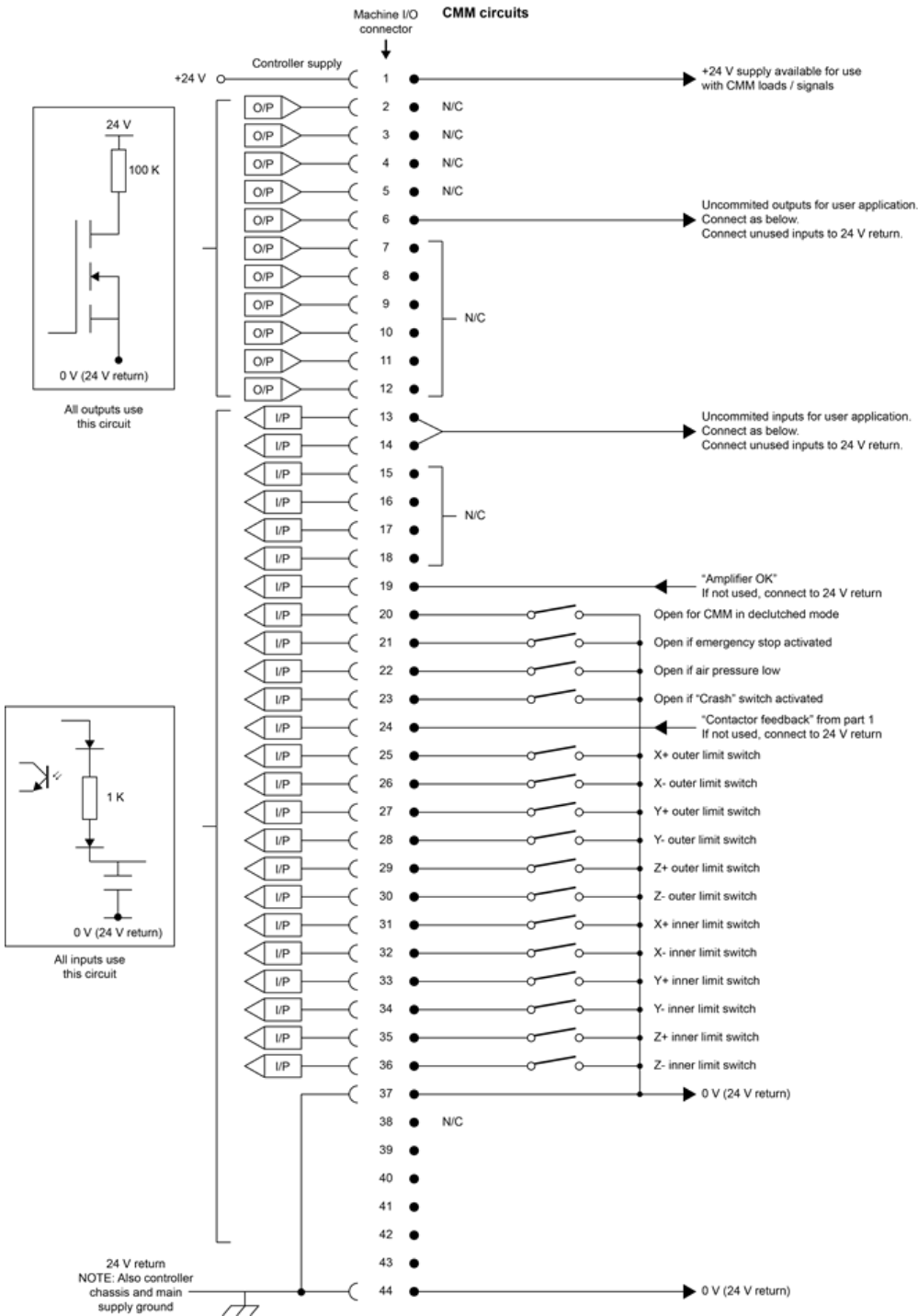
There are two methods for doing this:

1. Connect each pin to pin 37.
2. Switch the polarity of inputs using UCCassist-2 commissioning software.

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Generic UCC I/O connector



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CMM readhead input connections

The X, Y and Z-axis measuring scale readhead input connectors are high-density 15-way 'D' sockets.


The X, Y and Z-axis scale readheads of the CMM must be connected to the relevant socket on the rear panel of the UCC MMI enclosure.

Suggestion: Label all readhead connectors to avoid cross connection if removed and replaced in the future.

The three CMM readhead sockets are wired identically, suitable for direct connection to Renishaw RGH2, RGH4 and TONiC ranges of scale.


 **NOTE:** Other manufacturers' readheads and interpolators may require an external adapter to enable them to use the Renishaw standard readhead connector wiring. They may also not produce an error signal to the RS-422 specification.

The UCC MMI supplies the 5.25 Vdc power supply for the readheads. If standard Renishaw readhead cables are used, the recommended cable sizes are 3 m of head cable and 15 m of extension cable, or an equivalent combination. The head cable has 5 times the resistance of the extension cable.

 **CAUTION:** The connection of the cabling should be such that the CMM movements, as reported by the UCC MMI, are of the correct polarity i.e. machine movement in a positive direction along any axis should give positive change of position as reported to the host computer by the UCC MMI controller. Adjust this, if required, by reversing the inputs of the scale readhead signal (change over +A with +B and -A with -B) or switching polarity in UCCassist-2 commissioning software.

These connectors are supplied pre-blanked for use with UCC MMI.

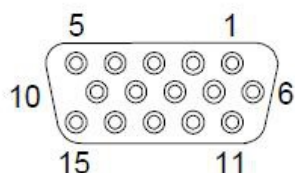
These are RS422 compatible scale inputs for each of the machine axes through the 15-way HDD connectors.

 **NOTE:** If the machine scale is of a different format (e.g. analogue, single ended) then this will require an external adaptor.

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Readhead connector (as viewed on the controller rear panel):



Pin number	Function
1	External N/C
2	0 V supply
3	- Error
4	- Reference mark
5	- B signal
6	- A signal
7	+5 V supply
8	Reserved
9	Reserved
10	Limit switch Q*
11	Limit switch P
12	+ Reference mark
13	+ B signal
14	+ A signal
15	Inner screen
Shell	Screen

* The UCC MMI is capable of supporting both single and dual limit-switch RG22 readheads. The electronic circuits can interface either type without any intervention but the correct type must be set in the machine ini file. If dual limit types are fitted pin 11 functions as the second limit switch.

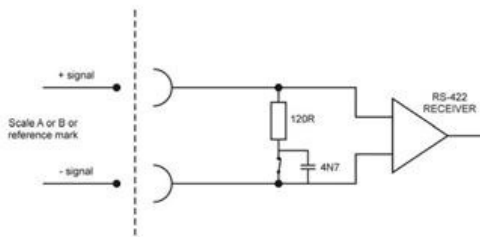
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CMM readhead interface circuit

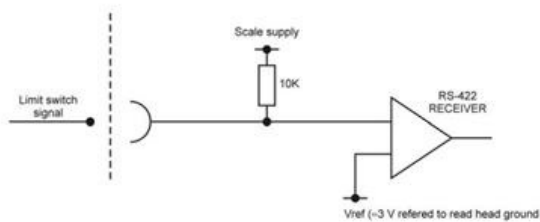
The signals from a readhead or interpolator should be to EIA specification RS-422.

UCC MMI input circuits for CMM readhead - scale and reference mark inputs:

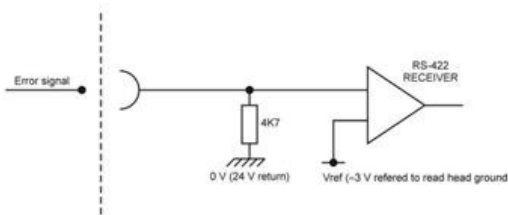


NOTE: If error inputs are not used or the readhead type is RGH24, connect the –Error input to +5 V.

UCC MMI input circuit for CMM readhead - limit switch inputs:



UCC MMI input circuit for CMM readhead – error input:



UCC MMI to CMM measuring scale readhead

The maximum specified cable length is 18 m assuming that individual cable wire cross-sectional area is a minimum of 0.055 mm².

The maximum frequency of any one of the scale readhead quadrature signals, with ideal waveforms and phase displacement, is 12.5 MHz. However, it is recommended that the maximum frequency of any one of the scale readheads should be 10 MHz

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Switched outputs

The UCC MMI has the following uncommitted switched output.

Pin 6 is the uncommitted output available on the UCC MMI I/O connector. The UCC MMI does not directly control the operation of this output, as it is controlled from the application software package via 'command 318, Write to controller port'.

The output is pulled up to the 24 V rail by a 20 k Ω resistor when inactive, and will be pulled down to the 24 V return line via an NPN transistor when activated. There is an excess voltage protective diode fitted internally to the controller. This output is suitable for driving inputs in the range 5 V to 24 V.

If the output is not connected to the installation then it should be left open circuit.

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USB connection

The host PC is recommended to have a dedicated USB connection to the UCC MMI. Connection to the UCC MMI through a USB hub causes a reduction in communication speed.

The UCC MMI uses the USB1.1 specification communication link. A 5 m USB cable is provided for this link as part of the UCC MMI kit. Other lengths may be used; the maximum being 5 m which is governed by the generic specification for USB connections.

When the UCC MMI is connected to the PC and power applied to the unit, Windows will automatically detect the new hardware and start the Windows hardware installation wizard.

The Windows hardware installation wizard will automatically identify the correct driver for the UCC MMI. This driver is located on the UCC software installation CD in the drivers' directory.

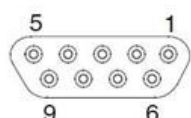
This is a standard USB type B connector providing the communication connection between the UCC MMI and the PC hosting the application software.

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PICS connector

This socket is intended for use with the TP1, TP2, TP6 or TP20 touch-trigger probes. The connector is a 9-pin 'D' type socket, pinout as follows:



Pin number	Function
1	PICS STOP
2	PICS probe power off (PPOFF)
3	0 V
4	PICS LED anode
5	Probe signal
6	Reserved
7	PICS probe damping (PDAMP)
8	PICS LED off (LEDOFF)
9	Probe common
Shell	Screen

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The controller - 24 V supply

This supply is available at both the servo power amplifier connector and the machine I/O connector for use by the CMM signalling circuits. It has an absolute maximum current rating of 1 A.

Please use semiconductors or relays to interface with high power loads or to those which need electrical isolation.

All inputs and outputs (except the optically isolated amp control signals) are referenced to this supply.

It is not a floating supply, the 24 V return line is connected to the controller chassis and to supply 0 V at a star point within the controller.

If there are any interconnections between this supply and any of the CMM supplies, there is a possibility that an additional path to ground may be created.

A separate supply of similar voltage may be used for signalling purposes in place of the controller 24 V supply but its negative rail must be connected to the controller 24 V return line.


Controller output supplies

The UCC MMI produces a +24 V current limited supply with a maximum output current of 1 A.

This supply is available for use by the CMM system to supply status switches, etc.

The UCC MMI also provides protected supplies for other external devices such as scale readheads, the probe, etc.

The supply to the scale readheads is a nominal 5.25 Vdc. It compensates for any cable volt drop.

 **WARNING:** There is no internal fuse on the power supply to the UCC MMI. The installer must provide suitable protection.

The maximum current demand of the UCC MMI is 2.5 A at 24 V.

Connection to an external power supply

- Remove all power from the installation
- Connect the UCC MMI power supply P-EA02-0021 to the power input connector on the rear of the UCC MMI
- Connect the mains power lead to the UCC MMI power supply

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CMM host computer

The latest version of UCCsuite 4.8 is recommended for use with UCC MMI. 4.8 is compatible with:

- Windows XP (SP3)
- Windows XP 64 bit
- Windows 7 (Professional)
- Windows 7 64 bit (Professional)
- Windows 8 Pro
- Windows 8 Pro 64 bit

The processor speed and RAM requirements are not excessive. If the PC supports the operating system and application software, it will almost certainly support the UCC controller operation. A minimum specification of 1 GHz processor speed and 256 MB RAM is recommended.

For UCC MMI only, one free USB port is required for the communication. It is recommended NOT to use a USB hub because of the reduction in speed of operation these devices normally produce.



If UCC MMI is to be used with MODUS 2 please see PC requirements for MODUS 2.

The following sections detail how to initially connect and configure the communication link between the UCC MMI and the host PC that is running either the UCC utilities or metrology application software.

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Installation software

Compatible software

The UCC MMI is only compatible with UCCsuite 4.8. Please use the latest release of UCCsuite 4.8.

UCCassist-2

The UCCassist-2 software offers the following capabilities:

- Basic machine system diagnostics
- Operation with Renishaw's machine checking gauge, enabling the user to complete frequent volumetric accuracy tests to ensure the CMM is running within the specified operational tolerances
- Error mapping for manual machines
- ISO 10360-2 CMM certification

UCC MMI system components

The part numbers of the UCC MMI kits and upgrades are:

Unit part number

- A-5331-1800 - UCC MMI

Top level kit part number

- A-5331-1850 - UCC MMI KIT

Manual machine upgrade kits

- A-5567-1950 - UCC MMI KIT 3M (3 m of scale + 3 encoders)
- A-5567-1951 - UCC MMI KIT 5M (5 m of scale + 3 encoders)
- A-5567-1960 - UCC MMI KIT NO SCALE

All kits include MODUS 2 M3 and 3-way foot switch.

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Testing and verification

The manufacturer of the finished machine, or the installer of the UCC MMI, is responsible for ensuring that the following testing and verification, to the appropriate standards, is performed as a minimum on the complete installation.

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

Following replacement, modification, software update or any other changes to the UCC MMI, the tests and verification procedures specified in the technical documentation must be performed.

These tests and checks should also be performed prior to machine calibration or at other intervals according to the user's risk assessment.

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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 the security of mounting screws and electrical connectors.

Periodical electrical safety checks should include inspecting the mains cable for damage and safe connections. An earth continuity (ground bonding) test may be applied between the protective earth pin of the mains connector and the metal case at a test current of no greater than 25 A.

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 fluids / water.

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