Technical Data Sheet

FMB Berlin

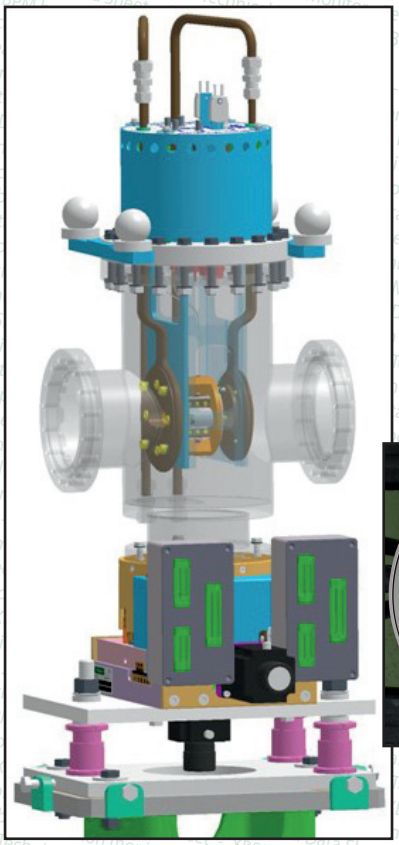
XBPM beam position monitor

FMB has over 15 years experience in building blade type X-ray beam position monitors (XBPMs). XBPMs made by FMB are widely used at many synchrotrons to monitor the photon beam position vertically and horizontally at the micron level for beam stabilization purposes.

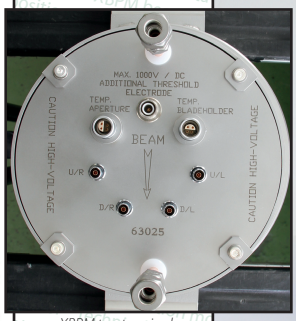
The FMB XBPM design is a joint development of Karsten Holdack (HZB, formerly BESSY) and FMB.

A typical FMB XBPM system consists of a XBPM insert, a vacuum chamber, a motorized precision X-Z stage, a X-Y-Z manual alignment assembly and a support. In addition FMB offers motion control hardware and software and signal processing / analysis electronics on request.

XBPM full unit



XBPM 3D-model



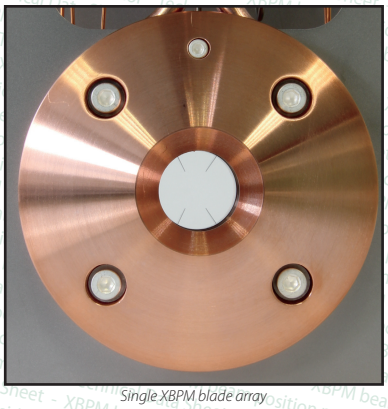
XBPM top terminal

XBPM insert

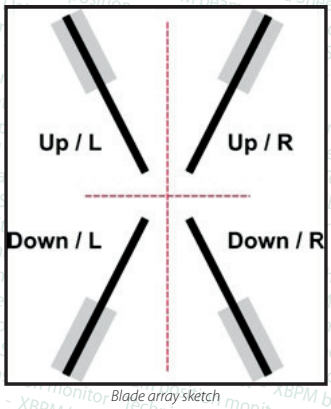
The XBPM beam position monitors use four blades, whose narrow fronts are oriented towards the radiation source. The blades are symmetrically arranged on a virtual X with its center close to the center of the radiation beam. With this blade setup the operator is able to scan the off-axis radiation of the source and determine on-line the horizontal and vertical position of the radiation source centre from the emitted signals.

Size and geometry of the blades will be adapted to the beam characteristics at the place of the position monitor in order to achieve a maximum photocurrent yield at a maximum sensitivity. The blades are made of Tungsten and cooled via heat conducting ceramics to resist the thermal load of the radiation source.

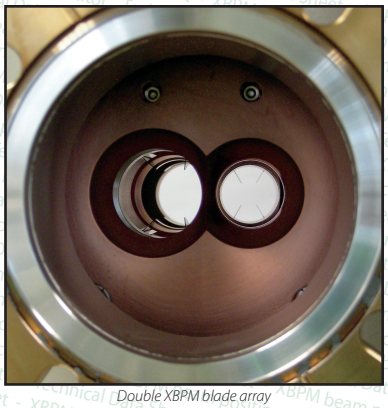
XBPM beam position monitor



Single XBPM blade array



Blade array sketch



Double XBPM blade array

Parameter		Specification
XBPM insert		
Type:		XBPM beam position monitor
Number of blades:		4 (optional 8 in double-XBPM for two independent beams)
Blade material / thickness:		Tungsten / 0.2 mm
Aperture / blade opening, blade angle:		Suggested by FMB, dependent on beam specifications at installation position
Max. blade power density:		50 W/mm^2 (standard), higher needs consultation
Max blade absorbed power:		100 W per blade
Cooling:		Water cooling
Temperature measurement:		Two thermocouples K-type, close to aperture / to blades
Electrical strength:		1 kV
Feedthroughs:		Triax, SHV, miniature TC flat pin (others on customer request)
Mounting flange:		DN 150 CF fixed
Fiducials:		2 / 3 / 4 Hubbs or laser tracker supports at base flange
XBPM chamber		
Chamber / flange material:		1.4301 / 1.4429 (similar 316L / 316LN)
Beam entrance /exit flange:		DN 40 CF or different on customer request
XBPM insert flange :		DN 150 CF fixed, oriented with respect to XBPM insert
Additional flanges:		Optional on customer request
X-Z precision stage		
Motors / encoders (optional):		2-phase stepper motors / incremental optical encoders
X / Z (horiz./vertic.)	range:	± 5 mm
	resolution:	<1 µm (step mode) / (< 0.1 µm with encoders)
	repeatability:	±10 µm with limit switches / ±1 µm with encoders
Support		
Column material:		Steel (Invar on request)
Manual chamber alignment:		Lateral ± 20 mm, vertical ± 12.5 mm, resolution (l, v) < 0.1 mm

FMB Berlin

ISO 9001:2008 DEKRA Certification — Qualitätsmanagement — Wir sind zertifiziert — DEKRA zertifiziert — Regelmäßige freiwillige Überwachung nach ISO 9001:2008

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