



## Specifications sheet: TM<sub>010</sub> Compression cavity

### Introduction

The compression cavity is a compact, single-cell, power-efficient resonant microwave cavity, supporting a TM<sub>010</sub> mode at a resonance frequency of 2.9985 GHz with an unloaded quality factor  $Q \approx 6000$ . The special  $\Omega$  shape of the cylindrical cavity enables the concentration of the oscillating electric field on the symmetry axis, which coincides with the path of the electron beam passing through. In this way, electric field strengths up to 8 MV/m can be achieved on-axis over a length of 6 mm with 1 kW of RF power. The cavity is thermally isolated by a epratex enclosure.

### Applications

- Ultrafast electron diffraction
- Velocity bunching
- ToF electron energy loss spectroscopy
- Acceleration

**Features**

- Power efficient
- High vacuum compatible ( $< 10^{-6}$  mbar)
- Tiny footprint
- Seamless integration with DrX Chiller

**General**

Acceleration gap	: 6 mm
Entry/exit tube	: 7 mm diameter
On-axis electric field	: $\sim 8$ MV/m for 1 kW input at 1% duty cycle
Thermal isolation	: Epratex enclosure

**Cooling**

Water Connection	: Legris (6 × 1 mm ) push in fitting
Water cooling	: DrX chiller recommended - temperature stability $\pm 1$ mk

**Heater**

Connector	: XLR male
Resistance	: 4.4 $\Omega$ (pin 1 & 3 linked) - Heater between 1 & 2
Power	: 100 W

**Temperature Sensor**

Type	: NTC / PT100 for integration with DrX chiller
Connector	: mini-XLR (RT3MC-B)
Time constant	: 15 s
R <sub>25</sub>	: 5 k $\Omega$
B-value B <sub>0/100</sub>	: 3450

**RF**

Mode of operation	: TM <sub>010</sub>
Frequency	: 2.9985 GHz
Loaded Q	: $> 4000$
Power connector	: N-Type female
P <sub>max</sub> average	: 100 W
P <sub>max</sub> pulsed	: 1 kW - pulsed at 10% duty cycle
Shunt impedance	: 2.5 M $\Omega$

Vacuum

Flange : CF16 rotatable  
Material : Stainless steel 316L  
Leak rate :  $< 10^{-9}$  mbar/l·s

Dimensions

Size :  $170 \times 170 \times 80$  mm  
Weight : 5.45 kg

Technical drawing

