

HSI hard-wired system interface



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Safety

Safety

In all applications involving the use of machine tools or CMMs, eye protection is recommended.

Information to the machine supplier/ installer

It is the machine supplier's responsibility to ensure that the user is made aware of any hazards involved in operation, including those mentioned in Renishaw product literature, and to ensure that adequate guards and safety interlocks are provided.

Under certain circumstances, the probe signal may falsely indicate a probe seated condition. Do not rely on probe signals to halt the movement of the machine.

Information to the equipment installer

All Renishaw equipment is designed to comply with the relevant EU and FCC regulatory requirements. It is the responsibility of the equipment installer to ensure that the following guidelines are adhered to, in order for the product to function in accordance with these regulations:

- any interface **MUST** be installed in a position away from any potential sources of electrical noise (for example, power transformers, servo drives);
- all 0 V/ground connections should be connected to the machine "star point" (the "star point" is a single point return for all equipment ground and screen cables). This is very important and failure to adhere to this can cause a potential difference between grounds;
- all screens must be connected as outlined in the user instructions;
- cables must not be routed alongside high current sources (for example, motor power supply cables), or be near high-speed data lines;
- cable lengths should always be kept to a minimum.

Equipment operation

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

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HSI basics

Introduction

CNC machine tools or grinding machines using RENGAGE™ or standard probes for workpiece inspection require an interface unit to convert the signals from the probe into voltage-free solid state relay (SSR) outputs for transmission to the CNC machine controller. The maximum SSR output operating current is 50 mA.

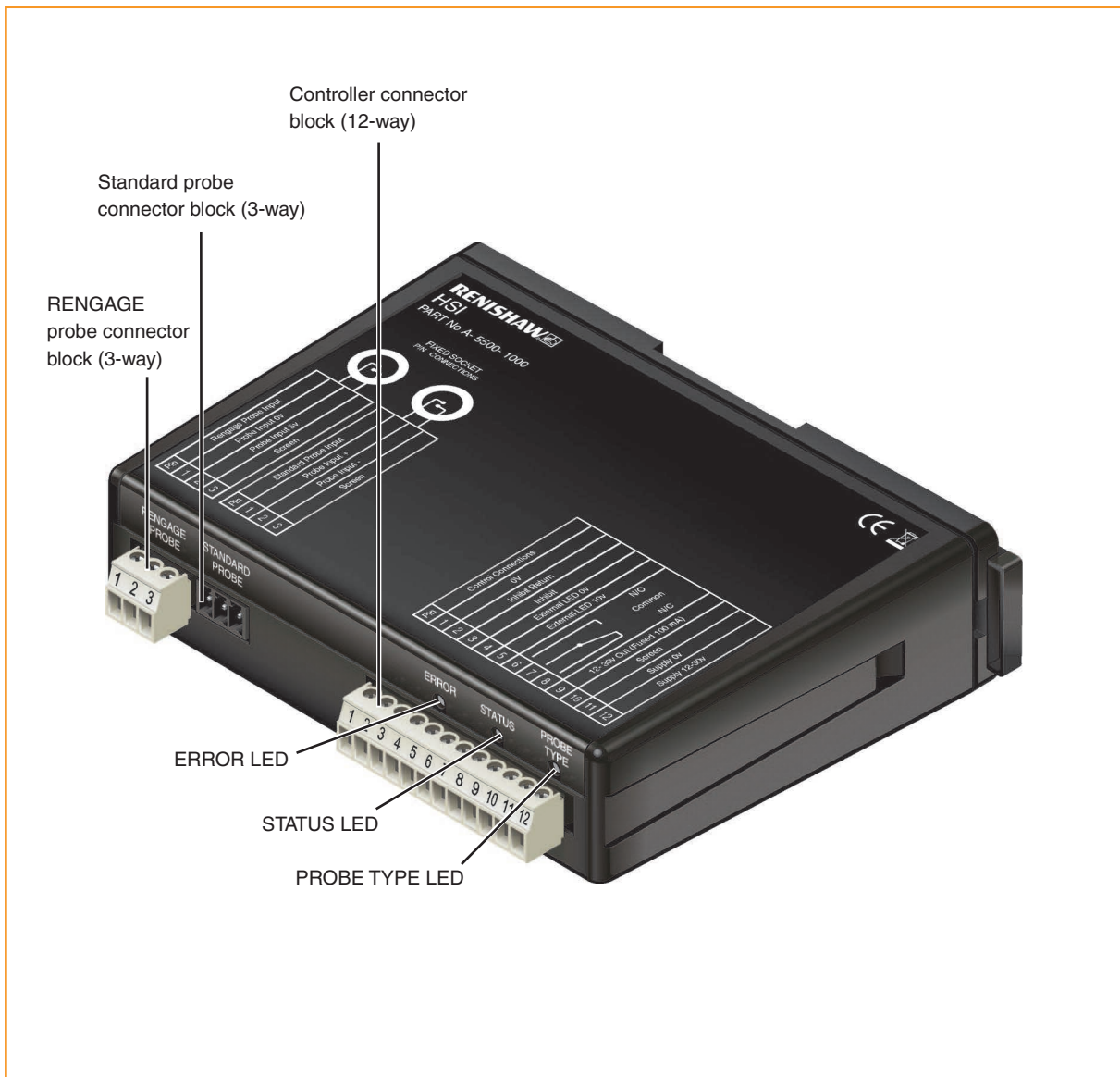
Typically installed within the CNC machine controller cabinet, and located away from sources of interference such as transformers and motor controls, the HSI can draw its power from the machine's nominal 12 Vdc to 30 Vdc supply. Where such a supply is not available, the HSI can be powered using any 12 Vdc to 30 Vdc (minimum 0.5 A) power supply.

The supply is protected by a 140 mA self-resetting fuse (its nominal current, when connected to an inspection probe, is either 40 mA @ 12 V or 23 mA @ 24 V). To reset the fuse, remove the power then identify and rectify the cause of the fault.

HSI components

The following components are housed within the front face of the HSI (as shown in the figure below):

- RENGAGE probe connector block (3-way);
- Standard probe connector block (3-way);
- Control connector block (12-way);
- ERROR LED;
- STATUS LED;
- PROBE TYPE LED.



RENGAGE™ probe connector (3-way)

The RENGAGE probe connector is a three-pin connector and is designed to connect to a Renishaw RENGAGE probe.

Standard probe connector (3-way)

The standard probe connector is a three-pin connector and is designed to connect to Renishaw standard probes.

Controller connector (12-way)

The controller connector is a 12-pin connector and is designed to connect the HSI to the CNC machine controller and appropriate power supply as follows:

Terminals 1 to 3

These are used to connect the inhibit function. For more information about the inhibit function, please refer to page 2.6.

Terminals 4 and 5

If the HSI is installed where it cannot be easily seen, an output is provided so that a remote device (such as an LED or buzzer – not supplied) can be connected to the HSI and positioned near to the machine operator. This is an open drain pull-up output at a nominal 10 mA.

Terminals 6 to 8

These are the SSR probe trigger outputs:

- terminal 6 is normally open (NO);
- terminal 7 is the common connection;
- terminal 8 is normally closed (NC).

The current output from any of these terminals is limited to 60 mA.

Terminal 9

This is used to connect the inhibit functions to 12 V to 30 V. It is fused at 100 mA.

Terminals 10 to 12

These are used to supply power to the interface. The supply is fused at 140 mA.

ERROR LED

The ERROR LED flashes red to indicate that an error condition has occurred. This happens when too much current is supplied to the probe or to the SSR output.

STATUS LED

The STATUS LED displays:

- a constant green when the probe is seated;
- a constant red when the probe is triggered or no probe is connected.

If the LED is unlit, there is no power supply to the HSI.

PROBE TYPE LED

The PROBE TYPE LED displays:

- a constant green when the interface is connected to a RENGAGE probe;
- a constant orange when the interface is connected to a standard probe or when no probe is connected;
- a flashing red when a probe inhibit function is active.

If the LED is unlit, then there is no power supply to the HSI.

Remote device

The remote device circuit provides:

- a closed output to indicate that the probe is seated (maximum current is 10 mA);
- an open output to indicate that the probe is triggered, that no probe is connected or that the power is off.

Solid-state relay (SSR)

The SSR relay is configured as follows:

Normally closed (NC)

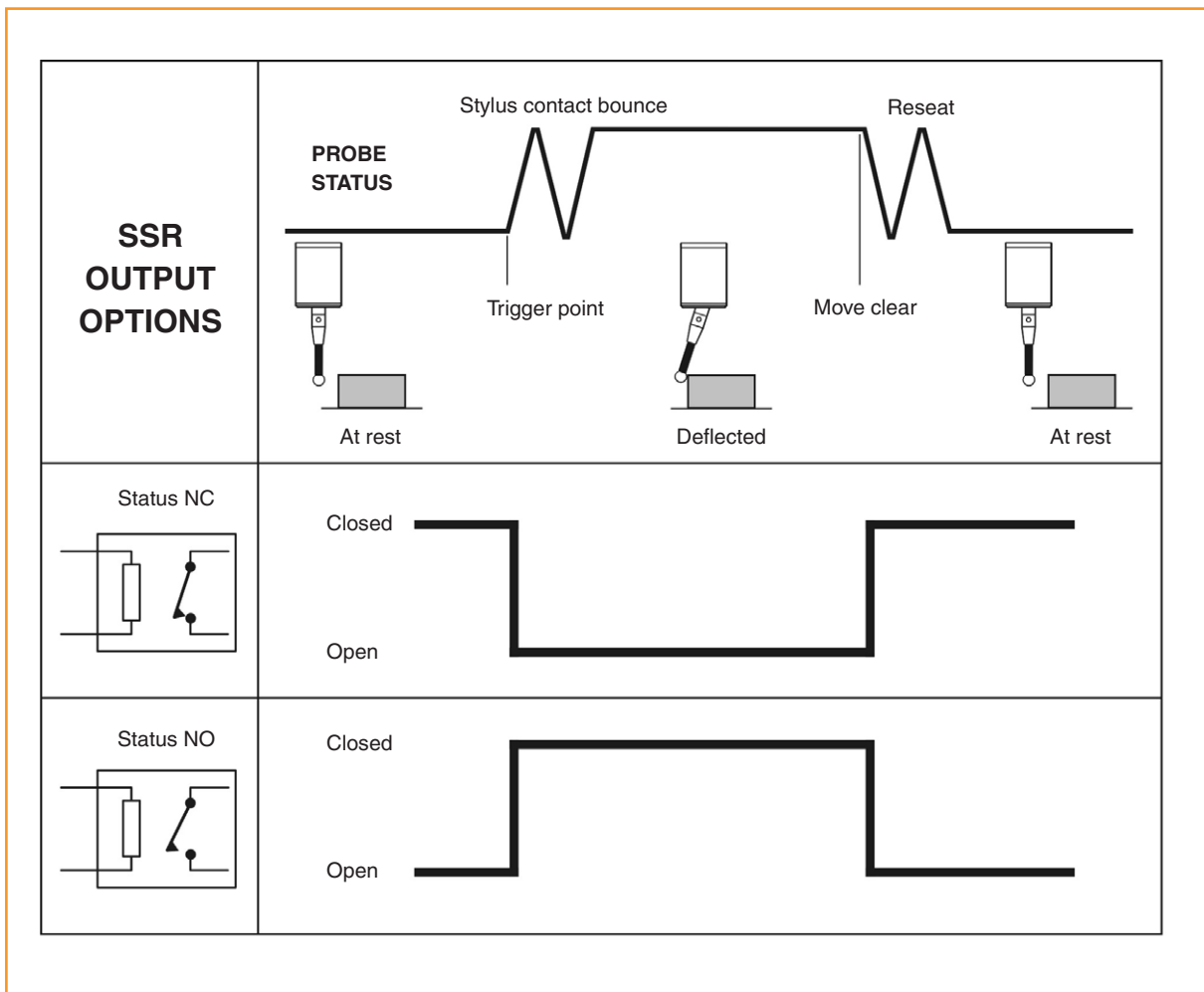
or

Normally open (NO)

Maximum current is ± 50 mA.

Maximum voltage is 30 V.

NOTE: Change of state debounce time is $25 \text{ ms} \pm 5 \text{ ms}$. Debounce time is the time delay between the HSI responding to a probe trigger and the point at which the probe can be used again.



Probe inhibit function

The inhibit function is used to switch off the RENGAGE probe and is activated by an M-code.

It is recommended that the RENGAGE probe is switched off using the inhibit function whenever it is not in use, and only switched on immediately before it is required. This will ensure that the RENGAGE probe is initialised just before measurement commences to ensure optimum performance.

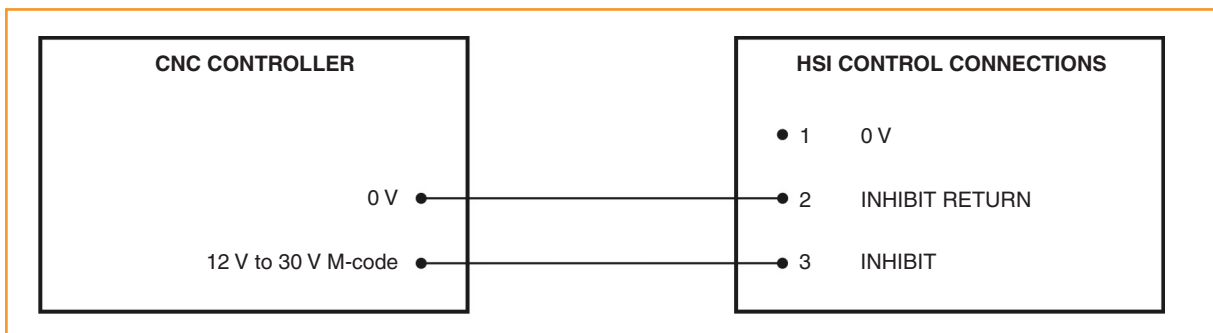
When the RENGAGE probe is switched on, it will take a minimum of 0.4 seconds before it is ready to measure and must remain stationary during this period.

The standard probe may also be inhibited using this function, if required. When the probe is inhibited, the status output is forced into the non-triggered (seated) state, irrespective of actual probe status. There are several alternative methods of selecting the inhibit function, each of which is listed below:

12 V to 30 V M-code connected directly to the HSI

When using this method, it is recommended that the HSI is connected as shown in the following diagram. Alternatively, pin 2 (INHIBIT RETURN) may be linked to pin 1 (0 V) on the HSI 12-way connector, rather than to the 0 V circuit within the machine's CNC controller.

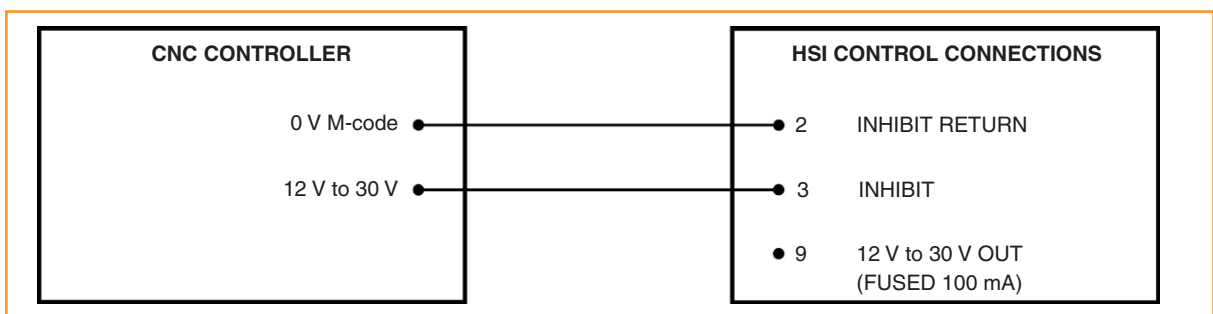
An M-code is used to activate the inhibit function. The M-code must supply a constant voltage of between 12 V and 30 V to pin 3 (INHIBIT) on the HSI 12-way connector. To deactivate the inhibit function, the 12 V to 30 V supply must be removed from pin 3 (INHIBIT) of the HSI 12-way connector.



0 V M-code connected directly to the HSI

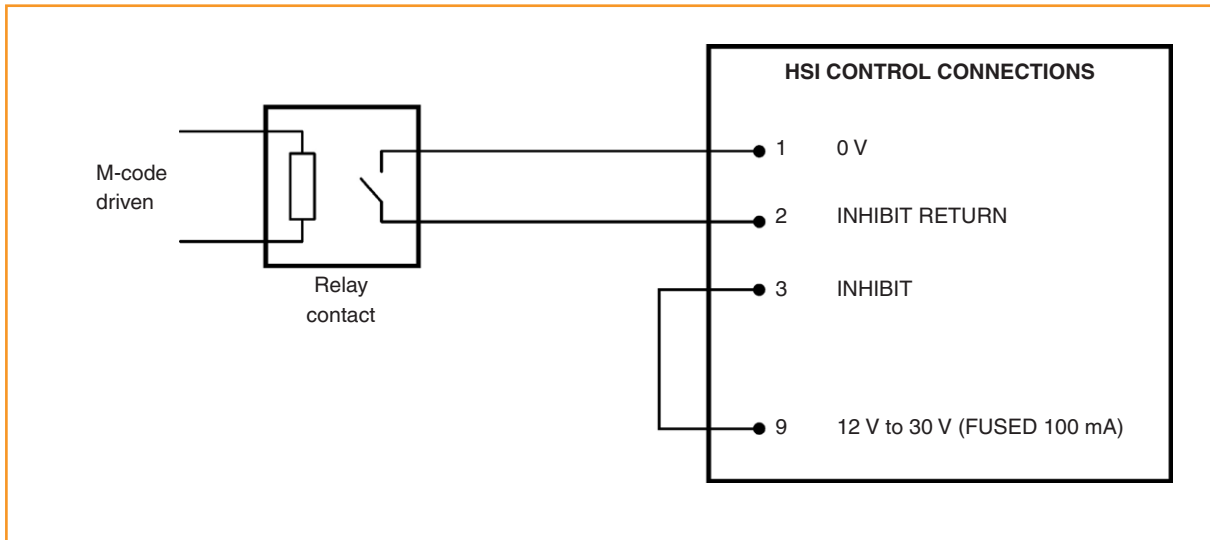
When using this method, it is recommended that the HSI is connected as shown in the following diagram. Alternatively, pin 3 (INHIBIT) may be linked to pin 9 (12 V to 30 V OUT (FUSED 100mA)) on the 12-way connector, rather than to the 12 V to 30 V circuit within the machine's CNC controller.

An M-code is used to activate the inhibit function. The M-code must supply a constant 0 V to pin 2 (INHIBIT RETURN) on the HSI 12-way connector. To deactivate the inhibit function, a constant voltage of 12 V to 30 V must be applied to pin 2 (INHIBIT RETURN) on the HSI 12-way connector.



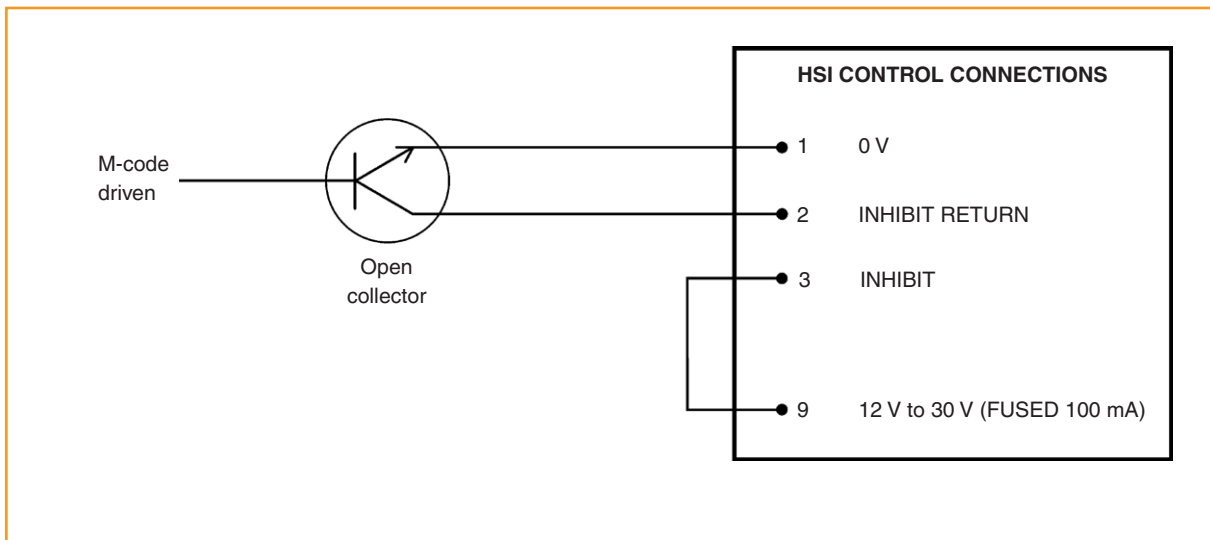
M-code driven relay contact

When using this method, it is recommended that the HSI is connected as shown in the following diagram. Shorting together pin 1 (0 V) and pin 2 (INHIBIT RETURN) of the HSI 12-way connector (less than 100 Ω) will force the output into a seated state, irrespective of actual probe status, and remove power from the probe. Breaking contact between pin 1 and pin 2 (greater than 50 kΩ) will remove the inhibit function.

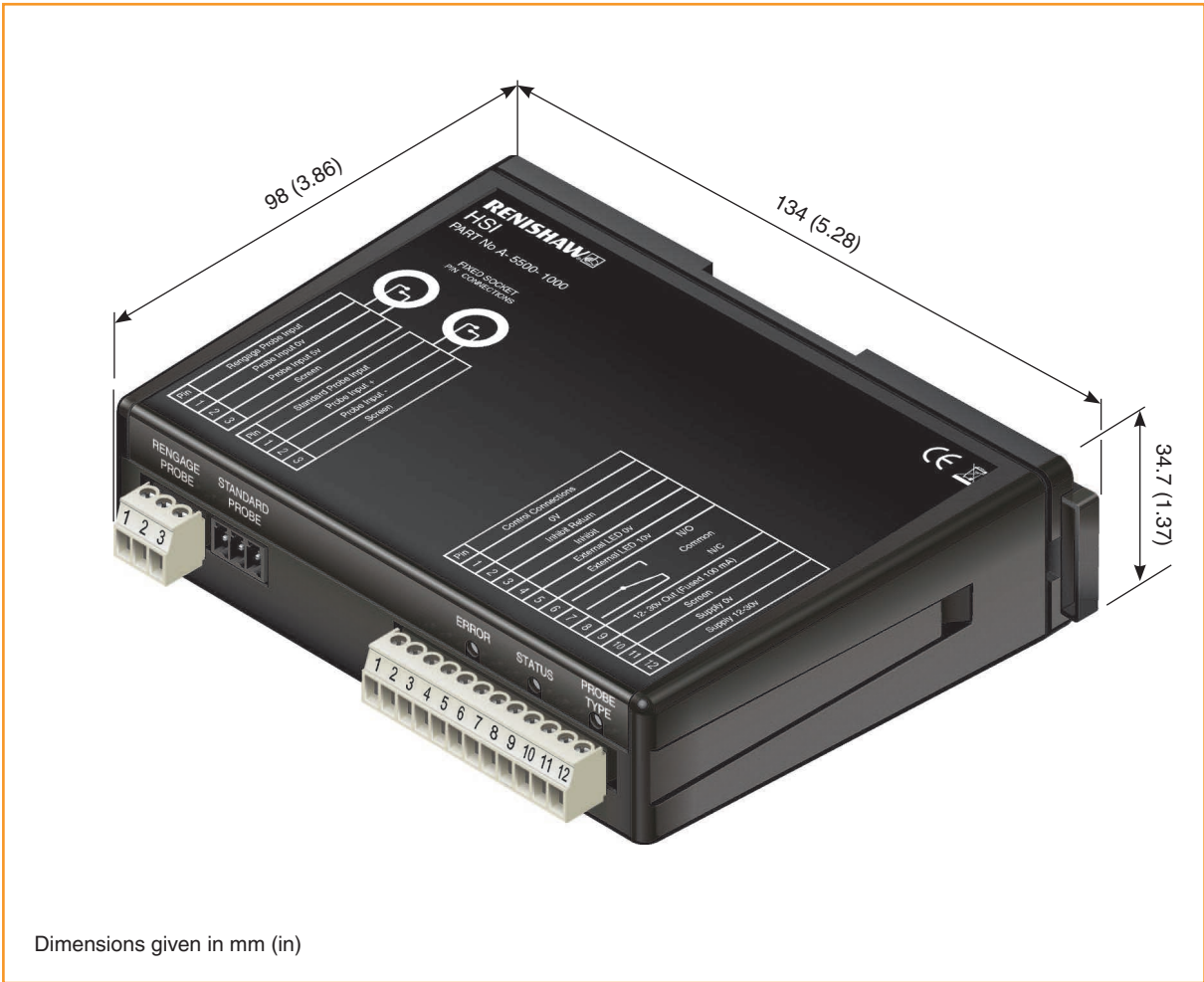


M-code driven open collector

When using this method, it is recommended that the HSI is connected as shown in the following diagram. An M-code is used to activate the inhibit function.



HSI dimensions



Dimensions given in mm (in)

HSI specification

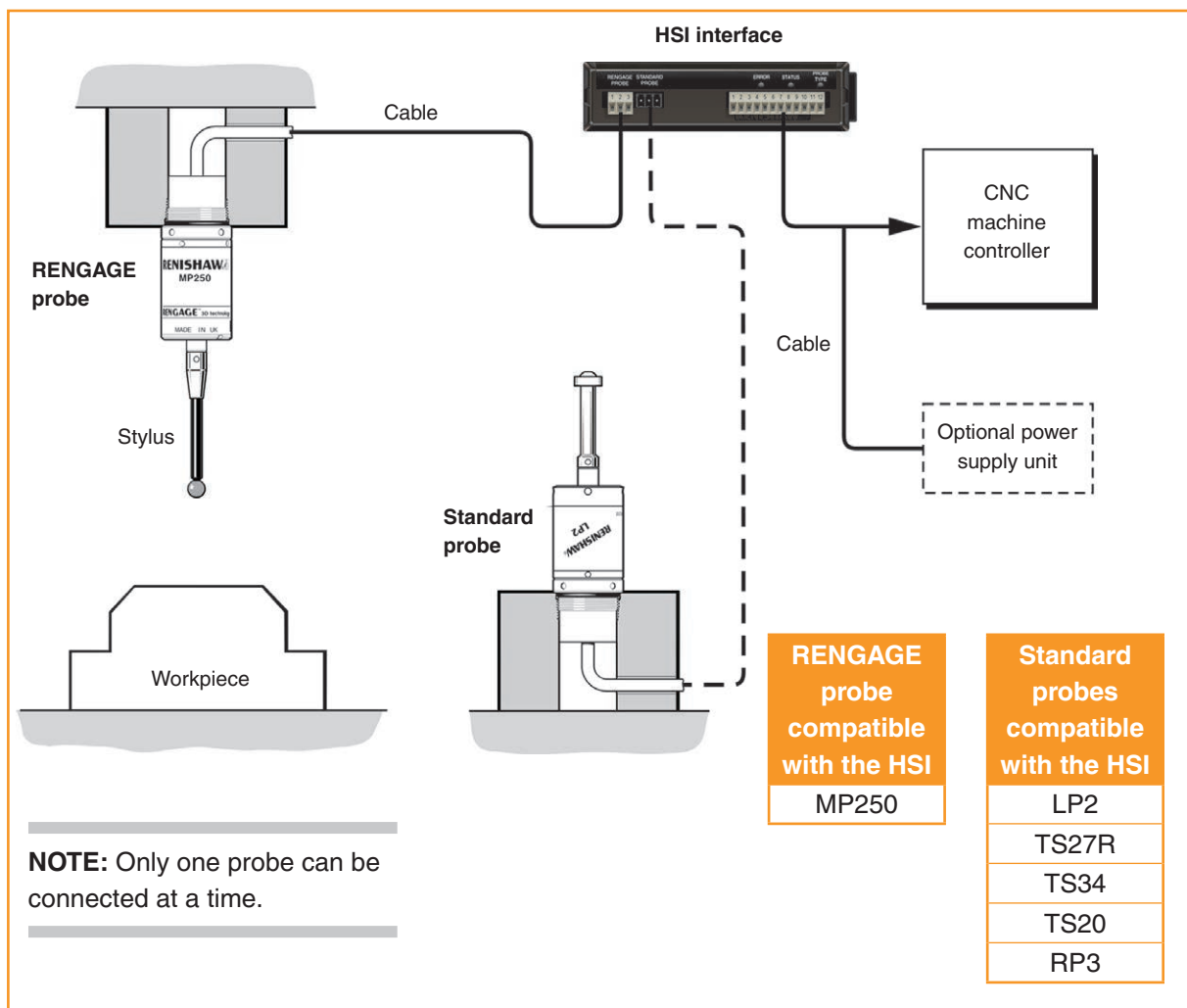
Principal application	The HSI processes signals from RENGAGE probes or standard probes and converts them into voltage-free SSR output, which is then transmitted to the CNC machine controller.	
Dimensions	Width:	134 mm (5.28 in)
	Height:	34.7 mm (1.37 in)
	Depth:	98 mm (3.86 in)
Supply voltage	12 Vdc to 30 Vdc	
Supply current	40 mA @ 12 V, 23 mA @ 24 V	
Output signal	Probe status Voltage-free solid-state (SSR) output, configurable normally open or normally closed.	
Mounting	DIN rail. Alternative mounting using screws.	
Input/output protection	SSR output is protected by overcurrent circuitry, the output current should not exceed 50 mA. Power input is protected by a 140 mA resettable fuse.	
Diagnostic LEDs	Error, status and probe type. Connection provided for remote device (LED or buzzer).	
Environment	Storage temperature	-25 °C to +70 °C (-13 °F to +158 °F)
	Operating temperature	+5 °C to +55 °C (+41 °F to +131 °F)

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System installation

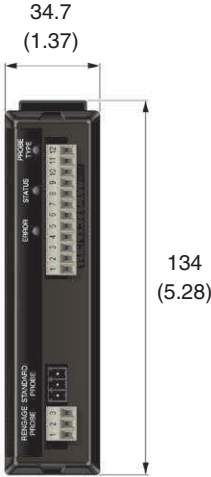
Installing the HSI

Typical HSI installation

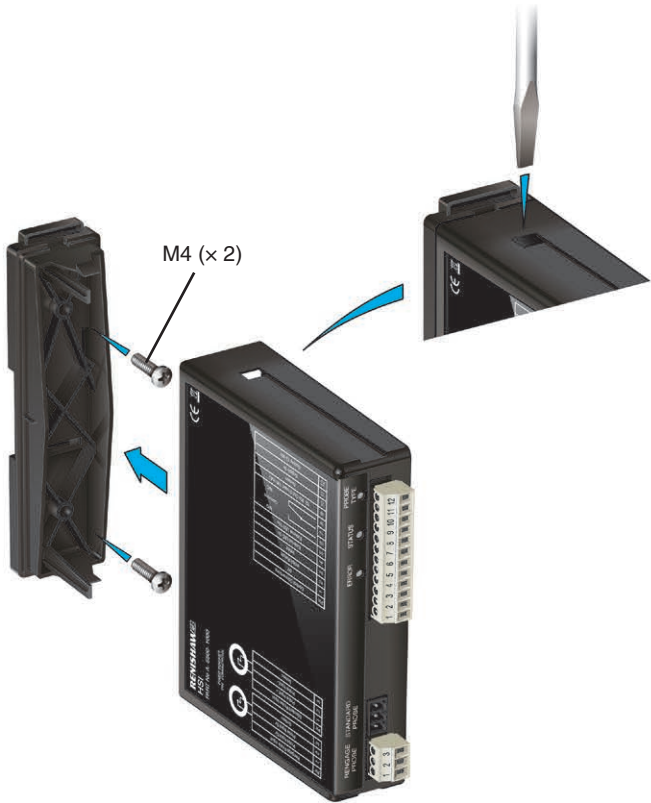


NOTE: The connection between the probe socket and the HSI interface must be screened and connected to ground at the interface.

Mounting the HSI to a DIN rail



Standard DIN rail mounting

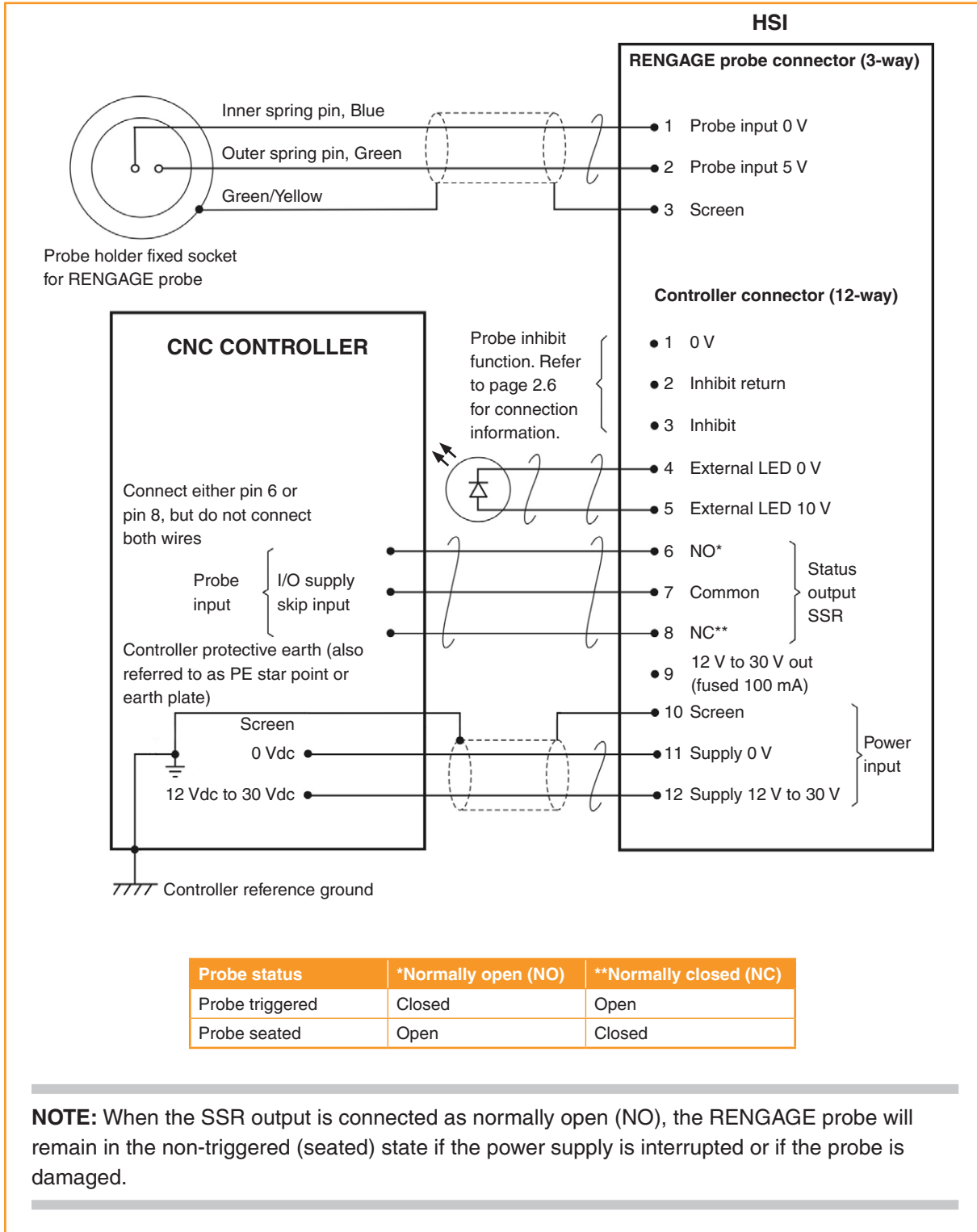


Alternative mounting

Dimensions given in mm (in)

Connecting the HSI to a RENGAGE™ probe and the CNC controller

For further information on RENGAGE™ probes compatible with HSI, refer to page 3.1.

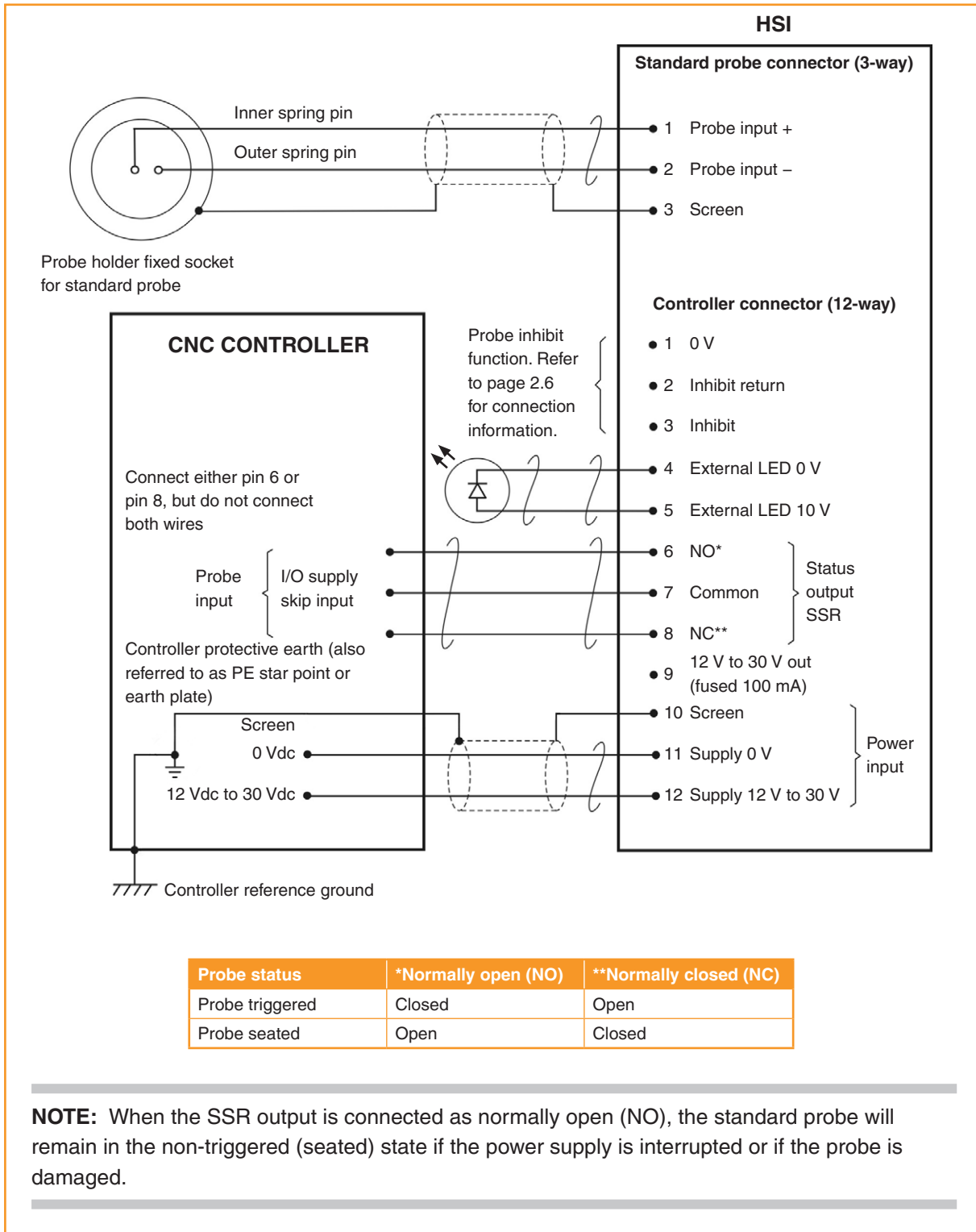


Probe status	*Normally open (NO)	**Normally closed (NC)
Probe triggered	Closed	Open
Probe seated	Open	Closed

NOTE: When the SSR output is connected as normally open (NO), the RENGAGE probe will remain in the non-triggered (seated) state if the power supply is interrupted or if the probe is damaged.

Connecting the HSI to a standard probe and the CNC controller

For further information on standard probes compatible with HSI, refer to page 3.1.



Probe status	*Normally open (NO)	**Normally closed (NC)
Probe triggered	Closed	Open
Probe seated	Open	Closed

NOTE: When the SSR output is connected as normally open (NO), the standard probe will remain in the non-triggered (seated) state if the power supply is interrupted or if the probe is damaged.

Parts list

Type	Part number	Description
Interface	A-5500-1000	HSI probe system interface with DIN rail mounting and three terminal blocks, quick-start guide and packaging.
Terminal block	P-CN25-0008	3-way terminal block.
Terminal block	P-CN47-0032	12-way terminal block.
Publications. These can be downloaded from our website at www.renishaw.com .		
MP250	H-5500-8500	Quick-start guide: for rapid set-up of the MP250 probe.
HSI	H-5500-8550	Quick-start guide: for rapid set-up of the HSI interface.
TS20	H-2000-5010	Installation and user's guide: TS20.
TS27R	H-2000-5018	Installation and user's guide: TS27R.
LP2	H-2000-5021	Installation and user's guide: LP2.
RP3	H-2000-5187	Installation and user's guide: RP3.
TS34	H-2197-8500	Installation and user's guide: TS34.

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General information

Disclaimer

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

Warranty

Equipment requiring attention under warranty must be returned to your equipment supplier.

Unless otherwise specifically agreed in writing between you and Renishaw, if you purchased the equipment from a Renishaw company, the warranty provisions contained in Renishaw's CONDITIONS OF SALE apply. You should consult these conditions in order to find out the details of your warranty but, in summary, the main exclusions from the warranty are if the equipment has been:

- neglected, mishandled or inappropriately used; or
- modified or altered in any way except with the prior written agreement of Renishaw.

If you purchased the equipment from any other supplier, you should contact them to find out what repairs are covered by their warranty.

China RoHS

For more information, on China RoHS visit:
www.renishaw.com/mtpchinarohs.

Changes to equipment

Renishaw reserves the right to change equipment specifications without notice.

CNC machines

CNC machine tools must always be operated by fully trained personnel in accordance with the manufacturer's instructions.

Care of the interface

Keep system components clean.

Patents

Features of the HSI, and other similar Renishaw products, are the subject of one or more of the following patents and/or patent applications:

EP 1425550

EP 1804020

JP 4237051

US 6941671

EU declaration of conformity



Renishaw plc declares under its sole responsibility that the HSI is in conformity with all relevant Union legislation.

The full text of the EU declaration of conformity is available at:

www.renishaw.com/mtpdoc

WEEE directive



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.

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

FCC Information to user (USA only)

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

47 CFR 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.

47 CFR 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 the user will be required to correct the interference at his own expense.

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