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HS10 to HS20 upgrade

Introduction

With many HS10s sold in the 1990s coming to the end of their serviceable lives, Renishaw has shown its commitment to this specialised sector of the machine tool market by introducing its HS20 long range laser encoder.

The HS20 has been specifically designed to be a drop in replacement for the HS10 and HS10X with all connections remaining the same. Set-up is simplified; it has improved power connections (for long range applications) and external dip switches for configuration.

The performance of HS20 is equal to its predecessor, the HS10X, with a range of up to 60 m.

When upgrading from HS10/HS10X to HS20, jumper/dip switch settings on the HS10/HS10X need to be noted then matched to the HS20 for backward compatibility.

Identify the HS10/HS10X configuration

The first stage in the installation process is to identify the current HS10/HS10X configuration. The HS10/HS10X laser head has three user configurable features:

- Output quadrature clock frequency
- Quadrature hysteresis
- Quadrature resolution

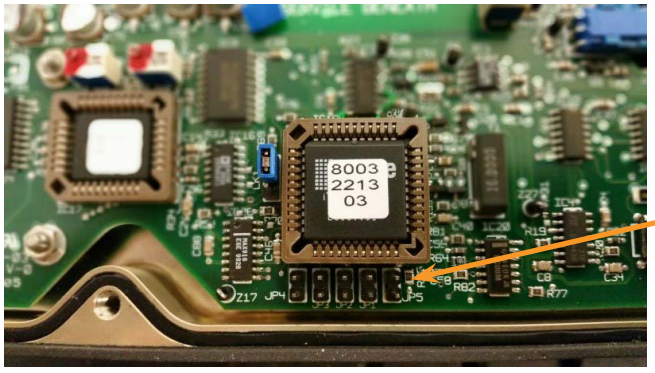
HS10/HS10X output clock frequency and quadrature hysteresis

The clock frequency and hysteresis are selected via jumpers inside the HS10 head.

Remove the six M4 bolts in the lid of the HS10/HS10X to gain access to the jumpers. Once you have removed the lid, you can use jumpers J1 to J5 to select clock frequency and LK1 to set the hysteresis as required.

HS10/HS10X quadrature clock frequency selection:

Jumper number	Clock frequency
JP1	1 MHz
JP2	2 MHz (default)
JP3	4 MHz
JP4	8 MHz
JP5	16 MHz

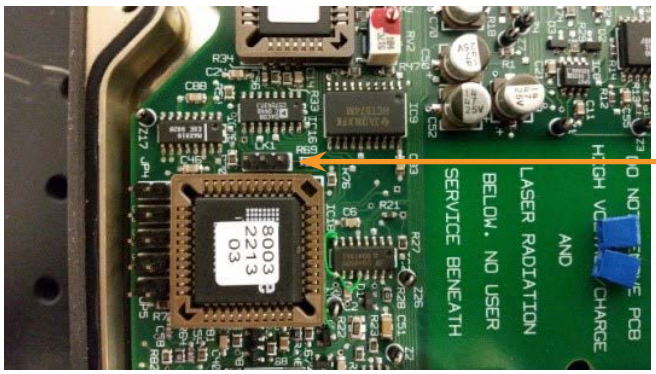


Jumper switches 1-5 used to configure clock frequency

Application note

Quadrature output clock frequency selection:

Link position	Hysteresis
Centre and top pins (R69 side)	80 nm (default)
Centre and bottom pins (R70 side)	0 nm



HS10/HS10X output quadrature resolution selection

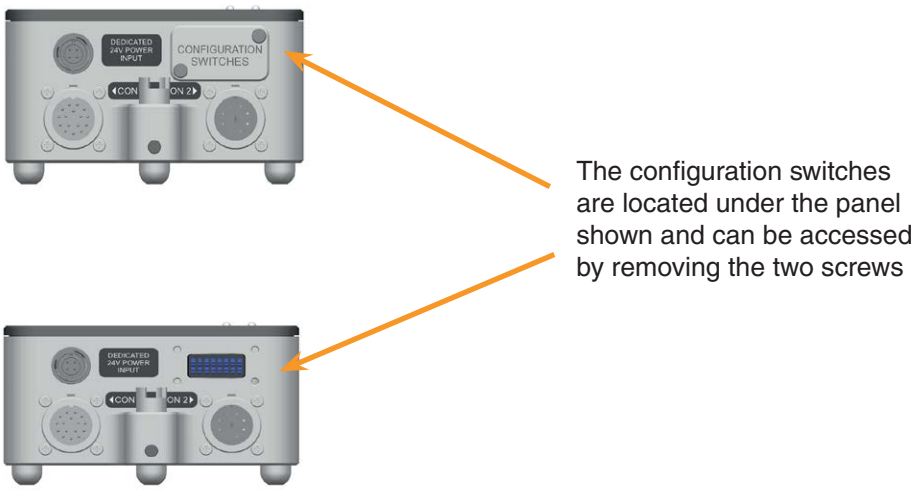
Selection of the quadrature output resolution is achieved by fitting a link into the cable mounted connector which mates with the HS10's 16-way male connector. Four output resolutions are available as detailed below.

Quadrature edge to edge resolution selection:

Pins linked	Quadrature resolution (nominal)
Pin 9 - 10 - 11	0.079 µm
None	0.158 µm (default)
Pin 9 - 10	0.316 µm
Pin 9 - 11	0.633 µm

Setting the HS20 configuration

Now the settings from the original HS10/HS10X have been identified, the next stage is to set the HS20 to the same settings to ensure the same outputs.



Configuration switch function

Switch	Function	Notes
1	No function	Should be set to OFF
2	Quadrature hysteresis	ON = Disabled OFF = Enabled
3	Quadrature resolution	See information later in this section
4	Quadrature resolution	See information later in this section
5	Quadrature clock	Frequency see information in this section
6	Quadrature clock	Frequency see information in this section
7	Quadrature clock	Frequency see information in this section
8	Parity	Set to ensure an odd number of 'ON' DIP switch states

Quadrature hysteresis

The quadrature hysteresis function can be switched on/off using configuration switch number 2.

Quadrature resolution selection

The quadrature resolution function can be selected using DIP switches 3 and 4. Four output resolutions are available as detailed below:

Switch 3	Switch 4	Quadrature resolution (nominal) µm
OFF	OFF	0.632
OFF	ON	0.316
ON	OFF	0.158 (default)
ON	ON	0.079

Digital quadrature update rate

The HS20 laser head allows the output update rate of the digital encoder output signals to be selected. The clock frequency can be selected using DIP switches 5, 6 & 7.

The clock frequency options are detailed below:

Switch 5	Switch 6	Switch 7	Update rate
OFF	OFF	OFF	1 MHz
OFF	OFF	ON	2 MHz (default)
OFF	ON	OFF	4 MHz
OFF	ON	ON	8 MHz
ON	OFF	OFF	16 MHz

Parity

The parity function can be switched on/off using configuration switch 8. The parity switch has been included as a safety feature. It prevents the accidental misconfiguration of a single switch.

This switch must be used to maintain an odd number of switches in the enabled position.

If this switch is set incorrectly, an error will be asserted and the signal LED will show flashing red. The default shipment state is with a parity error enabled. This is a safety feature to ensure the user checks the configuration before using the HS20. It also allows the electronics to detect the failure of a DIP switch in service and assert an error by tri-stating the quadrature output lines.

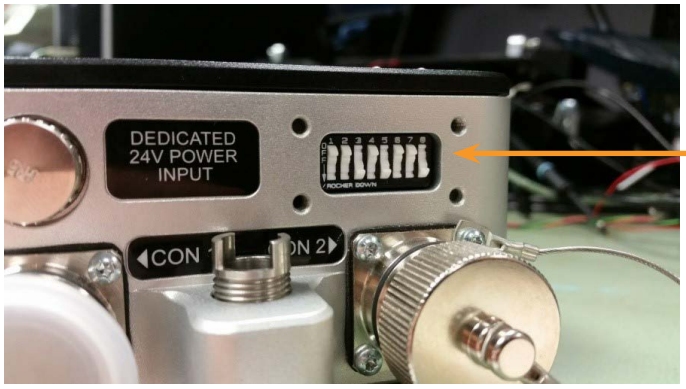
Example

The following example shows the settings of a HS10/HS10X and identifies which switch settings should be configured with a HS20.

HS10 settings: clock frequency **16 MHz**, hysteresis **80 nm**, resolution **0.158 µm**

HS20 settings would be:

Switch 1	Switch 2	Switch 3	Switch 4	Switch 5	Switch 6	Switch 7	Switch 8
OFF	OFF	ON	OFF	ON	OFF	OFF	ON
N/A	**Enabled**	**0.158 µm**		**16 MHz**			**Parity**



HS20 switches set to above configuration

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