

UCC MMI-2 installation guide

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UCC MMI-2 installation guide

Documentation part number: H-1000-7605-03-C



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General information

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 ORIGINAL LANGUAGE VERSION

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Unless you and Renishaw have agreed and signed a separate written agreement, the equipment and/or software are sold subject to the Renishaw Standard Terms and Conditions supplied with such equipment and/or software, or available on request from your local Renishaw office.

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.

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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

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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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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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Safety

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

There are no user serviceable parts inside the equipment.

The UCC MMI-2 controller is only warranted and approved for use with the provided PSU.

The UCC MMI-2 is isolated from ac power by disconnection of the IEC mains connector from the supplied PSU. If any additional means of isolation is required, it must be specified and fitted by the machine manufacturer or installer of the product. The isolator / disconnection device must be sited within easy reach of the operator and comply with IEC61010 and any applicable national wiring regulations for the country of installation.



WARNING: Earthing of the UCC MMI-2 is required. It is the responsibility of the OEM or installer to apply the earth bonding scheme provided by Renishaw in this installation guide.



WARNING: UCC MMI-2 is isolated from ac power by disconnection of the IEC mains connector from the supplied PSU.

Installation requirements

Prior to installation the installer must ensure that the requirements of the machinery directive are achieved by risk assessment and use of the appropriate harmonised standards (see External Documents for reference).

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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	90% maximum (non-condensing) for temperatures up to +40 °C, linearly derating to 50% at +50 °C
Pollution degree	2

 **NOTE:** If the UCC MMI-2 is to be used in an environment where a higher IP rating is required, then the UCC MMI-2 will need to be housed in a suitable enclosure.

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

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References and associated documents

It is recommended that the following documentation is referenced when installing the UCC MMI-2:

Renishaw documents

Title	Document number
Guide: Product interconnection system (PICS)	H-1000-5000
UCCassist-2 help	Found within UCCassist-2

External documents

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

- BS EN 60204-1:2018 (Safety of machinery - Electrical equipment of machines - Part 1: General requirements)
- BS EN 61010-1:2010+A1:2019 (Safety requirements for electrical equipment for measurement, control and laboratory use. General requirements)
- BS EN ISO 13849-1:2015 and BS EN ISO 13849-2:2012 (Safety of machinery. Safety-related parts of control systems)
- BS EN ISO 12100:2010 (Safety of machinery - General principles for design - Risk assessment and risk reduction)

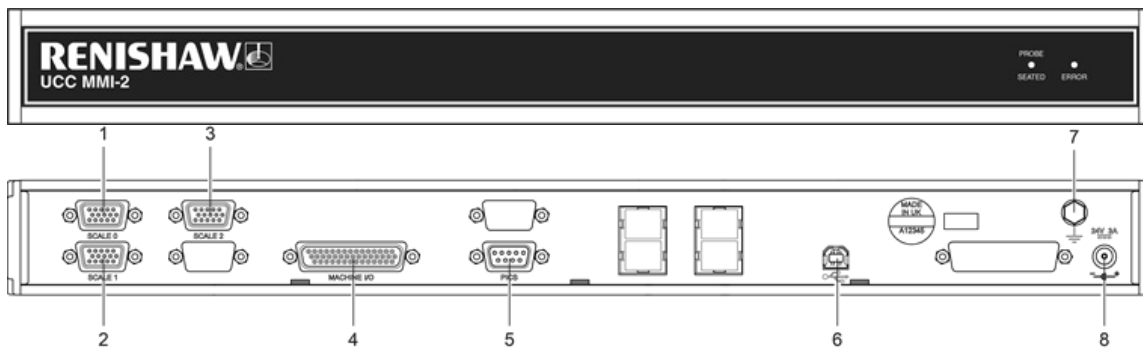
It is the responsibility of the OEM or installer to ensure that the finished installation complies with applicable national regulations for the country of installation.

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Introduction

The UCC MMI-2 controller provides a USB based interface for manual CMMs. The UCC MMI-2 interfaces to the Renishaw digital range of scale readheads, or electrically compatible OEM versions, and to TP20 or similar touch-trigger probes. The UCC MMI-2 controls the collection of scales data, and latches the scales positions when a touch-trigger event is detected. The UCC MMI-2 also supports limited 24 V machine IO signalling, and can interface to a manual head if required.



Key	Description	Key	Description
1	Scale 0 interface (15W HDD socket)	5	PICS (9W D socket)
2	Scale 1 interface (15W HDD socket)	6	PC connection (USB type B)
3	Scale 2 interface (15W HDD socket)	7	Earth terminal
4	Machine I/O (44W HDD socket)	8	UCC MMI-2 power jack (6.3 mm socket)

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UCC MMI-2 features

- Supports manual CMM data collection
- Three CMM axes can be interfaced by the UCC MMI-2
- Supports incremental encoders
- The UCC MMI-2 can automatically adjust the supply voltage to encoder readheads (to compensate for cable losses)
- Probe interface (PICS)
- Supports manual heads
- Connection for the TP20, TP1, TP2 and TP6 touch-trigger probes
- CMM machine input / output, including:
 - Air solenoid
 - Air status
 - 13 uncommitted I/O (6 input and 7 output) that can be customised by the user
- Status indicating LEDs
- 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


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General wiring standards

To achieve reliable operation of the UCC MMI-2 the following should be observed:

- All signal cables **MUST** be screened and all cable screens should be connected electrically to the cable connector's metal shells.
- It is recommended that cable screens should only be connected to the functional earth (via the connector shell) of the UCC MMI-2. To avoid earth loops, cable screens should not be directly attached to the CMM's functional earth.
- The grounding must be continuous between all equipment in the installation.
- All cable connectors should be secured to the UCC MMI-2 by the connector jack screws (where present).

 **NOTE:** The UCC MMI-2 electronics 0 V rail is connected to the system grounding scheme at a star point within the UCC MMI-2.

Naming convention

Function	Description
signal	Active high
/signal/	Active low
reserved	Do not use. For Renishaw purposes only.
signal +	Differential pair positive signal
signal -	Differential pair negative signal

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Installation

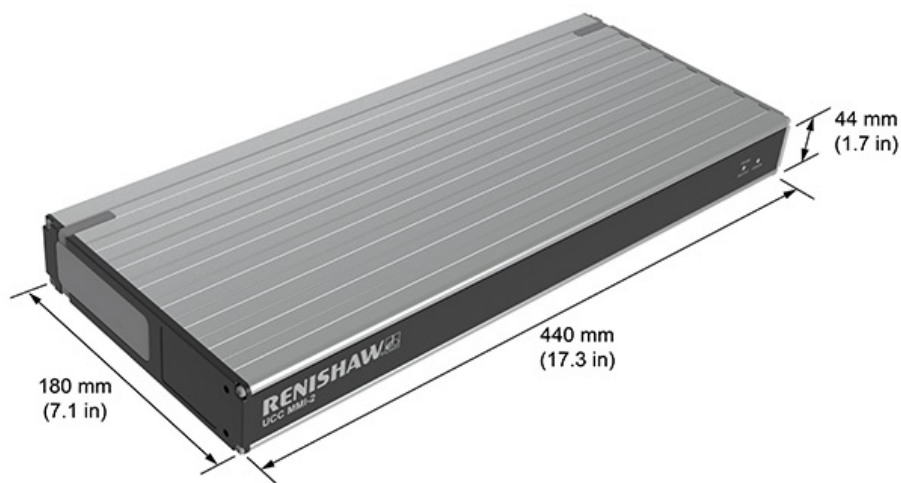
Dimensions

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)

The UCC MMI-2 can either be free-standing or used in a 19 inch rack system.



WARNING: Ensure the UCC MMI-2 is disconnected from the mains supply during installation.



Free-standing installation

Four self-adhesive feet are supplied with the unit for non-rack mounted installations.

A minimum clearance gap of 10 mm is necessary between the sides of the unit and any obstruction.

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Mounting in a 19 inch rack (optional)

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

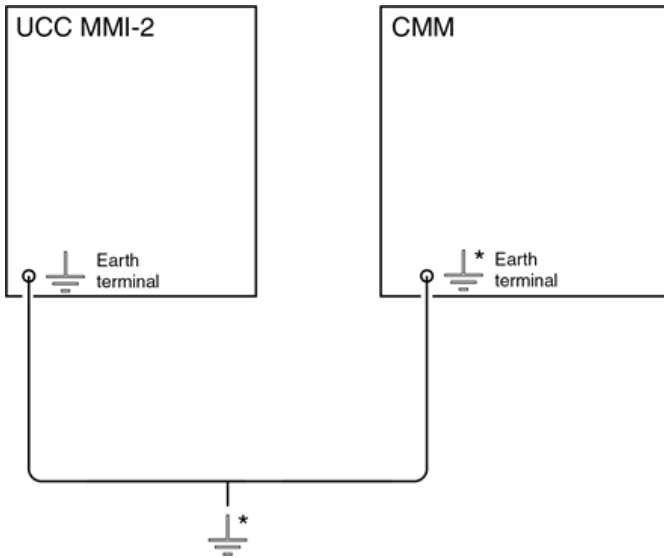
The rack mounting kit (Renishaw part number A-5518-0005) contains two brackets and four M5 × 6 mm screws. Assemble the brackets to the UCC MMI-2 as shown below:



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Earth bonding scheme



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

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Software installation

Support for the UCC MMI-2 is included in UCCsuite version 5.5 and onwards. All recommended updates for any of the system components must be installed for correct operation.

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

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

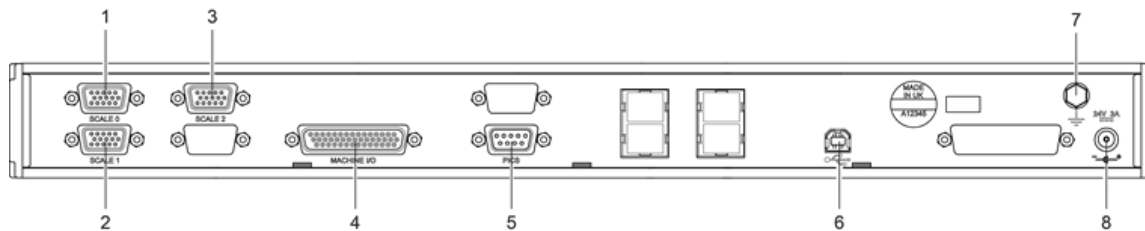
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Connectors and signals

This section contains information on the following UCC MMI-2 ports:

- Scale interface (15W HDD socket)
- Machine I/O (44W HDD socket)
- PICS (9W D socket)
- USB connection (USB type B)
- UCC MMI-2 power socket (6.3 mm socket)



Key	Description	Key	Description
1	Scale 0 interface (15W HDD socket)	5	PICS (9W D socket)
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Scale interface (3 × 15W HDD sockets)

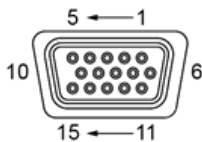
UCC MMI-2 provides a digital interface for Renishaw digital incremental encoders.

UCC MMI-2 can also be used with compatible 3rd party encoders.

Connector details

The ports use 15-way high-density 'D' sockets. The connections for the sockets are shown in the table below.

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



Pin no.	Function
1	Reserved
2	0 V scale supply
3	Error -
4	Reference mark -
5	B signal -
6	A signal -
7	+V scale supply
8	+V scale supply sense
9	0 V scale supply sense
10	/Limit switch Q/ (active low)
11	Error + or /limit switch P/ (active low)
12	Reference mark +
13	B signal +
14	A signal +
15	0 V scale supply (inner screen)
Shell	Screen

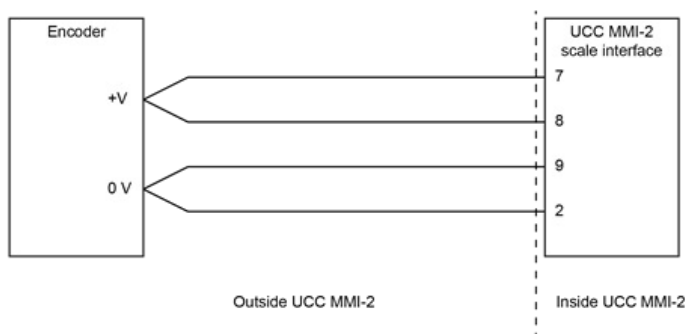
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+V scale can be adjusted independently for each scale interface port.

If the scale power sense wires are connected to the respective scale power supply signals at the readhead, the voltage will automatically adjust to maintain +5 V at the readhead.

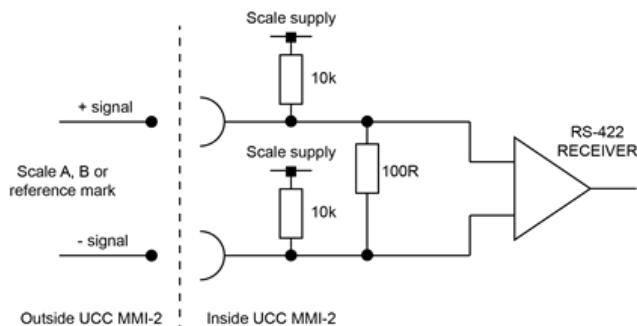
If the sense wires are open circuit then the voltage can be adjusted through the UCCsuite software. In both cases the scale supply voltage is nominally +5 V and can be adjusted to a maximum of +7 V. The sense and supply signals should be connected as close to the encoder as possible (see diagram below):



The scale inputs support a quadrature waveform with a minimum edge separation of 50 ns, which equates to 20 million counts per second with an ideal waveform.

Encoder resolution	Maximum move speed
1 μm	20 m/s
0.1 μm	2 m/s
50 nm	1 m/s
1 nm	0.02 m/s

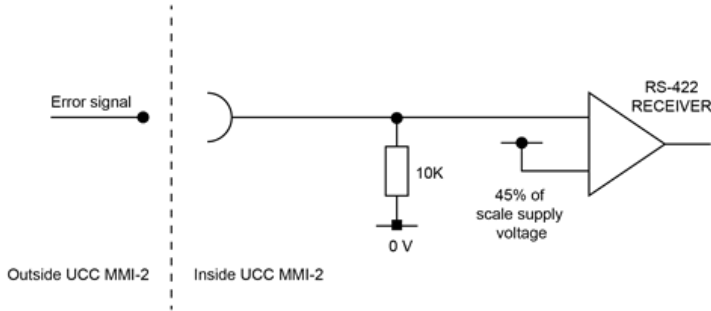
UCC MMI-2 scale signal interface circuit



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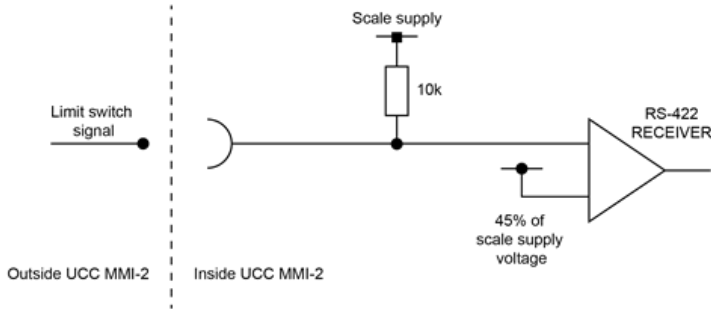
UCC MMI-2 scale error interface circuit



The UCC MMI-2 supports the error signal provided by Renishaw’s digital incremental encoders. The UCC MMI-2 can also detect tri-state conditions on the A and B signals. If the error signal is not integrated into the connected encoder, then the user should connect pin 3 (Error -) to pin 7 (+V scale).

UCC MMI-2 scale limit switch interface circuit

If scale limit switch signals are integrated into the the encoder being used then the following diagram should be referenced to ensure compatibility with the UCC MMI-2.

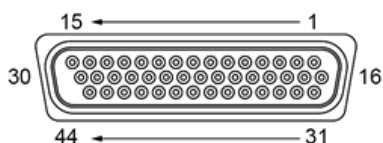


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Machine I/O (44W HDD socket)

The machine I/O socket is used to provide connections for the CMM input / output. The cable needs to be created by the CMM installer using the pin out guide below. The connector for the machine I/O socket is provided within the UCC MMI-2 kit.



Pin	Function	Pin	Function
1	External I/O +24 V	23	Reserved
2	/Enable air solenoid/ (active low)	24	Reserved
3	Reserved	25	Reserved
4	Reserved	26	Reserved
5	Reserved	27	Reserved
6	Uncommitted output 0	28	Reserved
7	Uncommitted output 1	29	Reserved
8	Uncommitted output 2	30	Reserved
9	Uncommitted output 3	31	Reserved
10	Uncommitted output 4	32	Reserved
11	Uncommitted output 5	33	Reserved
12	Uncommitted output 6	34	Reserved
13	Uncommitted input 0	35	Reserved
14	Uncommitted input 1	36	Reserved
15	Uncommitted input 2	37	0 V
16	Uncommitted input 3	38	Reserved
17	Uncommitted input 4	39	Reserved
18	Uncommitted input 5	40	Reserved
19	Reserved	41	Reserved
20	Reserved	42	Reserved
21	Reserved	43	Reserved
22	Low air pressure	44	0 V
		Shell	Screen

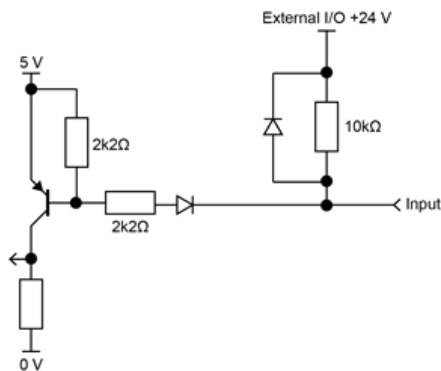
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All input pins

The inputs are activated by being pulled down to 0 V. They are not opto isolated and are pulled up to +24 V by a 10 kΩ resistor within the UCC MMI-2. These inputs can accept signal levels in the range of +5 V to +24 V, and need to be pulled below 1.5 V to signify the active state. The input pin must be driven above 4.2 V, or left open circuit, to signify the inactive state.

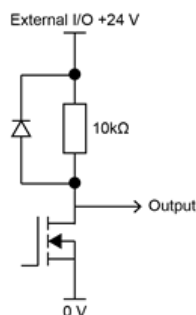
WARNING: The input pins must not be driven above External I/O +24 V.



All output pins

The open drain output with a 10 kΩ pull-up resistor to external I/O +24 V is suitable for driving devices in the range +5 V to +24 V and can sink a maximum current of 200 mA. If the output is not required, then it should be left as an open circuit.

WARNING: The output pins are not suitable for direct connection to circuits operating above External I/O +24 V.



External I/O +24 V

External I/O +24 Vdc supply is provided for use with the I/O equipment. Maximum current 1 A (1000 mA).

NOTE: All I/O peripherals should typically be supplied from the +24 V I/O pin, however if supplied externally, the voltage must be in the range 0 V to 24 V and the current must not exceed 200 mA.

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Enable air solenoid

An active low signal to engage an air solenoid.

Uncommitted inputs

These input pins can be configured to the customer's requirements via the UCCsuite software.

Uncommitted outputs

These output pins can be configured to the customer's requirements via the UCCsuite software.

Low air pressure

The low air pressure signal should be connected to a suitable air pressure switch. This input is monitored by the controller and when activated a system fatal fault is logged. During the commissioning process it is possible to invert this signal from an active low signal to an active high signal. If this capability is not required for integration to the system then the signal should be connected to the 0 V or inverted during commissioning.

0 V

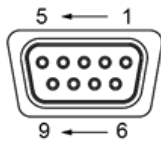
This is the 0 V reference for all of the I/O signals.

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PICS (9W 'D' socket)

This socket is intended for use with the TP1, TP2, TP6 or TP20 touch-trigger probes, and manual heads. The connector is a 9-pin 'D' socket.



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

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

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USB connection (USB type B)

i **NOTE:** UCCsuite should be installed before connecting the UCC MMI-2.

This is a standard USB type B connector providing the communication connection between the UCC MMI-2 and the PC hosting the application software.

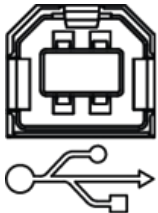
The host PC is recommended to have a dedicated USB connection to the UCC MMI-2.

Communication to a PC will be via a standard USB-A to USB-B cable using the USB 2.0 protocol supporting up to full-speed mode.

A 5 m USB cable is provided for this link as part of the UCC MMI-2 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-2 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-2. This driver is located on the UCCsuite software download.



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UCC MMI-2 power socket (6.3 mm socket)

It is highly recommended that the UCC MMI-2 is powered by the ac - dc power supply unit (PSU) supplied with the UCC MMI-2. The UCC MMI-2 controller is only warranted and approved for use with the provided PSU.

The PSU provides the UCC MMI-2 with up to 72 W at +24 Vdc. The UCC MMI-2 power socket interfaces with a dc jack plug, 2.5 mm inner diameter, 5.5 mm outer diameter, centre positive.



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

24V 3A



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Testing and verification

The machine manufacturer or the installer of the UCC MMI-2 is responsible for ensuring that the following testing and verification is performed to the appropriate standard:

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



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



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



WARNING: The system installer should intentionally cause a scale fault (for example: by placing a piece of paper between the readhead and the scale) to check that a scale error is reported during all service and maintenance operations.

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Maintenance



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

Periodically check that all mounting screws and electrical connectors are securely tightened. Electrical safety checks should include inspecting the mains cable for damage and the safety of the connections.

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



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.

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Troubleshooting

UCC MMI-2 visual diagnostics



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

LED status key

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

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Probe seated	Error	Description	Fault	Solution
⊖	●	Constant red error LED	Power fault/ FPGA reset	In the event of this fault, check the power supply or else, please return to Renishaw
⊖	●	Intermittent fast flashing red error LED	Security validation failure	In the event of this fault, please return to Renishaw
⊖	●	Continuous fast flashing red error LED	Factory configuration	Application FPGA image must be re-programmed and if fails, return to Renishaw
●	●	Slow green flashing error and probe LEDs	Normal start-up operation, waiting for comms synchronisation	Situation occurs during startup, software comms synchronisation or lost comms with software
●	⊖	Probe LED constant green	No fault Normal operation	Probe seated, normal operation
●	⊖	Probe LED constant red	No fault Normal operation	Probe open, normal operation

Fatal faults

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

A list of UCC MMI-2 related fatal faults is shown below and will be indicated through the user's software (for example MODUS):

- Air pressure is too low
- A scale reading failure
- An indicated overspeed (calculated from the rate of change of position)



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

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

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