

# BRIEF INSTRUCTIONS

## IB-C50-AIR



**JJ X-RAY**

Danish Science Design



## IB-C50-AIR

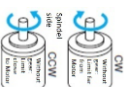
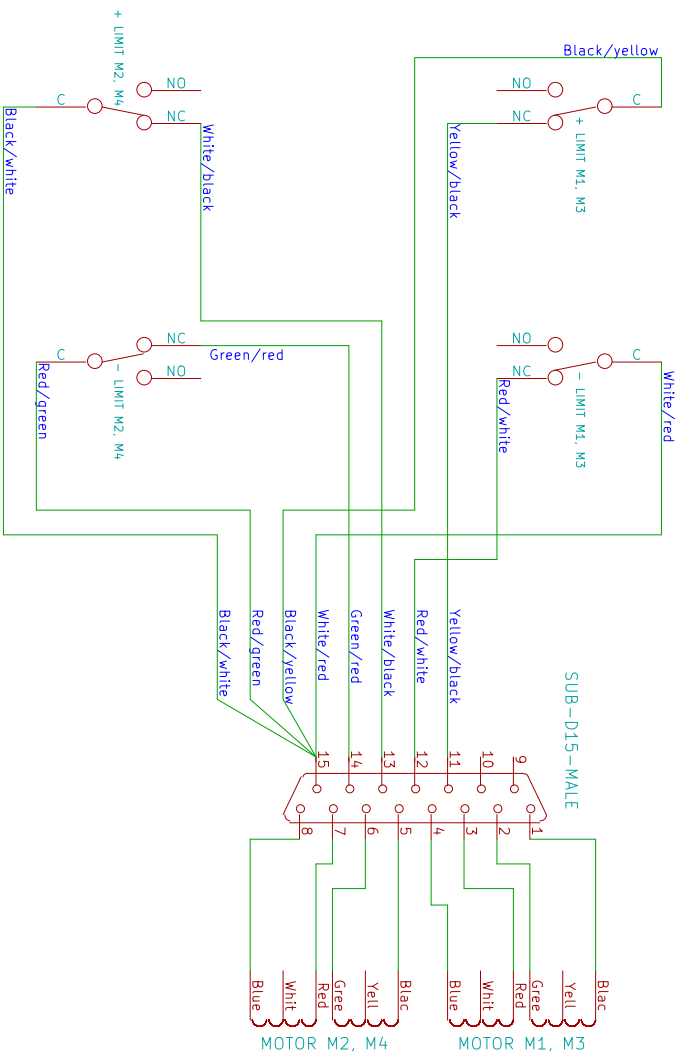
The IB-C50-AIR is a compact system but still spacious enough to house internal linear encoders (option). Our smallest system with this capability. Except for the additional space for internal encoders, the design is very similar to our classic IB-C30-AIR slit system: The aperture is defined by four independently movable highly polished tungsten carbide blades. The blades are in turn controlled by a high-precision guiding rail system and high-resolution stepping motors.

The standard 2 mm blades can be installed in two configurations: Either providing a curved polished surface of a radius of 16 mm or providing a knife-edge slope at 0.5 degrees. The standard blades are polished to obtain a RMS roughness better than 25 nm.

*Please notice: The versions shown on the front page are with encoder option.*

# Technical Specifications

IB-C50-AIR	
Aperture size	Maximum: 50 mm x 50 mm Minimum: Full overlap
Resolution	1 micron per full step
Accuracy	$\pm 5$ micron over full range
Mechanical dimension	228 mm x 228 mm x 63 mm 166 mm x 166 mm x 63 mm (housing only)
Standard blades	2 mm thick tungsten carbide blades, can be mounted either with 0.5 degree knife-edge or R16 radius edge
Mechanical connections	M6-threaded holes on the sides as shown on the drawing.
Limit switches (end-of-travel)	Included as standard on all motions
Weight	$\approx 4.5$ kg
Outer surface	Anodized aluminum in color nature
Guiding	High precision internal rails and carriages
Electrical connections	Microswitches coupled to 2 motor connectors (SUB-D 15 pins male)
Motors	2 phase stepping motors



JJ X-Ray Michael Andersen

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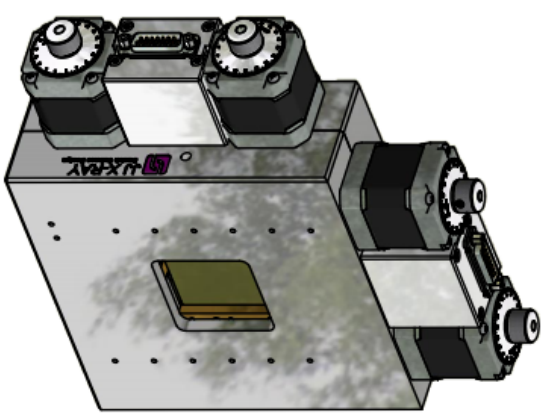
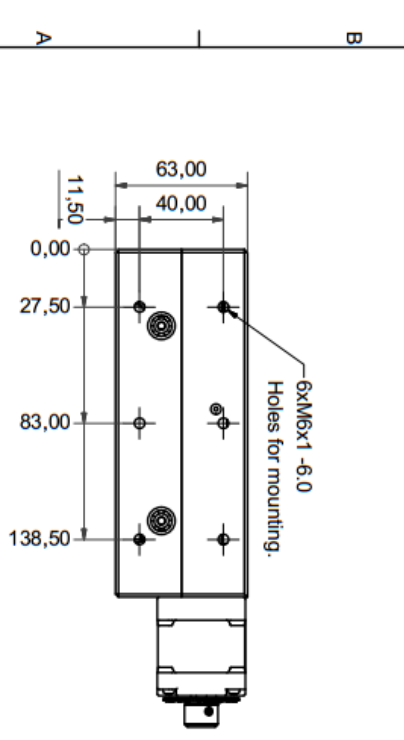
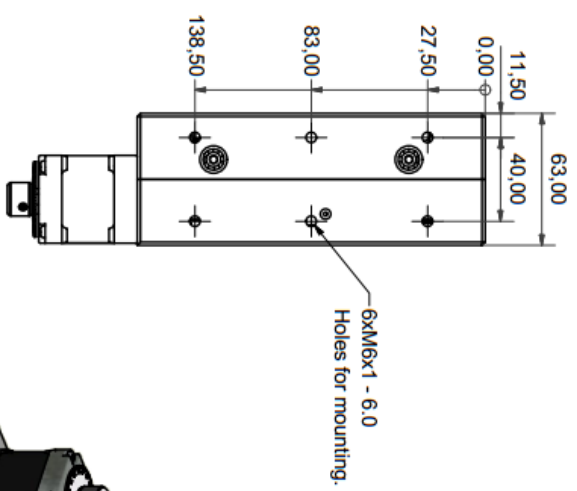
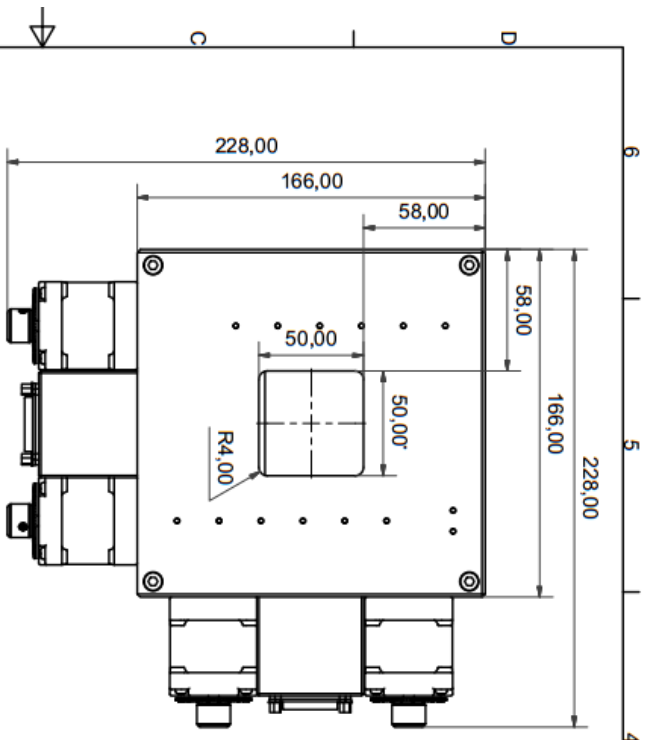
Date: 9 jan 2018

Kicad E.D.A. eschema (2013-05-16 BZR 4016)-stable

Rev: 1.0

Id: 1/1

REV	DATE	APPROVED	Changes
0	15-09-2015	HBP	



All dimensions are in mm.		Date:	14-09-2015	Rev:	0	QTY:		Remarks:	
All Tolerances are accordance with ISO 2768-1 class L unless otherwise specified.		Project Name:	JJ X-Ray	Mass:	N/A				
Tolerance:		Surface Treatment:							
- Dimensions: 0,2 mm									
- Internal corners R0,2 max.									
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# Motor Specifications

Motor Specifications	
Number of motors	4
Motor type	2-phase stepping motor
Manufacturer	Oriental Motors
Motor make	PK245M-01B
Step angle	0.9°
Connection type	Bipolar (Serial)
Current per phase	0.85 A/phase
Resistance	6.6 $\Omega$ /phase
Inductance	15.6 mH/phase
Limit switches	'+' and '-' end of travel

Motion Mechanism	
Type of motion	Translation
Guidance	Linear rails and carriages
Motor step angle	0.9°/step
Motor gear	None
Lead screw pitch	0.4 mm/rev
Scale factor	1000 steps/mm
Mechanical resolution	1 $\mu\text{m}$ /step
Translation calibration	1 $\mu\text{m}$ /step

Recommended Driver Settings	
The motors should be run <u>at 0.85 A per phase.</u> The motors have been tested at:	
Running speeds	1000 steps/second
Starting speeds	300 steps/second
Ramp times	0,1 second

Always use “backlash correction” if available (i.e. the motor always approaches the final position from the same side). A useful backlash parameter could be 0.1 mm.

Warning:

If you are using systems/detectors that can be damaged by overexposure, where the slits are used to remove a lot of the intensity, be careful when changing aperture size since the backlash correction may result in the slit being opened significantly more than you anticipated during adjustment.



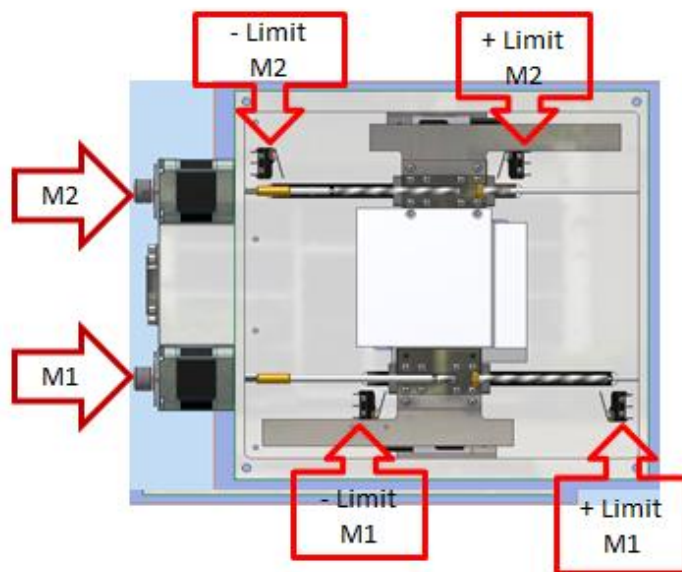
## Manual Control

If for some reason, you need to move the slit blades manually, it is possible to use the scale wheel attached to the back shaft of the motor. It is probably easiest, if this operation is done with an open cover so you can see what is going on.

The manual control is not possible in slit-versions with back shaft encoders or slit versions mounted with IMS motors.

## Limit Switches

The limit switches should be wired up, if at all possible. There is always some ambiguity in the definition of the travel direction. The first time you test the slits and cables you should therefore open up the slit and test the actual functioning of the limit switches. Below we show an image that may help you in determining the appropriate limit switch setup.



*Mechanical overview of limit switch*

# Trouble Shooting

The most common issues and their resolutions are:

- ❏ The motor does not move when it should (it can be silent, be jittering or be making a noise).
  - The motor is not receiving enough current. Try setting the current a bit higher (for example 10%). If problems persist check with an amp-meter to see that your driver is working properly.
  - The wiring is bad. Check cabling.
  - One of the motors' phases is burnt. Check that the resistance on all phases is the same. If not, contact us to have the slit sent for repair.
  - The motor is stuck against a limit switch. Un-stick it, using the scale wheel or, if an AT-slit, open the slit (see manual control), and fix the limit switch issue.
- ❏ Restart the controller and the controller program.
- ❏ The blade system shows irreproducibility during operation.
  - The rail system may have become loose. Open the slit. Check if the rail-system is tight. Tighten screws if you need to.

## Common Options

- ❏ Blade options: 2, 4, 5, 10 mm, other blade materials.
- ❏ Motors: Custom high resolution stepping motors, including IMS motors.
- ❏ Encoders: Back-axle rotary encoders or internal Renishaw linear encoders.
- ❏ Non-magnetic guides and lead screws and extension of motor housings for large distance.



# The JJ X-Ray Product Range

- ☒ Slit Systems (AIR, HV, UHV)
- ☒ Complete Beamline Solutions
- ☒ Spectrometers
- ☒ Refractive Optics
- ☒ Foil Collimators
- ☒ Positioning

## Contact JJ X-Ray A/S

If you have any questions, concerns, request for quotations or need general advice, please feel free to contact us:

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