HiDIFF-X

IRELEC

Bespoke, Smart and Swift

The new generation single crystal X-ray diffractometer

Irelec HiDiff-X Micro-Diffractometer is designed to help synchrotron facilities attract more users and run more experiments so that they can resolve more structures. Plus, with the fastest switchover time between operating states on the market and a high accuracy Ω-axis, this diffractometer helps users get the most out of their time on the beamline.

- Vertical Ω-axis with <200 nm sphere of confusion
- Fast switchover (<2s) between operating modes
- Automatic centering using the on-axis camera and automatic sample centering with x-rays (raster scan)

  3-clicks centering feature also available
- Safe operation with absolute encoders on all axis
- Hand-shake operation with ISARA2 sample changer
- Digital twin and CAS for ultimate safety

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HiDiff-X Micro-Diffractometer

Technical specifications

Ω Axis	
Orientation	Vertical
Sphere of confusion	< 200 nm (radius) @ 100 deg/s
Max. rotation speed	720 deg/s
Static accuracy	< 0.3 mdeg
Dynamic accuracy	< 1 mdeg @ 10 deg/s
Sample centering stages (X/Z)	
Speed	≥ 5 mm/s
Range	X: 80 mm / Y: 5 mm
Resolution	< 5 nm
Actuators	Fast brushless motors for quick process
Encoders	Optical absolute encoders
Alignment stages (X/Y/Z)	
Speed	≥ 5 mm/s
Range	X: 10 mm / Y: 110 mm / Z: 10 mm
Resolution	< 5 nm
Actuators	Fast brushless motors for quick process
Encoders	Optical absolute encoders
On-axis camera	
Type	Double branch camera system for instantaneous zoom solution between 2.4x and 35x
Zoom	Continuous
Field of view	2.7x2.2mm² or 0.19x0.16mm²
Video server bandwidth	20 fps
Resolution @max. zoom	72 nm/pixel
Sample holder head	
Type	permanent magnet sample base holder compatible with Spine and non-Spine magnetic sample bases
Thermal stabilization	Via regulated heating elements

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Tools unit	
Common FastX stage	
Range	80 mm
Speed	40 mm/s
Aperture support (X/Y)	
Range	X: 10 mm / Y: 5 mm
Resolution	< 50 nm
Actuator	Brushless motors and absolute encoders
Aperture(s)	Platinum, Iridium Different hole size available from 5µm
Capillary support (X/Y)	
Actuator	Brushless motors and absolute encoders
Alignment	Pitch / Yaw manual adjustment
Support	Magnetic support to prevent from collision
Capillaries	Material Molybdenum Different size available Scatter guard and cleaning apertures available
Beamstop support (X/Y/Z)	X: 10 mm / Y: 10 mm / Z: 75 mm
Range	< 50 nm
Resolution	Brushless motors and absolute encoders
Actuator	Pitch / Yaw manual adjustment
Alignment	Beamstop position along beam can be selected on a range from 5 to 80mm from sample position
Beamstop	Material Tungsten carbide Different sizes available from 300µm
Diagnostics unit	
Mounted on a common X translation stage: Fluorescence screen (Yag:Ce) or Cadmium Tungsten / For beam position detection Photodiode / For capillary alignment in the beam Cold light Backlight / For sample illumination.	
Sample base detection	
Type	With laser sensor
Backlight	
Features	The LED backlight can be remotely controlled to power on/off and adjust the power

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Control		
	Remote operation	Via TCP/IP command through ethernet
	Control features	Individual motions position control and encoders position readout Camera visualization Automatic centering function for Sample alignment and centering to the beam position Beam shaping tools setup Beam location on sample position with scintillator and camera Collimator alignment tool with photodiode measurement Backlight control
	Process I/O	16 Inputs and 16 outputs
	ISARA2 sample changer robot	Handshake HW & SW integration
General		
	Fast tool changer	Gonio-head, mini-kappa, plate holder, … can be exchanged within a minute without delicate and tedious re-cabling work
	Dimensions (L x W x H)	610 x 210 x 670 mm
	Weight	88 kg
	Power supply	110VAC or 230VAC 1500W
Remote access		
Upon a specific granted access by the final user, IRELEC can take the system in hand remotely in order to perform maintenance operation, to upload an upgraded software or to check the system operation and correct potential failures.		
Customization		
IRELEC studies all specific requests in order to meet the particular needs of the beamline.		

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Options

Kappa/Phi head

Range	Kappa: 200° / Phi: 360°
Resolution	Kappa: < 0.3 mdeg / Phi: < 1 mdeg
Sphere of confusion with Kappa/Phi head	< 200 nm (radius)

Plate holder

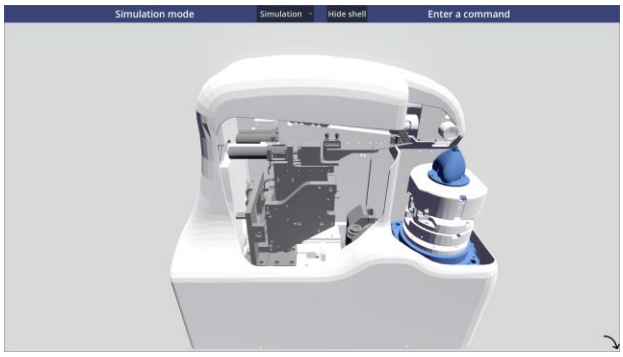
Compliant with SBS plates (including low profile plates)
Automatic plate transfer with ISARA2 robotic sample changer

Quick tool changer

The HiDiff-X integrates a quick tool changer interface allowing the mechanical re-centering and electrical connection of different tools on top of the Centering stages. No tools are required to switch from Fixed sample holder to Kappa/Phi head or plate holder.
Each tool is also equipped with a tool identification chip to allow the automatic recognition of the mounted equipment, and a smart start up procedure. Therefore, functions of diffractometer will be automatically enable/disable

Digital Twin and Collision Avoidance System (CAS)

A digital twin of the full diffractometer is available. It can be operated in simulation mode so as to check a sequence of motions and the absence of potential collisions. It can also be operated in real-time mode so as to safely operate the diffractometer. The detection collision mode allows to check for example a collision between the sample holder and beam shaping tools in case of an excessive centering stage or alignment stage motion.



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