Products

Complete Endstations for Protein Crystollagraphy

Over the last years Bruker ASC has developed and delivered several components and systems for protein crystallography (PX) endstations and can now offer the complete product range including diffractometer, beam conditioning elements and the support structures for the diffractometer and detectors. Reference projects are complete endstations delivered to the Canadian Light Source, PROXIMA1 beamline at Soleil, LS-CAT at the APS in Chicago, and BESSY.

Ccomplete endstation for Protein Crystallography as installed at BESSY

The Bruker ASC endstation concept allows a flexible arrangement of the beam conditioning elements to meet the needs of the specific beamline. This includes the integration of standard components such as attenuators, slit systems, ion chambers, beam position and intensity monitors, fast shutters as well as specific customized components. The scope of supply can be individually selected by the customer and each component can be freely arranged on the alignment table.

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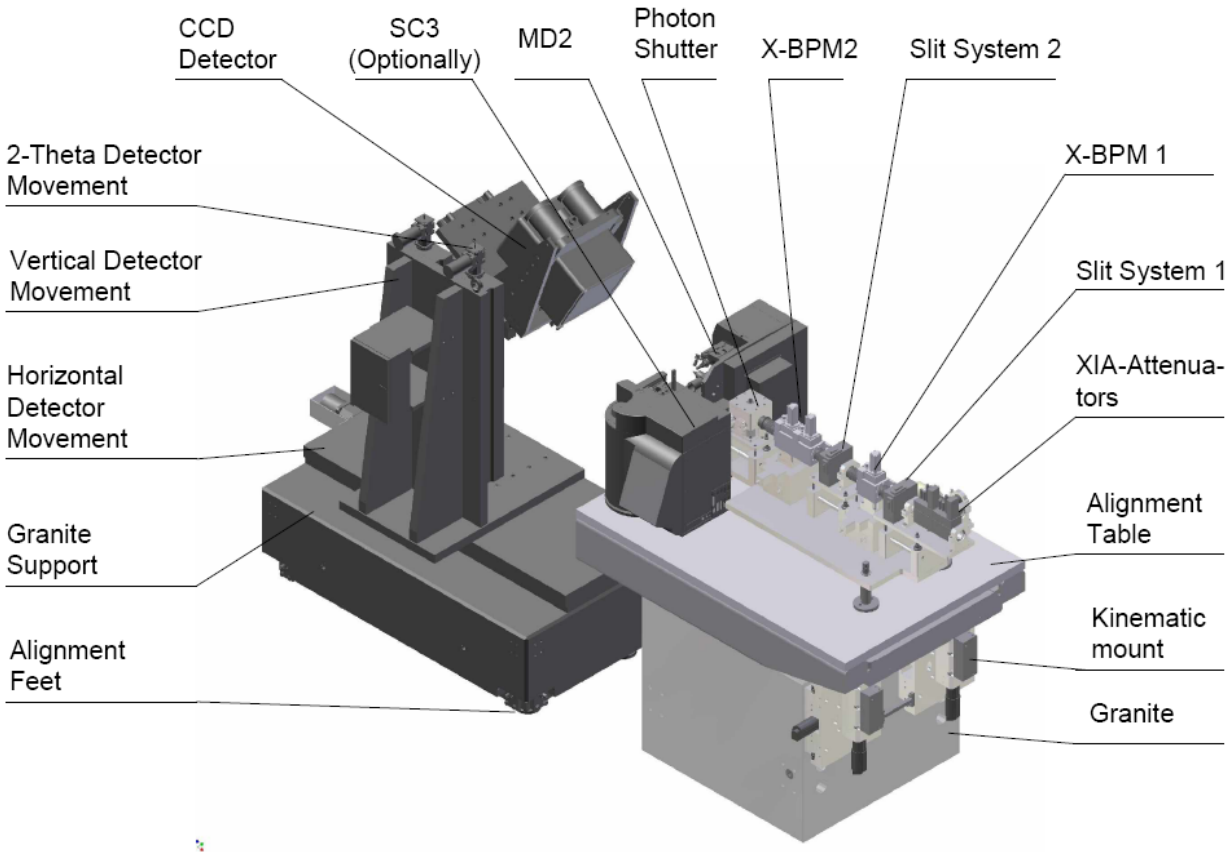
The picture below shows a schematic view of a complete fully operational PX endstation. A detector support plus an alignment table equipped with a 5-axis kinematic mount including beam conditioning elements Microdiffractometer MD2 and the Sample Changer SC3. A support for the cryojet is available and can be supplied on demand. The alignment table for the beam conditioning elements is designed to support the Microdiffractometer MD2 and the Sample Changer SC3 developed by EMBL in Grenoble (ESRF). For more details about the MD2 please see the related product sheets.

Layout of a complete Crystallography Endstation



General Concept of the Supports

A solid granite block forms the basis of our endstation components. This allows a very stable design which minimizes vibration impacts to the components. Very robust and accurate industrial stages are used to reliably position components such as the detector and the final part of the beamline including the goniometer. Each motion can be equipped with an encoder.

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Alignment Table

Features of the alignment table

The alignment table forms the basis of the experimental set-up and is equipped with two different platforms to support the required endstation components. The goniometer (diffractometer), the cryojet, a compact sample changer such as the SC3, and any other component to be installed in the sample environment will sit on the lower level platform. This will be positioned as one common unit to the beam by means of a very robust 5 axis kinematic mount. The upper level platform allows a manual adjustment of beam conditioning elements such as attenuators, beam position monitors, slits, ion chambers, and the shutter. Each of these devices can be positioned parallel and perpendicular to the beam by means of manual or motorized positioning units for alignment purpose. Once the initial alignment is achieved, all the elements of the endstation can be adjusted to the beam position, as one assembly, using the kinematic mount of the support structure.

Mechanical properties of the alignment table

5 axis kinematic mount:

- **Vertical and horizontal motions designed to carry a weight of up to 3000 kg**
- **Every motion equipped with rotary encoders on the motors**
- **Linear encoders available optionally**
- **Two high precision limit switches on each axis**
- **Self locking gears on each unit to secure the position at power failure**

Support table:

- **Customized dimensions of the support tables**
- **Individual arrangement of beam conditioning elements**
- **Easy Integration of additional components**
- **Integration of the sample changer/ robots possible.**

Control options:

In addition to the hardware of the alignment table and the detector support Bruker ASC can also supply:

Motion control:

- **Connectors and cables as specified by the customer**
- **Motor drivers**
- **Motor control software**
- **Software for the combined motions**

Diffractometer/Beam-Conditioning-Elements:

- **Control of the Microdiffractometer MD2 (see product sheet)**
- **Shutter Control**
- **Beam Position Monitor readout**
- **Slit system and attenuator control**
- **Customized GUI**
- **System integration of the components mentioned above**

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Detector Support

Features of the detector support

The detector support is available in 3 different versions with the following properties:

- Precise movement along the beam (travel range can be determined on request)
- Linear encoders for accurate positioning of the detector
- Redundant end switches for fail-safe operation
- Mechanical hard stops on the horizontal drive
- Motors with solenoid actuated brakes for power failure conditions
- High speed operation on the horizontal drive up to 3 cm/s
- The support can be adapted to different detector sizes and different types of detectors. Even the largest available detectors fit the support; max load approx 400 kg.
- The detector support can be used in combination with many different goniometer and end-stations designs
- Extremely stiff and stable support structure through oversized robust stages and
  support brackets.
- Small footprint inside the hutch

The **1 axis detector support** enables a positioning of the detector along the beam. A travel range up to 1 m has been built to date. Longer travel ranges are available on demand.

The **3 axis detector support** is additionally equipped with two vertical stages to lift and angle the detector. As shown on the picture, a two-theta motion is achieved by a combined motion of the vertical stages. An adjustment platform underneath the detector mounting brackets enables a manual angular adjustment of the detector to the beam direction.

The **4 axis detector support** (see picture above) enables a further horizontal movement of the detector perpendicular to the beam direction for the cases where different setups are required to follow the beam horizontally. Furthermore we would be able to integrate a rotation around the vertial axis as well.

Bruker ASC

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