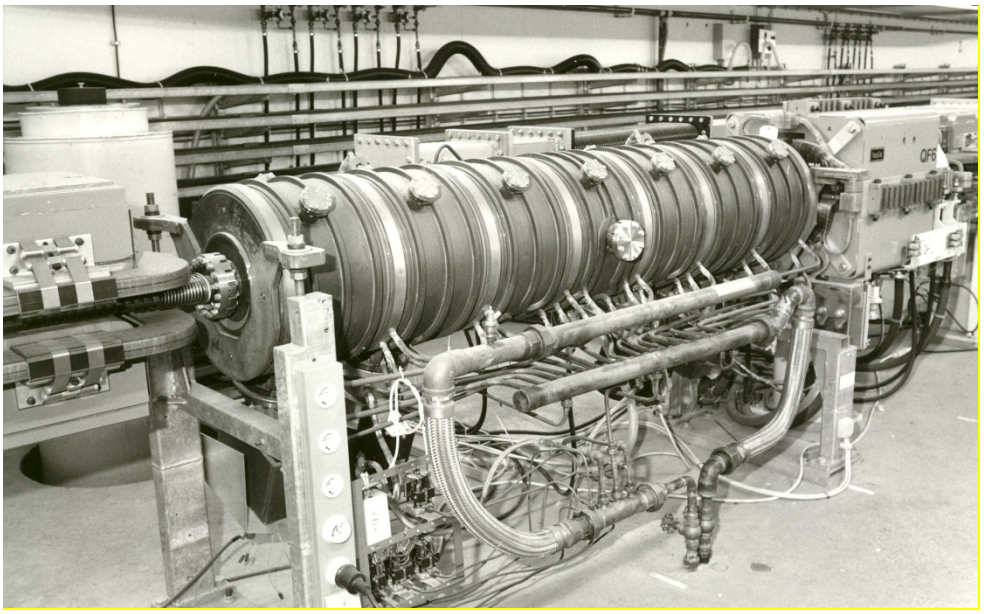
DATA SHEET

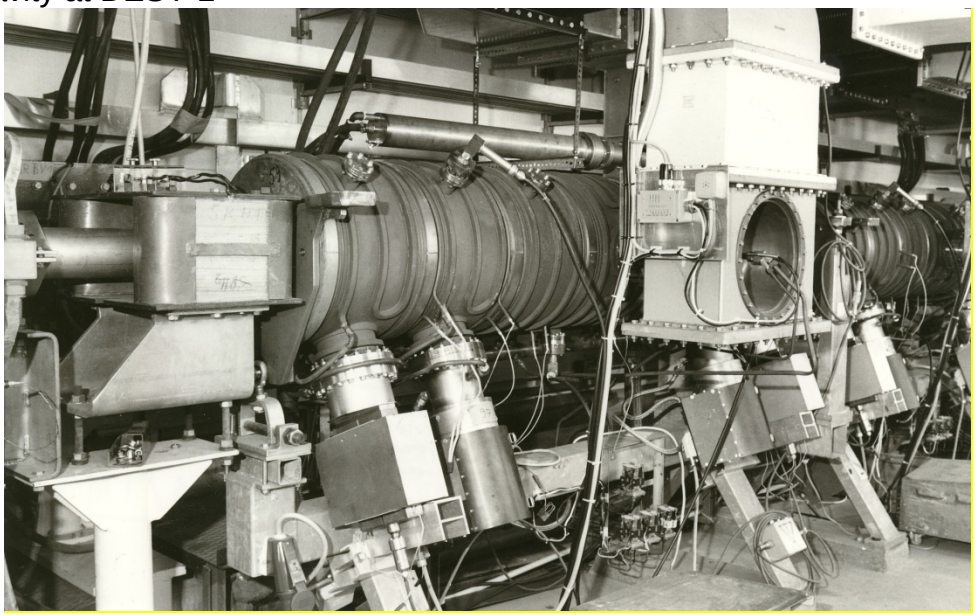
500 MHz, 7-Cell Cavity

DESY-MHFe, Vers. 3.2 June 2015

Type: PETRA
Manufacturer: **DESY / Balzers Hochvakuum GmbH,** 1982/83



7-cell cavity at DESY-2



7-cell cavity at PETRA-2

Technical Data:

	Unit	Min.	Nom.	Max.	Remarks
π-mode frequency @ 40°C	MHz		499.67		Plungers flat
Tuning range @ 20°C	MHz	499.40		500.23	Plunger Δs=53mm
Tuning range @ 40°C	MHz	499.23		500.06	Plunger Δs=53mm
Unloaded quality factor	-	29,000	32.800	36,000	
R/Q	Ω		856		MAFIA
Shunt impedance	MΩ		28.1		
Coupling factor	-			2.0	
Bandwidth	kHz			58	Plungers flat, coupling factor 2.0

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	Unit	Min.	Nom.	Max.	Remarks
Beam tube cut-off frequency	GHz		2.2		H_{11}
Field flatness	%		+/- 6		For nominal data with optimized cooling flow
Coupling between cells	%		0.95		$k = \frac{1}{2}\frac{\omega_0^2 - \omega_\pi^2}{2\omega_\pi^2 - \omega_0^2 \cdot (1 - \cos\left(\frac{\pi}{N}\right))}$
Coupling attenuation of Pick-up loops	dB	30		50	Adjustable; $a = 10 \cdot \log\left(\frac{P_{CavLoss}}{P_{LoopOut}}\right)$
Detuning due to temperature	kHz/°C		8		Measured 2011 @ PETRA-III
Detuning due to plunger pos.	kHz/mm	8 [1)]	15		Both plungers moved [1)] Plunger pos. >22mm
Required plunger correction due to temperature	mm/°C	1	0.5		
Accelerating voltage	MV		1.67	3.0	
Accelerating gradient	MV/m		0.79	1.44	
Dissipated cavity power	kW		60	200	
Water flow rate (total)	m³/h		8		Sum of all discs & cells, optimised for maximum field flatness
Water flow rate of single cooling circuits	l/h	900	1200	1400	Pressure drop 3 bar
Test pressure	bar			9	15 minutes
Nominal pressure	bar		6		
Pressure drop	bar			4	Cooling circuits in parallel and flow rates adjusted by orifice plates
Total length	mm		2200		Flange to flange
Cell length	mm		7*300		
Outside diameter	mm		448		Without water manifolds.
Area of inner surface	m²		4		
Volume	m³		0.3		
Beam tube aperture	mm		80		
Weight	kg		700		Accessories and blind flanges excluded

Cooling water flow

Cooling circuit	Q_{nom} [l/h]	$Q_{PETRA-III}$ [l/h]	Diameter orifice plates [mm]	Remarks
end discs 1 & 8	290	260	3.1	
cells 1 & 7	360	260	3.2	GIP cells
discs 2 & 7	1000	780	6.7	
cells 2 & 6	360	260	3.2	plunger cells
discs 3 & 6	860	780	6.7	
cells 3 & 5	290	260	3.2	
discs 4 & 5	710	520	4.7	
cell 4	290	260	2x 3.1	input coupler cell
Sum	**8000**	**6500**		

Mode frequencies [(2)]

Mode	Frequency [MHz]	Q_0
π	499,67	36,000
$5/6\pi$	500.10 ±0.07	32,000
$2/3\pi$	501.24 ±0.13	31,000
$1/2\pi$	503.19 ±0.12	35,000
$1/3\pi$	505,32 ±0.14	33,000
$1/6\pi$	507.31 ±0.22	37,000
0	508,59 ±0.025	39,000

[(2)] Mode frequencies were measured at PETRA-III insitu at cavity-temperatures of 22°C on 30.3.2011. Frequencies shown in table were scaled from measured values to the typical operation temperature of 34°C

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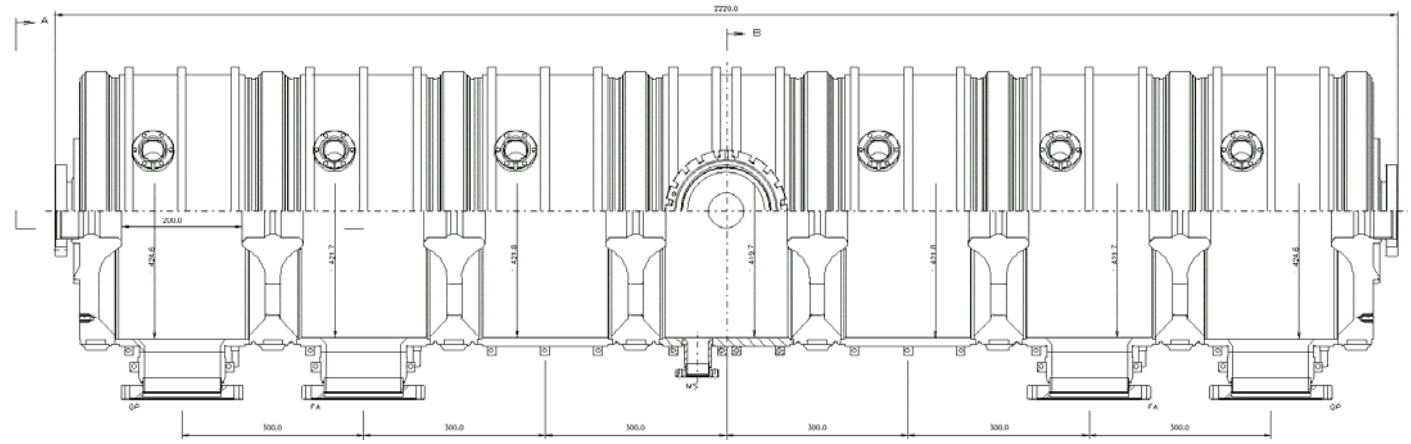
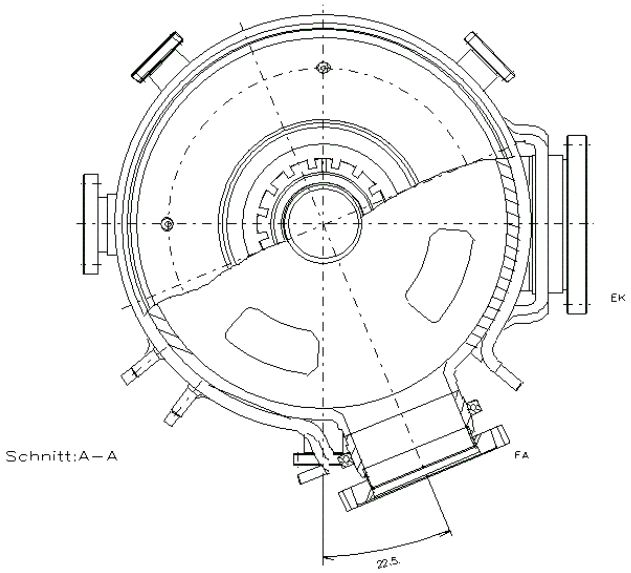
disc #:	1	2	3	4	5	6	7	8
cell #:		1	2	3	4	5	6	7

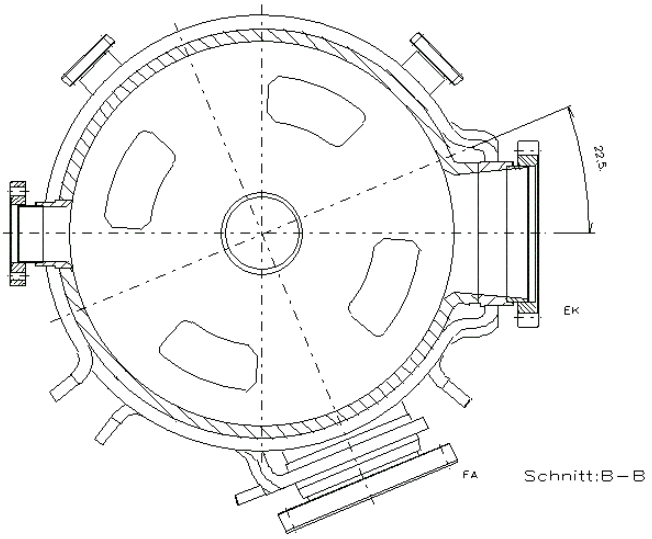


Flange neck diameters	2xDN35, 1xDN125	2xDN35, 1xDN125	2xDN35	2x DN35, 1x DN63 1x DN144	2xDN35	2xDN35, 1xDN125	2xDN35, 1xDN125
Flange types:	2xDN35 CF 1xDN150 CA	2xDN35 CF 1xDN150 CA	2xDN35 CF	2x DN35 CF 1x DN63 CA 1x DN150 SF	2xDN35 CF	2xDN35 CF 1xDN150 CA	2xDN35 CF 1xDN150 CA

Sectional drawing A-A
Disk 1 to Cell 2 (Plunger cell)



Sectional drawing B-B
Cell 4 (Input coupler cell)



Beam tube flanges:
Flange neck diameters: DN90
Flange types: DN100 SF