Mounting Rails for 3-Axis 50mm LIGHTNING™ II Modular Scan Heads

1 Introduction

The main purpose of this document is to help the users of a 3-axis LIGHTNING II modular scan head to choose the right mounting rail. It describes several examples of mounting rails that are compatible with this type of scan head.

The beginning of this document also points out the critical dimensions to note, including the optical axis height for easy integration of the modular 3-axis scan head with the rest of the optics in the user machine (laser collimator, beam expander, etc.).

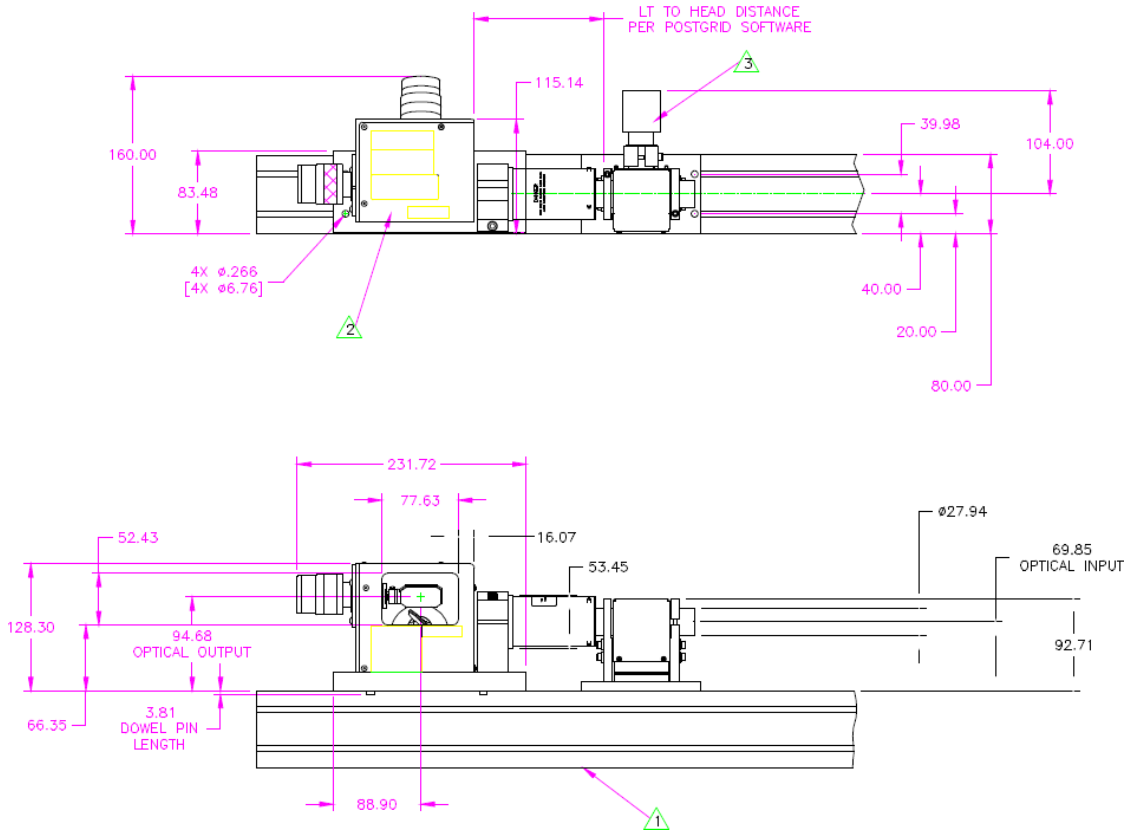
For other general guidelines of XY scan head and DFM (Dynamic Focus Module) mounting instructions, please refer to 3-Axis Scanning System Installation and Operation Manual (P0900-0170), chapter 8.

2 Optical Axis Height of 69.85mm from Rail to Optical Input

Figure 1 shows a modular 3-axis 50mm LIGHTNING II scan head mounted on a rail.

Please note the optical height of 69.85mm, which is critical to position the input optical beam. The optical height is the distance between the center of the DFM lens and the top surface of the mounting rail.

On the baseplates of the XY scan head (labeled 2 in Figure 1) and the DFM (Dynamic Focus Module, labeled 3 in Figure 1), there are through holes that are spaced 40mm (39.98mm) apart for the user to mount the XY scan head and the DFM onto a rail for rough alignment. Therefore, the chosen mounting rail should have the track spacing of 40mm (or 1.57 inch).



△ **NOTE 1**: Mounting rail, with example shown above

△ **NOTE 2**: XY scan head

△ **NOTE 3**: DFM - Z galvo

Figure 1 - The 50mm 3-axis system mounted on sliding rail (all dimensions are in mm)

Table 1 below lists reference information when integrating the 3-axis scan head into your system.

Table 1 - Reference

Parameters	Value	Descriptions
XY Scan Head Weight	28 lbs.	3-Axis 50mm LIGHTNING II Modular Scan Heads, including DFM
Servo Stack Weight	3 lbs.	Servo Driver Stack of 3-axis
Mounting Rail Weight	4 lbs.	Alignment rail
Optical Height	69.85mm	Optical height is the distance from the top surface of the mounting rail to the center of the DFM aperture. The input optical beam should be aligned to the optical axis of the DFM lens.
Slide Track Spacing	40mm (1.57 inches)	Width between sliding track grooves on the mounting rail

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3 Mounting Rail Dimensions and Options

The mounting rail can be machined per Cambridge Technology design shown in Figure 2 or Figure 3. A quick prototyping option is to purchase an 80-20 rail shown in Figure 5 for a relatively quick setup, or a gantry with the same rail shown in Figure 6.

3.1 Option 1 (Recommended): Mounting Rail by Cambridge Technology

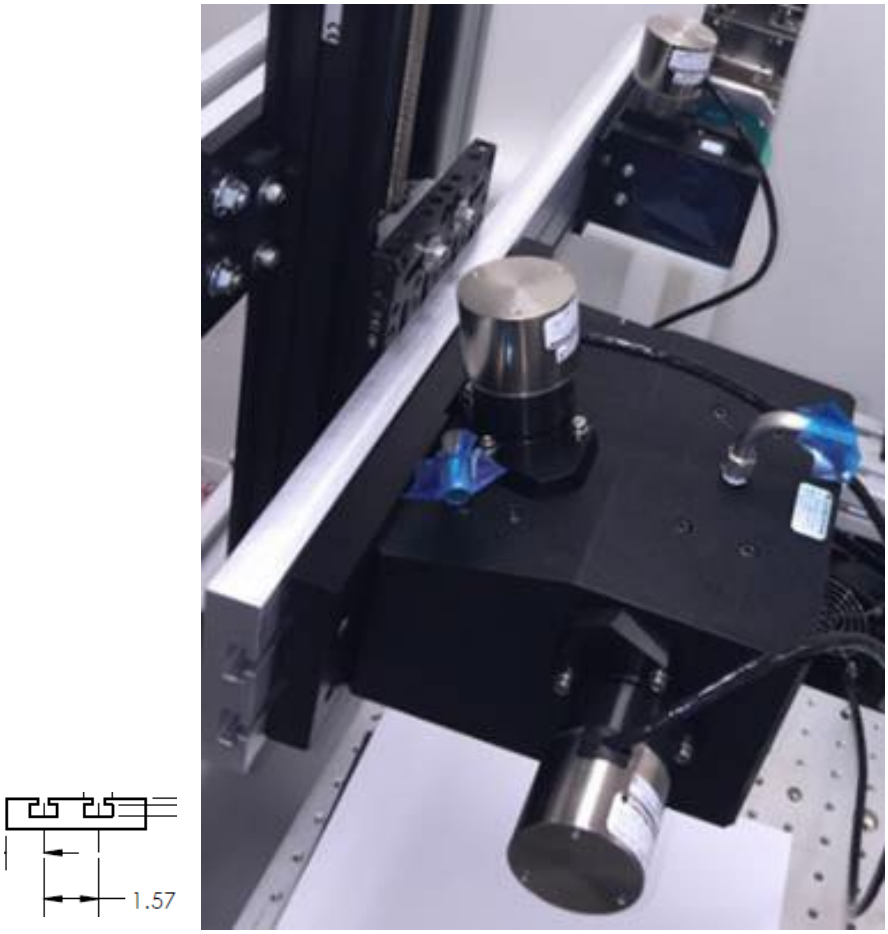

Figure 2 - Cross-section of rail shown (left) mounted with XY scan head and DFM (right)

3.1.1 T-Slot Mounting Nut

The commercially available T-Slot nut is used to mount both the XY scan head and the DFM to the mounting rail as shown in Fig. 3. The T-Slot nut also allows for sliding within the grooves such that the DFM and the XY scan head can be moved relative to each other.

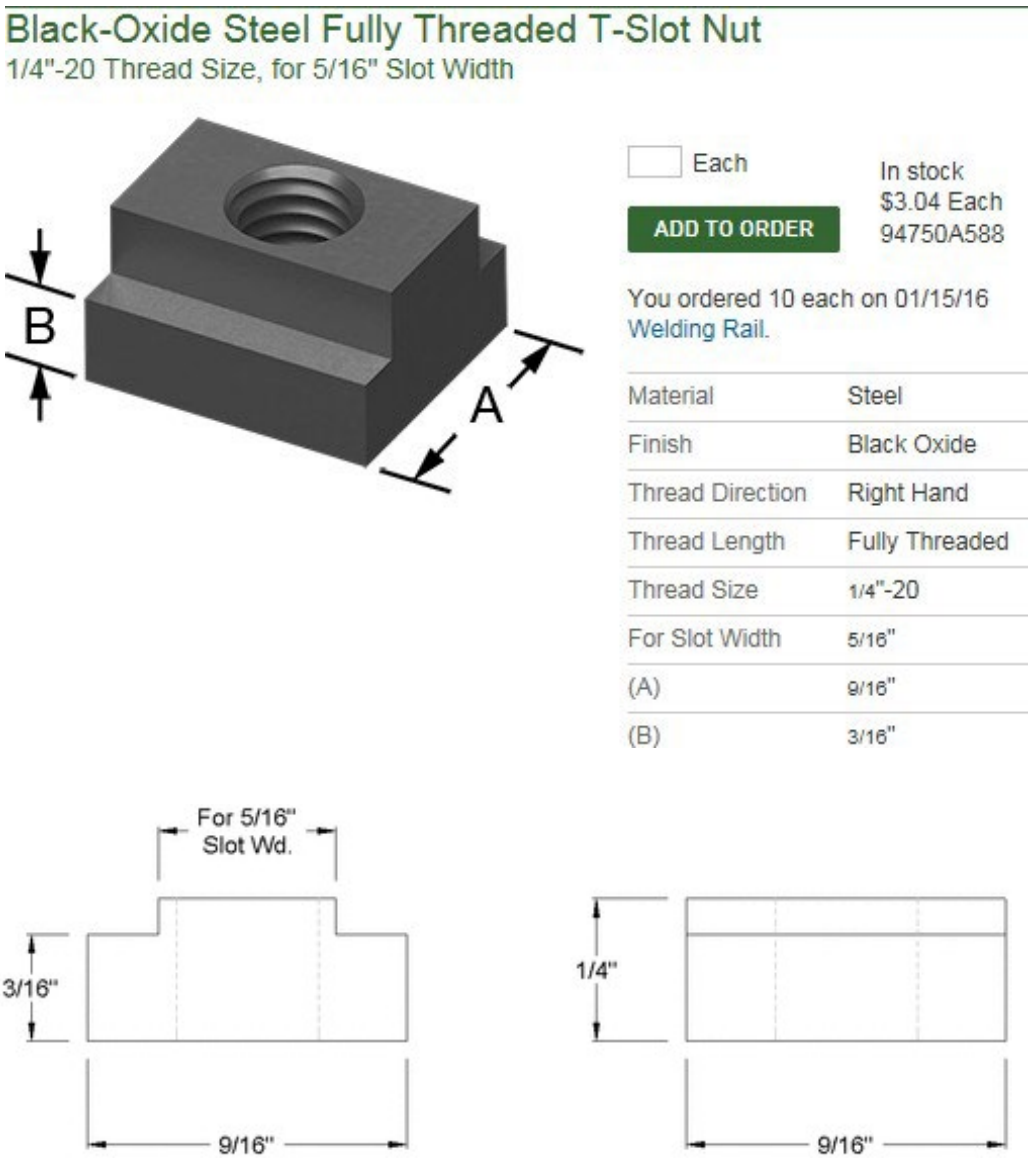

Figure 3 - T-Slot Nut

Details of T-Slot nuts and purchasing information can be found at the following link.
http://www.mcmaster.com/#94750a588/=10rb8vc

3.1.2 Cambridge Technology Mounting Rail

The back side of the rail can also be populated with the various mounting, and possibly mounted to a gantry system. The example as shown in Figure 3, per design D11212 from Cambridge Technology.

NOTE: Mounting holes should not interfere with sliding track grooves.

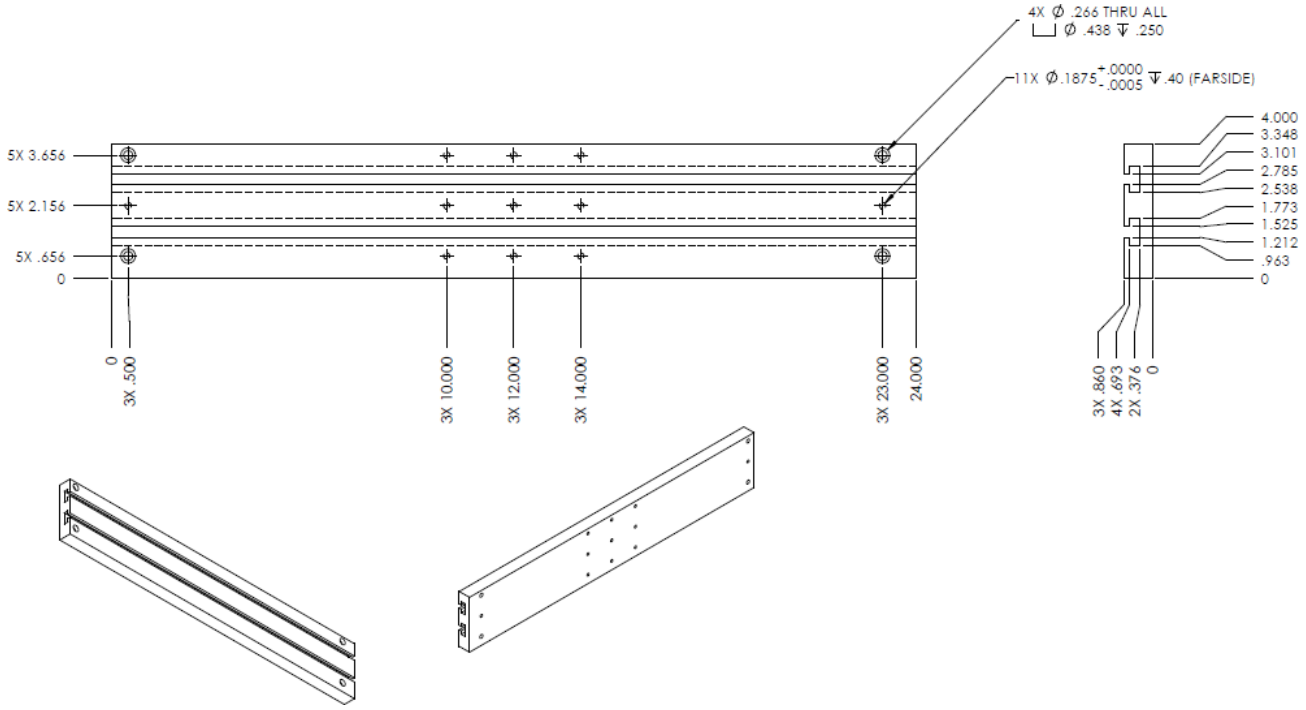

Figure 4 - Mounting rail designed by Cambridge Technology shown with mounting holes on back side of plate

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3.2 Option 2 (Prototype): Mounting Rail using 80/20 T-slotted Extrusion

Pre-manufactured rails with a base width of 40mm (1.57 inch) are also an option. The following is an example of the prototype rail that can be purchased from Amazon which is 610mm (24 inches) long, but the rail can be purchased in multiple lengths.

80/20 40 SERIES 40-4080 LITE 40mm X 80mm LITE T-SLOTTED EXTRUSION x 610mm

http://www.amazon.com/gp/product/B001F0G6V6/ref=ox_sc_act_title_1?ie=UTF8&psc=1&smid=A1H481IPHNMK5K

Figure 5 below shows the cross section of the rail with dimensions.

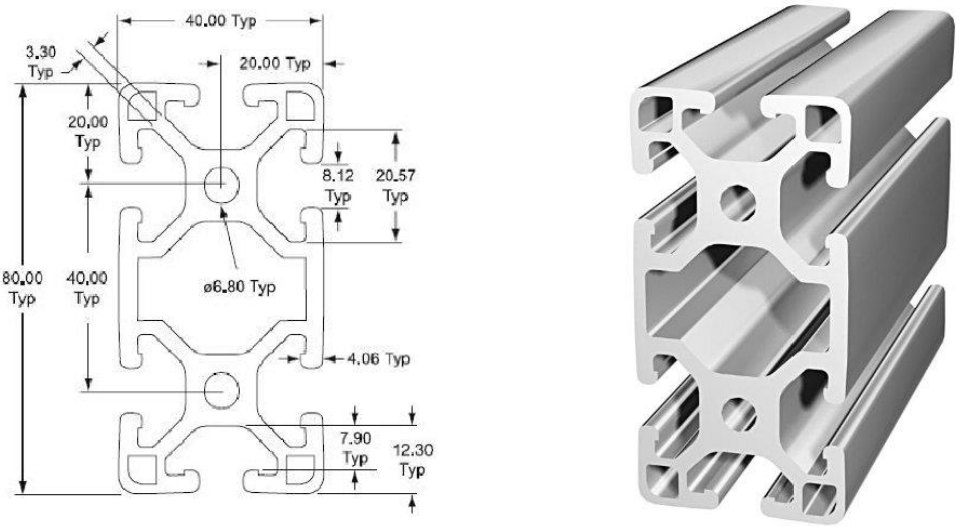

Figure 5 - Rail dimensions (left), and image shown (right)

3.3 Option 3: Gantry Assembled with Bosch Rexroth Rails

As an alternative to just a single 80/20 rail in Option 2 above, users who need to put the 3-axis scanhead onto a multilevel gantry system can choose a gantry with the extrusion rails of the same dimensions, as shown in Figure 5. Figure 6 below illustrates a frame made from several 40mm spacing (1.57 inch) extrusion rails from Bosch Rexroth, assembled with a 3-axis system mounted at the first level. The second level can generally be used to mount other instruments or equipment.

http://www13.boschrexroth-us.com/Framing_Shop

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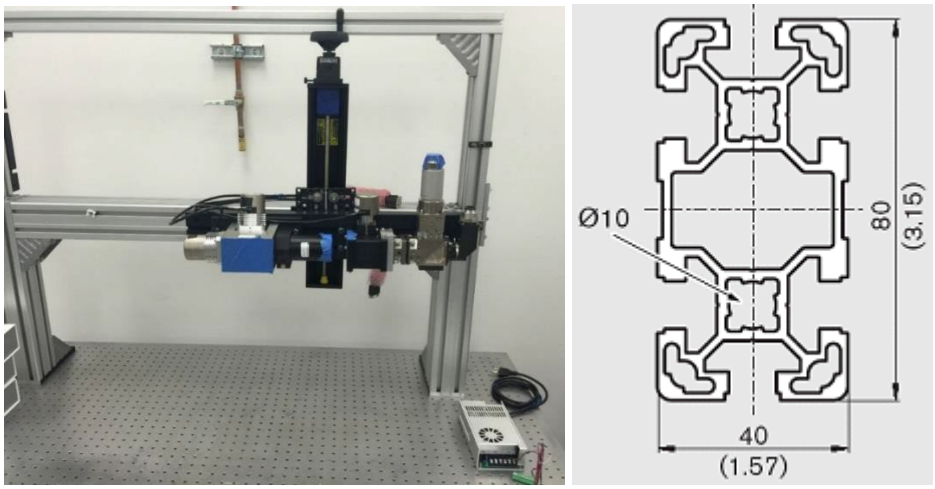

Figure 6 - Gantry (left) of various length extrusion framing rails from Bosch Rexroth (right)