Installation guide
H-5500-8554-03-A

RENISHAW
apply innovation™

HSI hardwired system interface

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Before you begin

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Warranty

Equipment requiring attention under warranty must be returned to your equipment supplier. No claims will be considered where Renishaw equipment has been misused, or where repairs or adjustments have been attempted by unauthorised persons. Prior consent must be obtained in instances where Renishaw equipment is to be substituted or omitted. Failure to comply with this requirement will invalidate the warranty.

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 hardwired system interface and related products, are subject of one or more of the following patents and/or patent applications:

EP 0695926 US 5,669,151

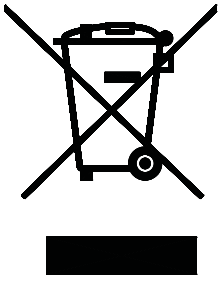
EC declaration of conformity

CE

Renishaw plc declares that the HSI interface complies with the applicable standards and regulations.

Contact Renishaw plc at www.renishaw.com/hsi for the full EC declaration of conformity.

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.

FCC information to the user (USA only)

FCC 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.

FCC 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.

FCC 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.

Safety

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 EEC 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, i.e. power transformers, servo drives etc;
- all 0V/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, i.e. motor power supply cables etc, or be near high speed data lines;
- cable lengths should always be kept to a minimum.

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.

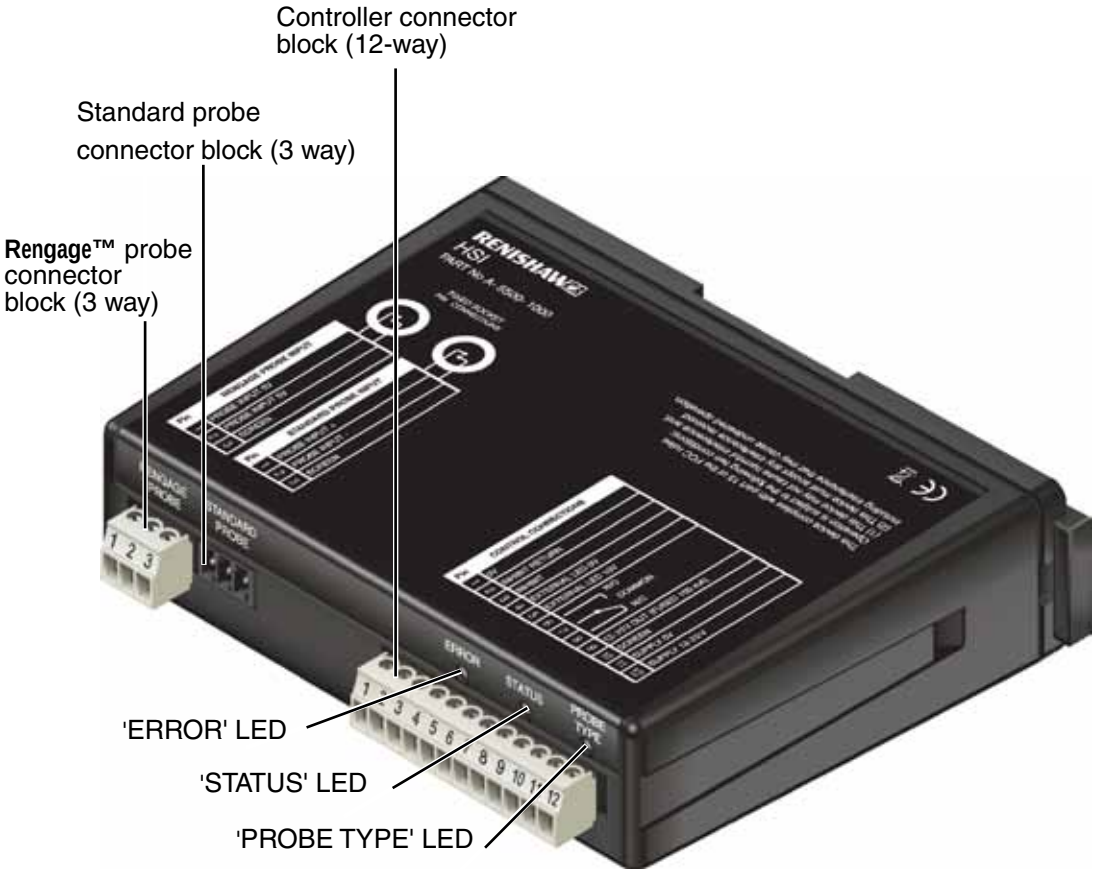
Typically installed within the CNC machine controller cabinet, and located away from sources of interference such as transformers and motor controls, the HSI can draw its power from the machine's nominal 12 Vdc to 30 Vdc supply. Where such a supply is not available, the HSI can be powered using any 12 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 three pin and is designed to connect to a Renishaw **Rengage™** probe.

Standard probe connector (3-way)

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

Controller connector (12-way)

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

Terminals 1 - 3

Used to connect the inhibit function. For more information about the inhibit function, please refer to page 2.5.

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 - 8

These are the SSR probe trigger outputs:

- terminal 6 is normally open (N/O);
- terminal 7 is the common connection;
- terminal 8 is normally closed (N/C).

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

Terminal 9

Used to connect the inhibit functions to 12 V - 30 V. It is fused at 100 mA.

Terminals 10 - 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 then 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.

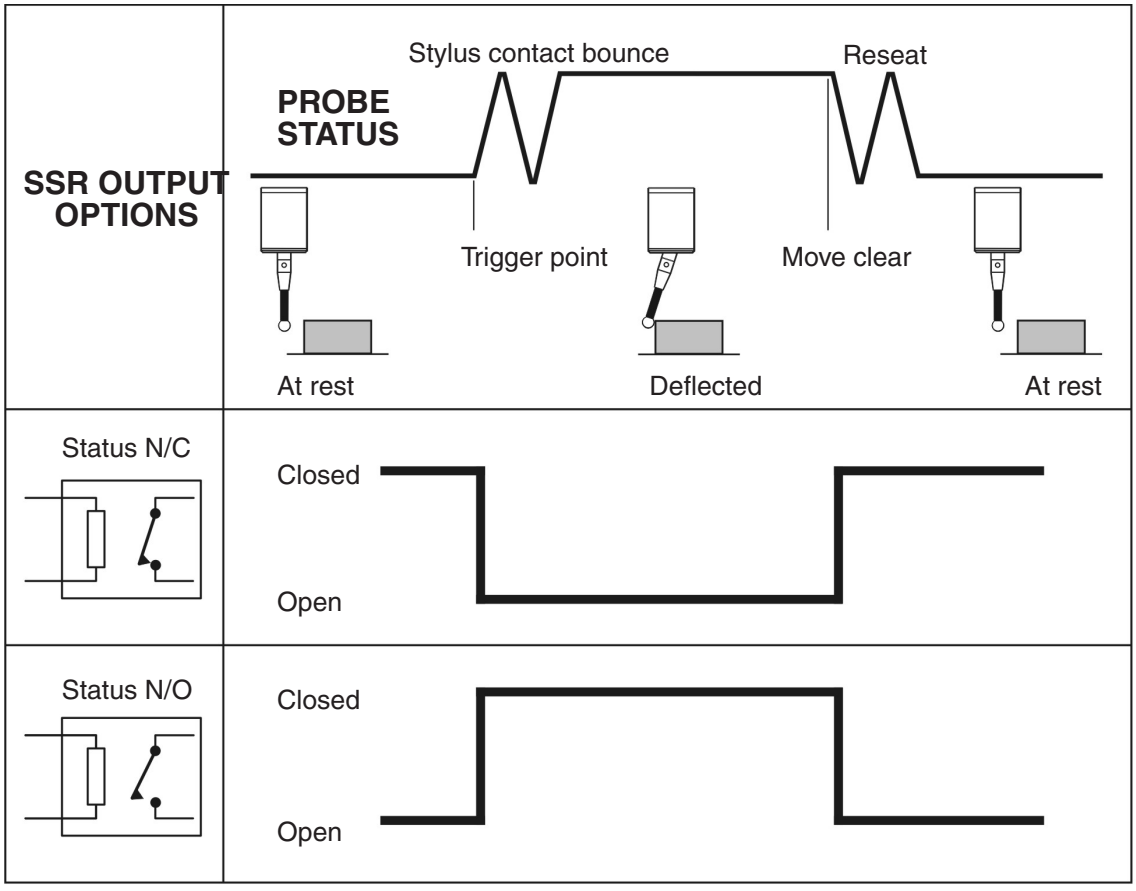
Solid-state relay (SSR)

The SSR relay is configured as follows:

Normally closed (N/C)
or
Normally open (N/O)

Maximum current is ±50 mA.
Maximum voltage is 30 V.

NOTE: Change of state debounce time is 25 ms ±5 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.



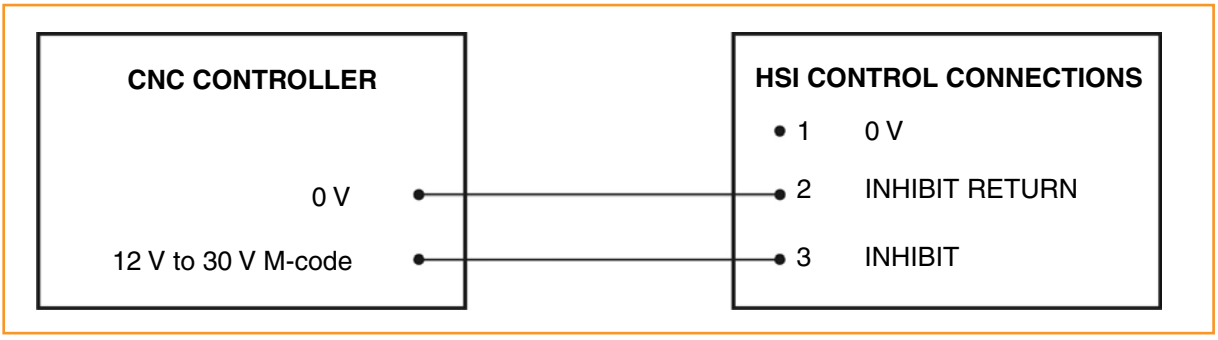
Probe inhibit function

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 - 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.

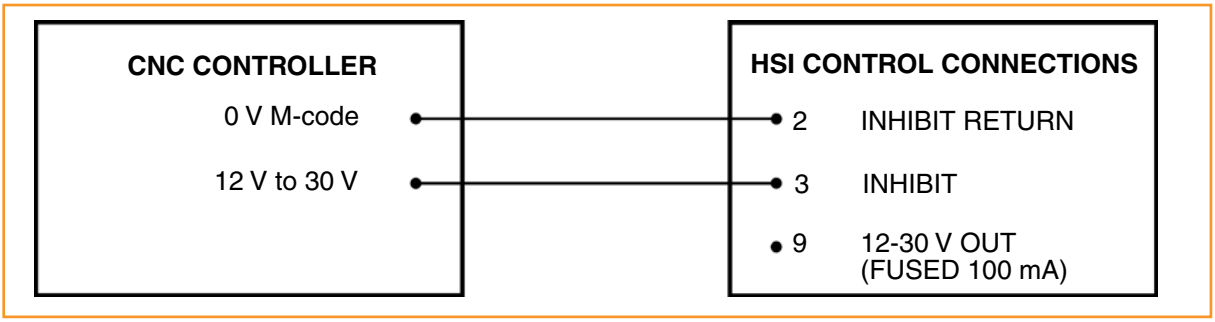
An M-code is used to activate the inhibit function. The M-code must supply a constant voltage of between 12 V and 30 V to pin 3 (INHIBIT) on the HSI 12-way connector. To deactivate the inhibit function, the 12 V to 30 V supply must be removed from pin 3 (INHIBIT) of the HSI 12-way connector.



0 V M-code connected directly to the HSI

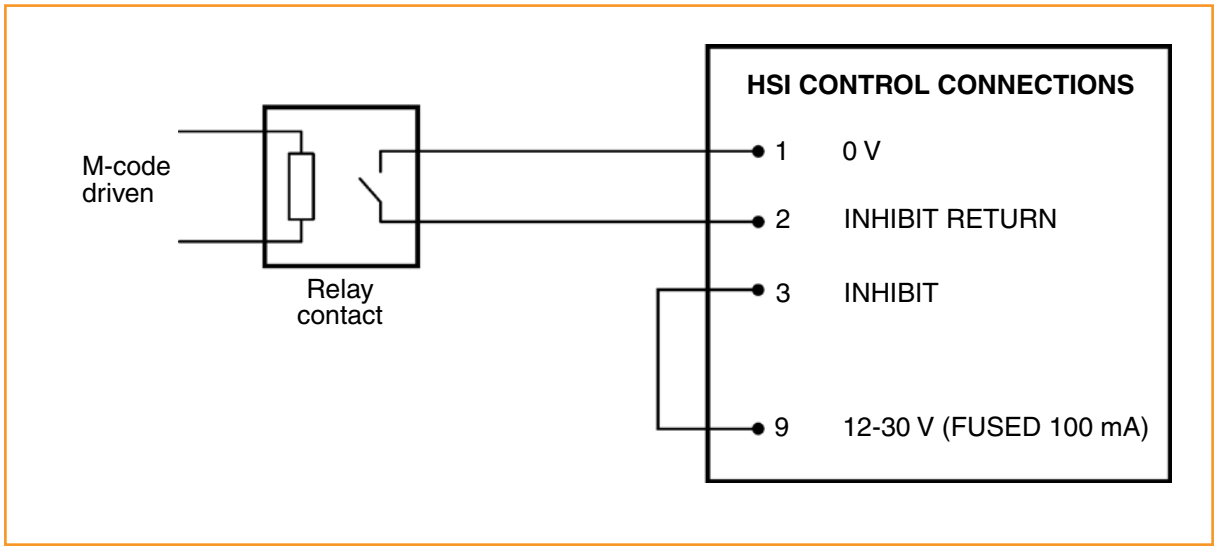
When using this method, it is recommended that the HSI is connected as shown in the following diagram. Alternatively, pin 3 (INHIBIT) may be linked to pin 9 (12-30 V OUT (FUSED 100mA)) on the 12-way connector, rather than to the 12 V to 30 V circuit within the machine's CNC controller.

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.



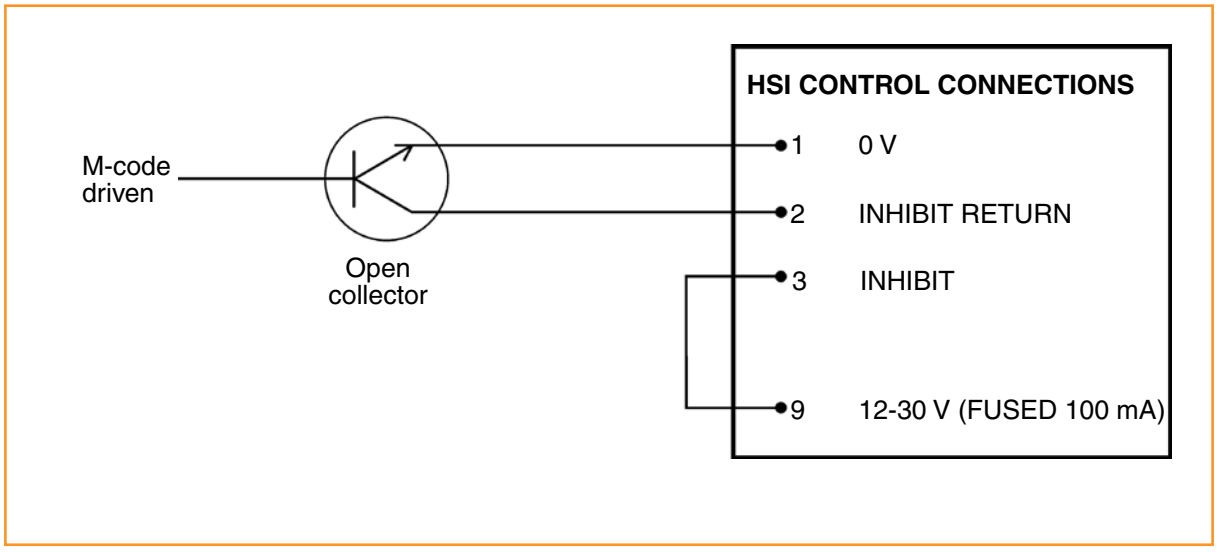
M-code driven relay contact

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 ohms) 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 K ohms) 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)

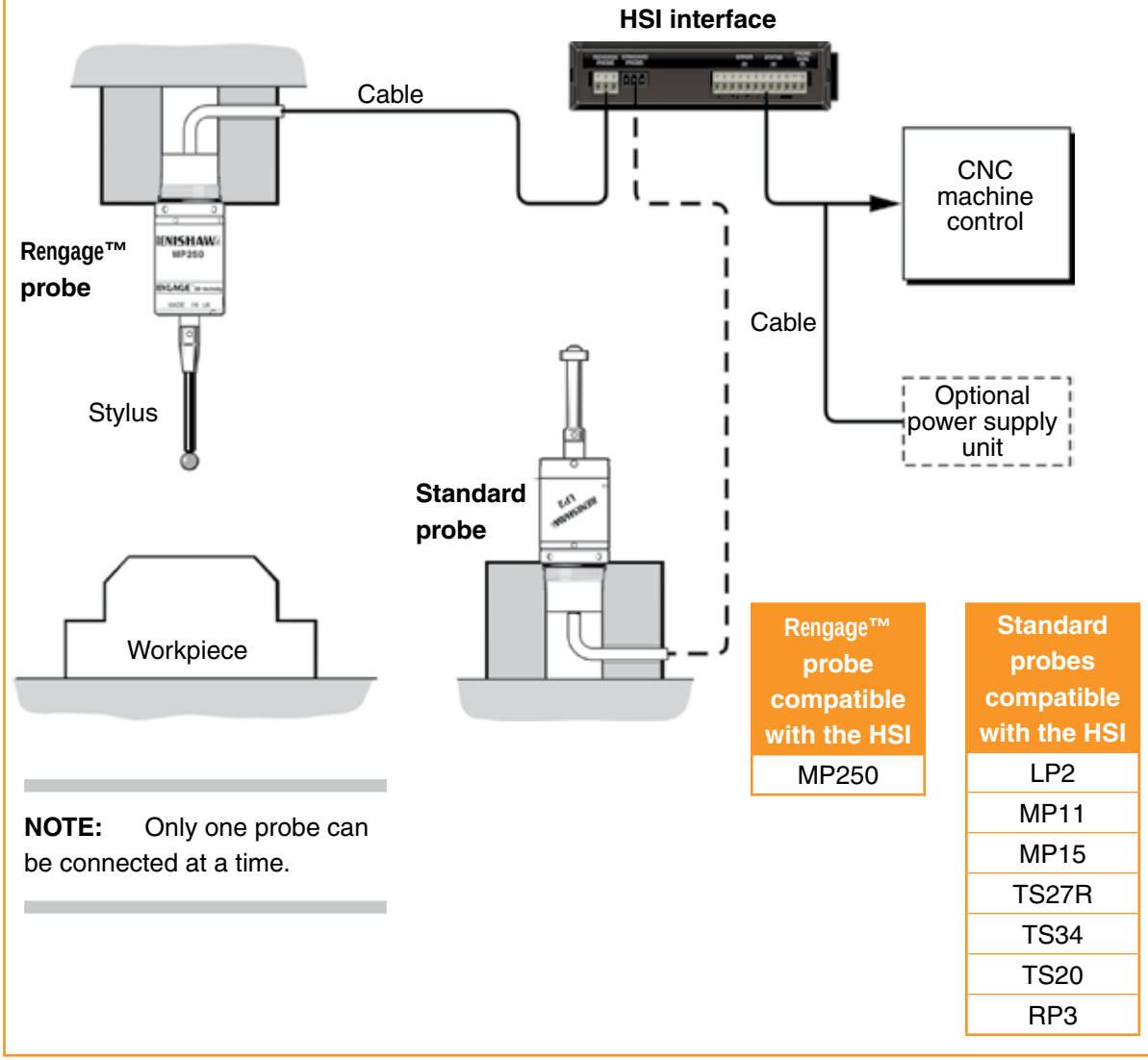
HSI specification

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: Height: Depth:	134 mm (5.28 in) 34.6 mm (1.36 in) 98 mm (3.86 in)
Supply voltage	11 Vdc to 30 Vdc	
Supply current	40 mA @ 12 V, 23 mA @ 24 V	
Output signal	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 an electric circuit which limits the current to 60 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)

System installation

Installing the HSI

Typical HSI installation



Rengage™ probe compatible with the HSI
MP250

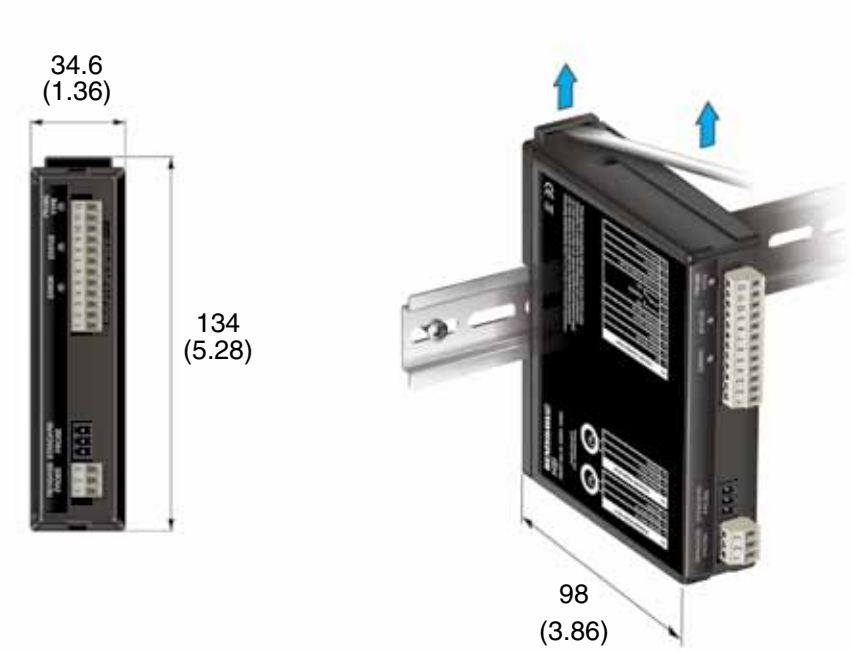
Standard probes compatible with the HSI
LP2
MP11
MP15
TS27R
TS34
TS20
RP3

NOTE: Only one probe can be connected at a time.

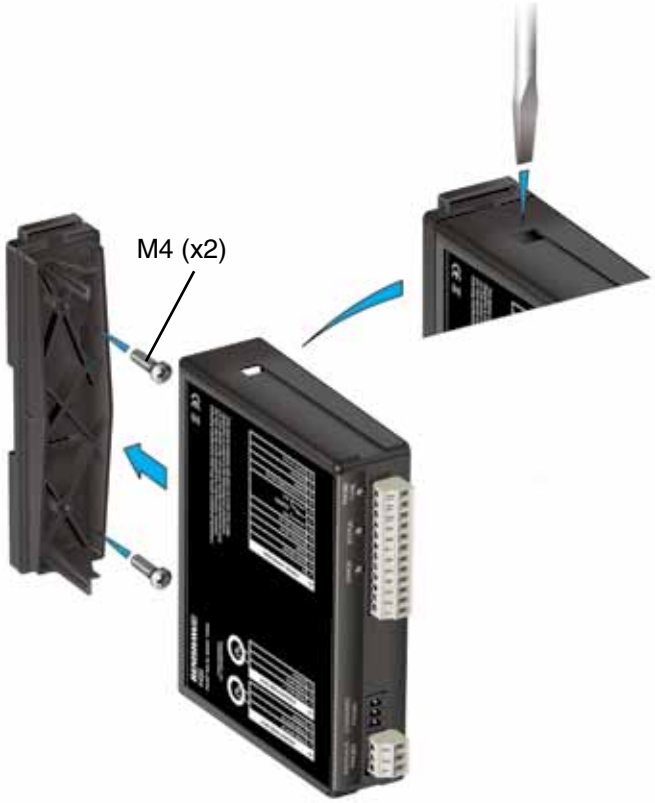
NOTE: The connection between the probe socket and the HSI interface must be screened and connected to ground at the interface.

Mounting the HSI to a DIN rail

Dimensions given in mm (in)



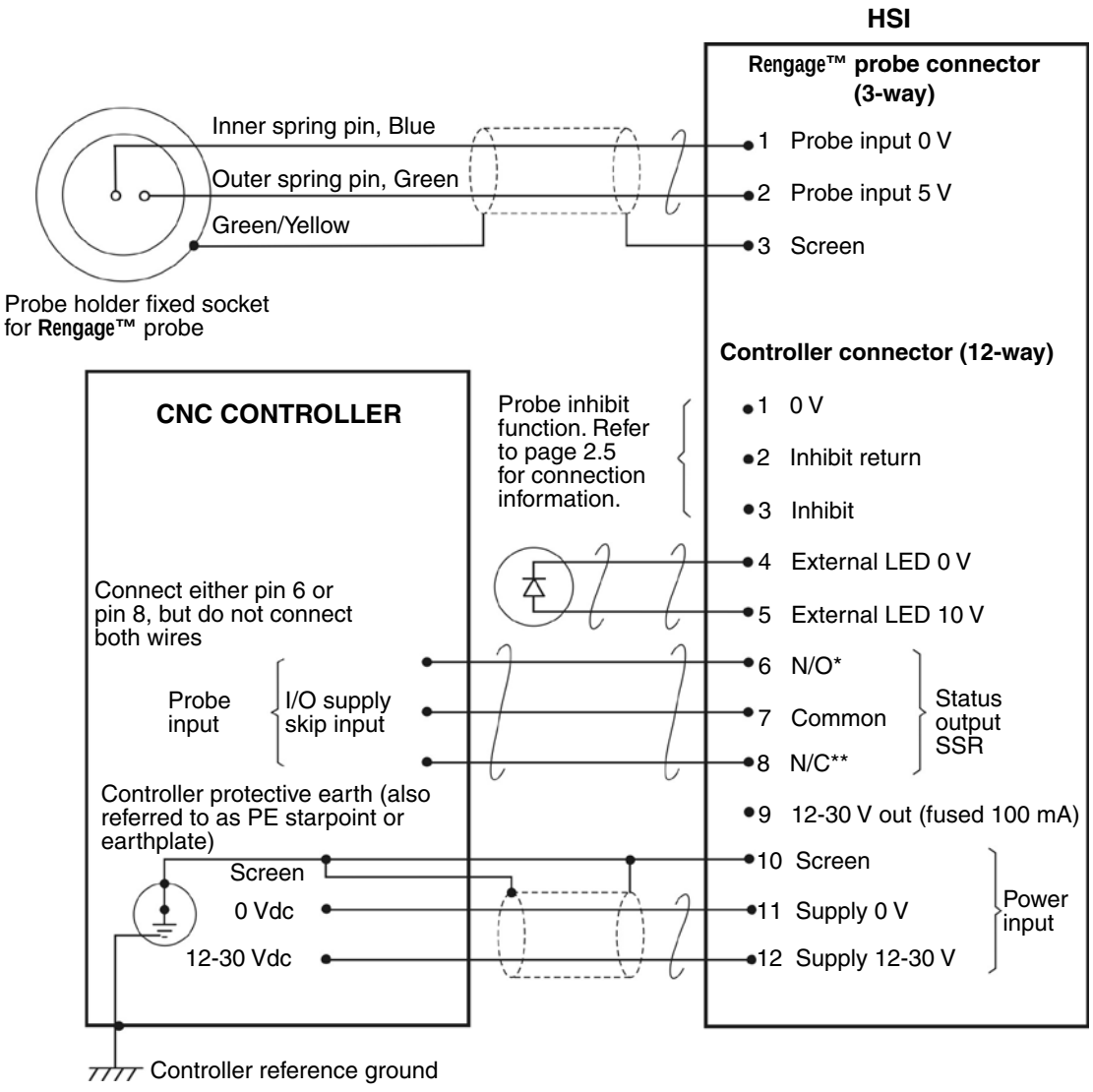
Standard DIN rail mounting



Alternative mounting

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

For further information on **Rengage™** probes, compatible with HSI, please refer to page 3.1.

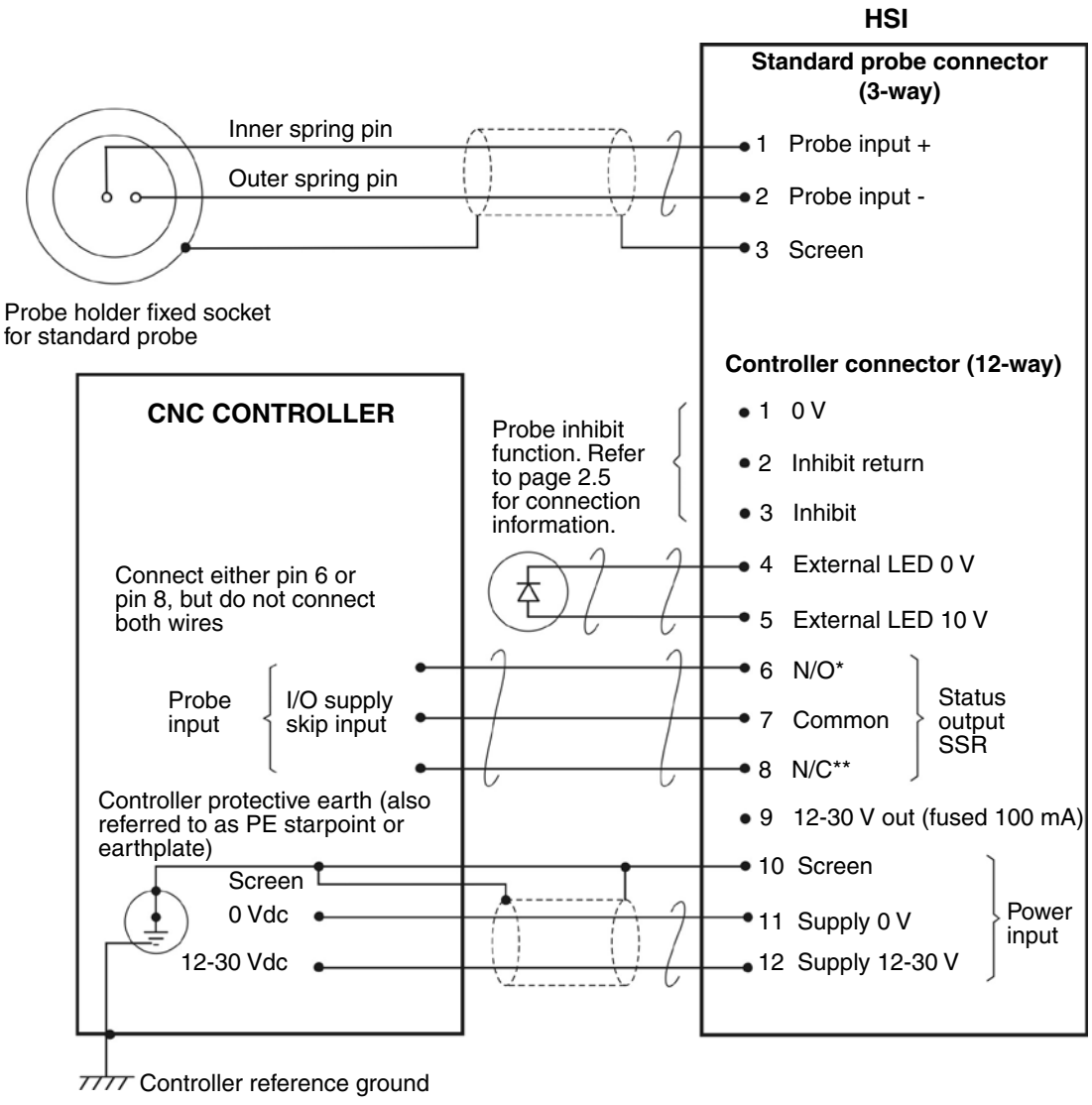


Status	*Normally open (N/O)	**Normally closed (N/C)
Probe triggered	Closed	Open
Probe seated	Open	Closed

NOTE: When the SSR output is connected as normally open (N/O), 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, please refer to page 3.1.



Status	*Normally open (N/O)	**Normally closed (N/C)
Probe triggered	Closed	Open
Probe seated	Open	Closed

NOTE: When the SSR output is connected as normally open (N/O), 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 web site at www.renishaw.com		
MP250	A-5500-8500	Quick start guide: for rapid setup of the MP250 probe, includes CD with installation guides.
HSI	A-5500-8550	Quick start guide: for rapid setup of the HSI interface, includes CD with installation guides.
MP11	H-2000-5007	Installation and user's guide: MP11.
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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