

Hexapod & CRLs

Description

The 6-circle diffractometer setup at P10-EH1 is equipped with short-focus CRL optics mounted on a PI hexapod (H-824). The available motions of the hexapod are depicted in Figure 1. These optics enable to focus the beam down to ~1 micron size. The stack of Be lenses is mounted inside of a vacuum cube shown in Figure 2. The cube compartment is connected from its back flange via a bellows to the vacuum system of the beamline. The front flange is used to mount a vacuum nozzle which extends the evacuated beampath towards the sample position at the center of the 6-circle diffractometer. The whole hexapod support is mounted on rails such that it can be translated to the beam position when the diffractometer setup is in use and moved aside otherwise. Table 1 lists the main parameters and motorized motions of the hexapod.

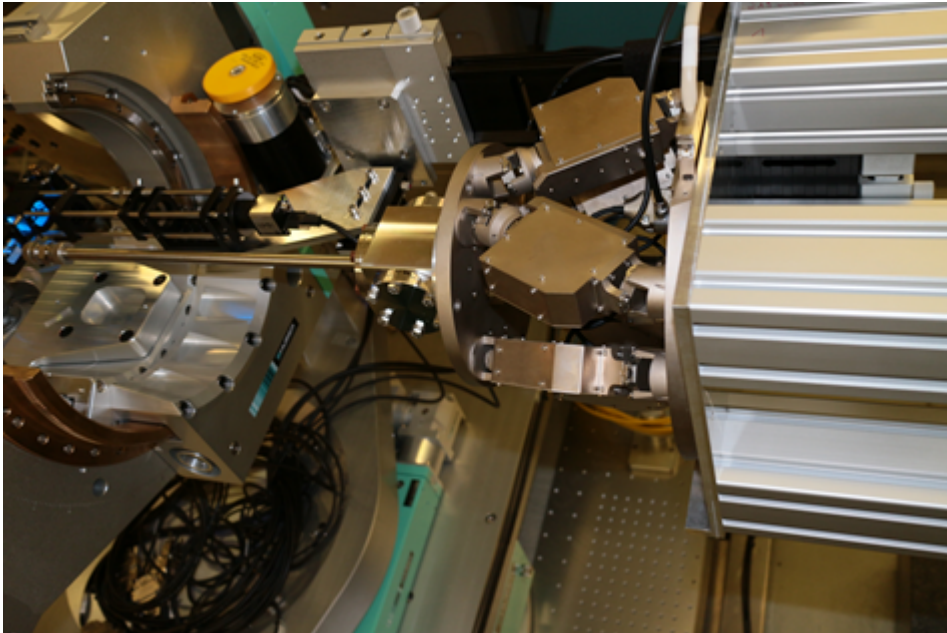
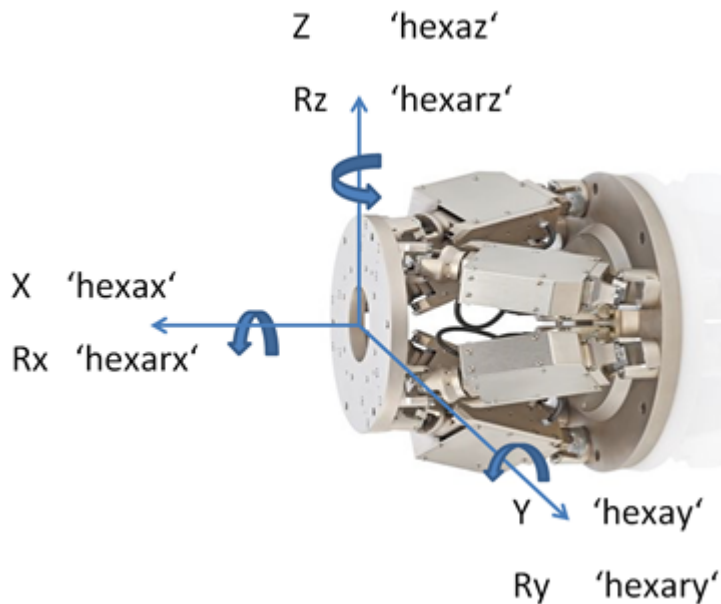


Figure 1: Left: Available motions of hexapod at EH1. Right: Photo of hexapod CRL at 6-circle diffractometer.

The hexapod configuration depends on the chosen focusing option. The pivot point changes for each of the options along the beam direction ('PositionPivotT'). The construction of the lens holders has been made such that the nominal components of the pivot point in the two other directions is zero ('PositionPivotR' & 'PositionPivotS'). These parameters plus the 'SlewRate' can be entered via Jive on haspp10e1 in the Tango Server 'p10/hexapodconfig/hexa1.01'.

ATTENTION: Only change the Pivot position when all axes of the hexapod are at 0 (so, only directly after an INI command of the hexapod).

As mentioned most 'standard values' are (see image of Atk panel below):

PositionPivotR = 0 ⚠

PositionPivotS = 0 ⚠

SlewRate = 0.500 ⚠

For the "standard" CRL stack position (center lens holder to sample distance of 520 mm) the value for the T direction of the Pivot Point is:

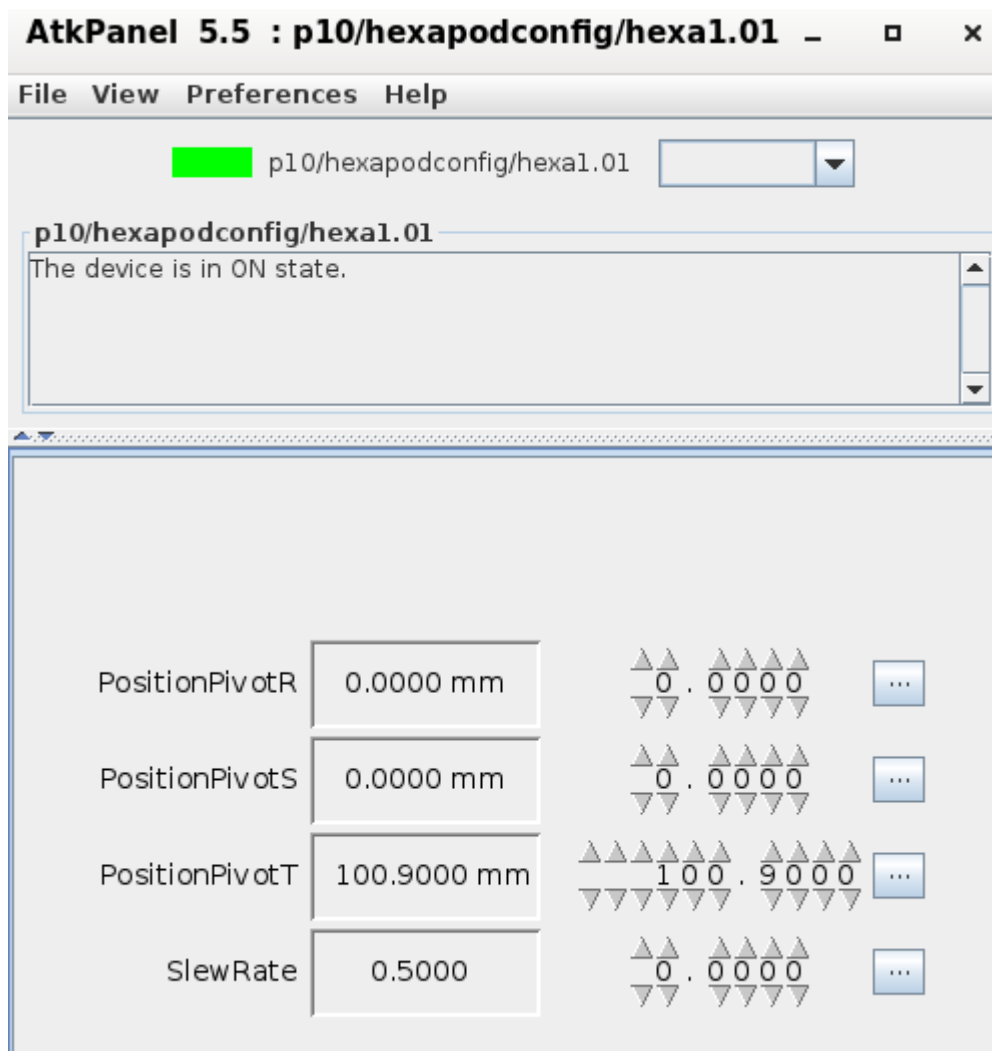
PositionPivotT = 100.9 ⚠

For the first newer medium distance CRL stack position (center lens holder to sample distance of 385 mm) the value for the T direction of the Pivot Point is:

PositionPivotT = 235.9 ⚠

For the newer short CRL stack position (center lens holder to sample distance of 174 mm) the value for the T direction of the Pivot Point is:

PositionPivotT = 446.9 ⚠



Hexapod 'standard' CRL parameters

Lens-to-sample distance: 0.520 m

Max. stack capacity: 31 lenses (1.6 mm thick; old model) or 25 lenses (2.0mm thick; new model)

Energie range: 5.3 - 13.4 keV

No. lenses	Energy [eV]	v_size [um]	h_size [um]	Transmission
4	~5.3	~1.15	~1.60	~67%
5	~5.9	~1.00	~1.45	~71%
6	~6.5	~0.95	~1.35	~73%
7	~7.0	~0.90	~1.30	~75%
8	~7.5	~0.85	~1.25	~76%
9	~8.0	~0.80	~1.20	~77%
10	~8.4	~0.75	~1.15	~78%
11	~8.8	~0.70	~1.10	~79%
12	~9.2	~0.70	~1.10	~79%
13	~9.6	~0.65	~1.05	~80%
14	~10.0	~0.65	~1.05	~80%
15	~10.3	~0.60	~1.05	~80%
16	~10.7	~0.60	~1.00	~81%
17	~11.0	~0.60	~1.00	~81%
18	~11.3	~0.55	~1.00	~81%
19	~11.6	~0.55	~1.00	~81%
20	~11.95	~0.55	~0.95	~81%
21	~12.25	~0.55	~0.95	~81%
22	~12.55	~0.50	~0.95	~81%
23	~12.85	~0.50	~0.95	~81%
24	~13.1	~0.50	~0.95	~81%
25	~13.4	~0.50	~0.95	~81%

Hexapod 'medium distance' CRL stack parameters

Start Lens stack-to-sample distance: 0.353 m

Fixed lens stack capacity: 32 lenses (option for correction lens available)

Energie range: 12.98 keV

Expected beam size: $\sim 0.5 \times 0.7 \text{ um}^2$ (v x h) [\[to be verified\]](#)

Hexapod 'short distance' CRL stack parameters

Start Lens stack-to-sample distance: 0.174 m

Fixed lens stack capacity: 32 lenses (option for correction lens available)

Energie range: 8.57 keV

Expected beam size: $\sim 0.3 \times 0.4 \text{ um}^2$ (v x h) [\[to be verified\]](#)

Additional comment:

The hexapod is controlled by an old MS-DOS PC and the operating system plus control software are installed on an industrial SD Card (<2Gb!). This card has been cloned and replaced 20190619. ...

URL of the vendor:

<https://www.physikinstrumente.com/en/products/parallel-kinematic-hexapods/h-824-6-axis-hexapod-700815/>

