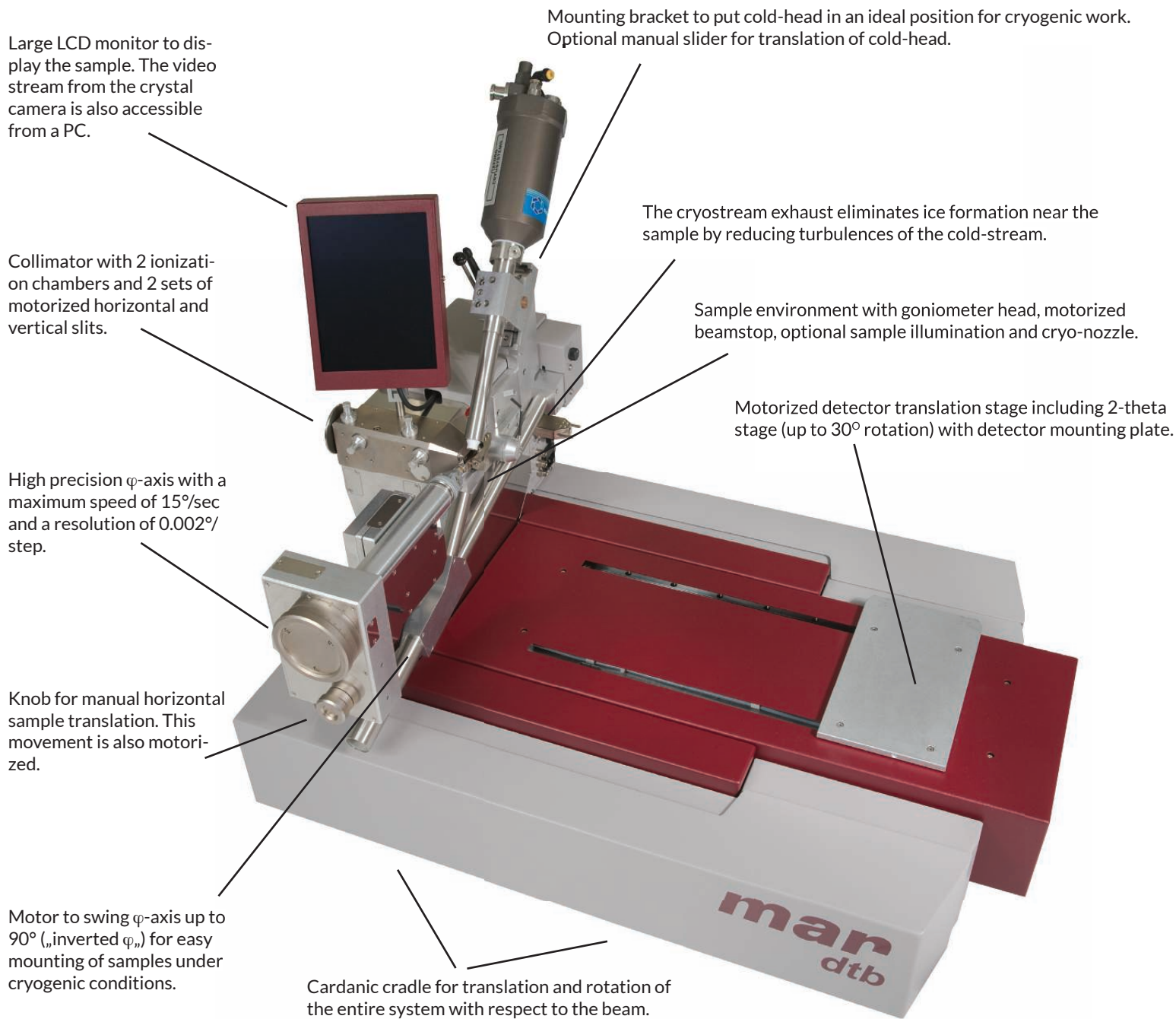


mardtb

Goniostat for
X-ray crystallography



mardtb “desktop beamline”

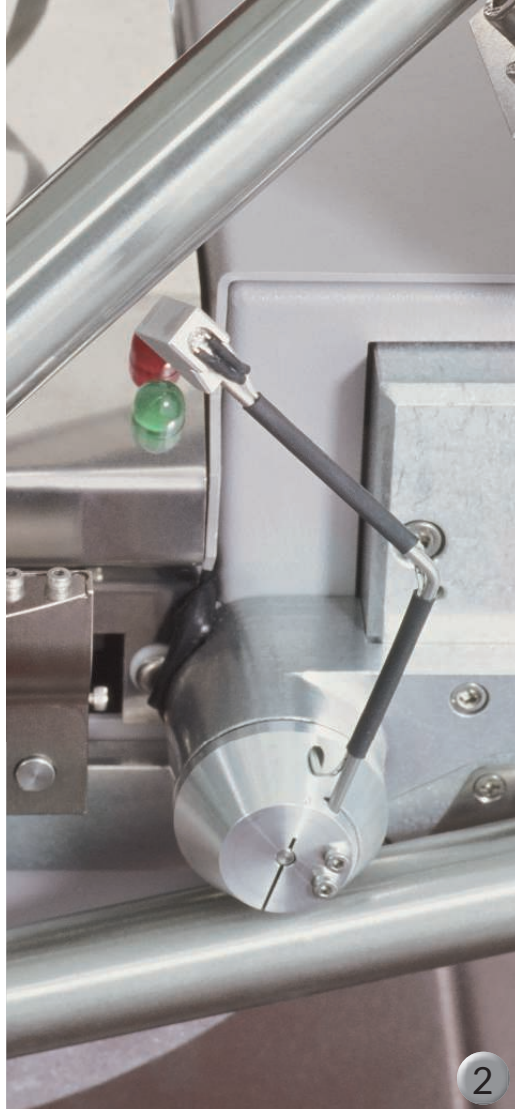


The **mar dtb** is a highly versatile goniometer system for general use in X-ray crystallography. Due to an autonomous control system, it can accommodate any X-ray detector, e.g. the **mar345** image plate or the family of CCD-detectors produced by Rayonix.

The most striking feature is its high degree of motorization. This includes four motors for aligning the entire instrument automatically with the X-ray beam without user intervention - a concept borrowed from synchrotron beamlines. The automatic alignment ensures that the sample really „sees“ the best possible beam.

The base configuration comprises four motorized slits to collimate the beam, a high precision φ -axis, a φ -swing used for cryo-mounting, a crystal translation, a detector translation and a 2-theta swing.

The base instrument can readily be equipped with an automatic sample mounting mechanism, either for a single sample („**easymount**“) or for up to 19 samples (**marcsc** „cryogenic sample changer“). Either option has striking benefits for safely mounting and storing frozen crystals and increases productivity.



OPTIONS

The **martb** can be upgraded with a variety of additional components which make the life of a scientist easier. All optional components may be retrofitted to already delivered instruments.

1. Automatic goniometer head for the φ -axis. This option provides x,y-motors in addition to the z-motor and enables motorized xyz-translations of the sample for manual or automatic centering from the remote control unit or from the user interface on the PC. A solenoid operated via the remote control unit holds or releases a standard ferromagnetic SPINE cap.
2. Illumination unit consisting of a bright red LED-light mounted on a paddle that flips into the camera view by pushing a button on the remote control unit or in the user interface on the PC. The LED light provides a homogeneous high contrast background for the sample that makes sample centering easier. The camera view becomes completely independent of external light sources. Two additional white LED's focus on the crystal and provide even more versatility for locating very small objects.
3. Manual cryo-slider optimized for single-handed operation. It provides a translation lever and a brake lever to keep the cooler in a given position. The slider allows for easy translation of the cold-head along its long axis. This is helpful for creating more room around the sample during mount and unmount operations.
4. Motorized cryo-slider. The motor can be operated from the remote control unit or from the PC. The range of movement is up to 80 mm.



easymount

The **easy**mount adds an automatic sample changing mechanism to the **mar**dtb. Its purpose is to safely mount a single sample onto the goniometer head and retrieve it from there after data collection has finished. The operation is supported from both the remote control unit and from the software. The **easy**mount comprises a standard **mar**dtb and:

- an automatic goniometer head with motorized xyz-translations
- a sample transport mechanism consisting of a rotational motor and a translational motor
- a motorized cryo-actuator to move the cold-head out of the way during sample load and unload
- an illumination unit
- an extended remote control unit with buttons for xyz-translations of the sample, rotations of the PHI-axis and buttons for activating the load and unload mechanism



marcsc - „cryogenic sample changer“

The **mar**csc is a fully automatic sample changer to mount and unmount multiple samples from a reservoir dewar onto the goniometer head. The **mar**csc adds the following components to an **easy**mount / **mar**dtb goniometer system:

- a sample storage dewar with room for 19 samples
- an automatic refill system for the storage dewar consisting of a self-pressurizing LN₂ dewar, two LN₂ level sensors and a magnetic valve
- a barcode reader that scans the caps for barcodes on their way onto the goniometer

The system is designed for low LN₂ consumption and for uninterrupted operation for up to 14 days. It integrates perfectly into a **mar**-**dtb** system and does not require an additional controller since the entire operation of the sample changer is controlled by the **mar**-**dtb** itself.

SPECIFICATIONS

mar*dtb* / **easy***mount* / **mar***csc*

General description	Stand-alone single-axis goniometer system with dedicated real-time OS and network interface to host computer
Goniometer	High precision φ -axis with resolution of 0.002°/step and speed of $\leq 900^\circ/\text{min}$ Motor-driven φ -axis translation (sample z-translation) with a range of ± 20 mm IUCR goniometer head mount or optional motorized goniometer head with x,y-translations with a range of ± 1.5 mm Motorized φ -axis swing ("inverted φ ") to easily mount samples under cryogenic conditions with a range of 0° to 90°
Collimator	Four motorized slits with variable aperture from 0 to 5 mm with resolution of $5 \mu\text{m}$ Two ionization chambers with large dynamic range coupled to 16-bit A/D-converters Fast rotary beam shutter with closing time of $\leq 25 \mu\text{sec}$ High resolution CCD-microscope with viewing area of $1.5 \text{ mm} \times 2.5 \text{ mm}$ with built-in 7" LCD monitor and video feed for PC Motorized beamstop with a range of movement of ± 20 mm
Cardanic cradle	Motors for horizontal (± 10 mm) and vertical (± 8 mm) translation of system with respect to beam Motors for horizontal ($\pm 3.5^\circ$) and vertical ($\pm 1.5^\circ$) rotation of goniometer and detector around first ionization chamber Fully automatic beam search and optimization from scratch from PC
Detector mount	Motorized crystal-to-detector distance translation stage with a range of movement of 350 mm Motorized vertical 2-theta arm with a range of rotation of 30°
Others	Remote control unit for push-button operation of distance, 2-theta, φ -swing, φ -axis, beamstop and xyz-goniometer head motors (optional) Optional motorized cold-head translation Optional illumination unit with 1 red background LED and 2 white LED's focussed on sample for optimal illumination conditions
easy <i>mount</i>	mar <i>dtb</i> with automatic goniometer head, motorized cold-head translation, illumination unit and a transport mechanism for a single sample onto goniometer head using 2 additional motors
mar <i>csc</i>	Additional storage dewar for 19 samples attached to easy <i>mount</i> system for fully automatic liquid sample transfer of 19 samples Barcode reader for 12, 14 or 16-dot data matrix SPINE codes Automatic refill system from self-pressurized LN_2 supply dewar

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