

# Rotating Turbine „HiReNT“

## The High Reynolds Number Turbine Rig



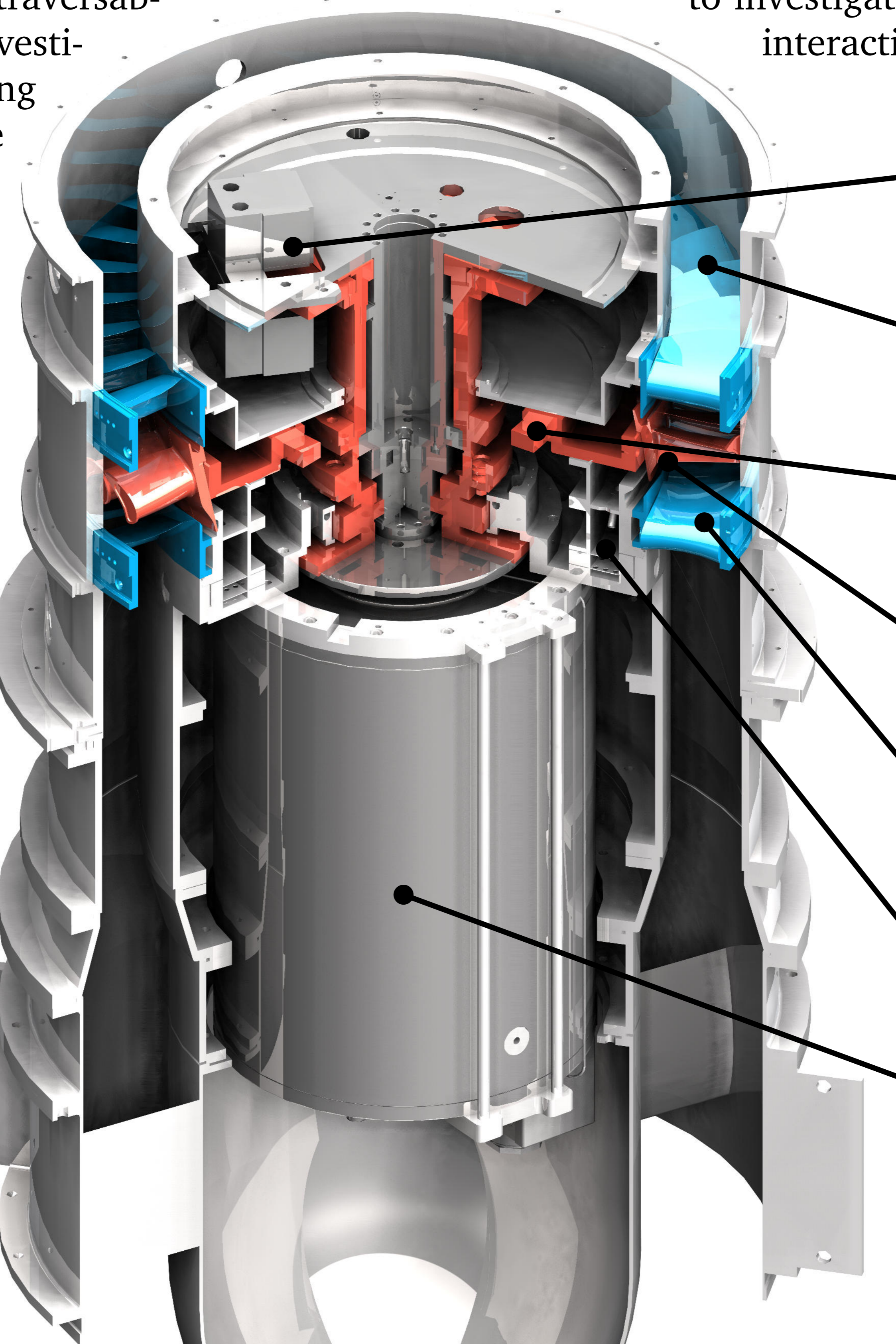
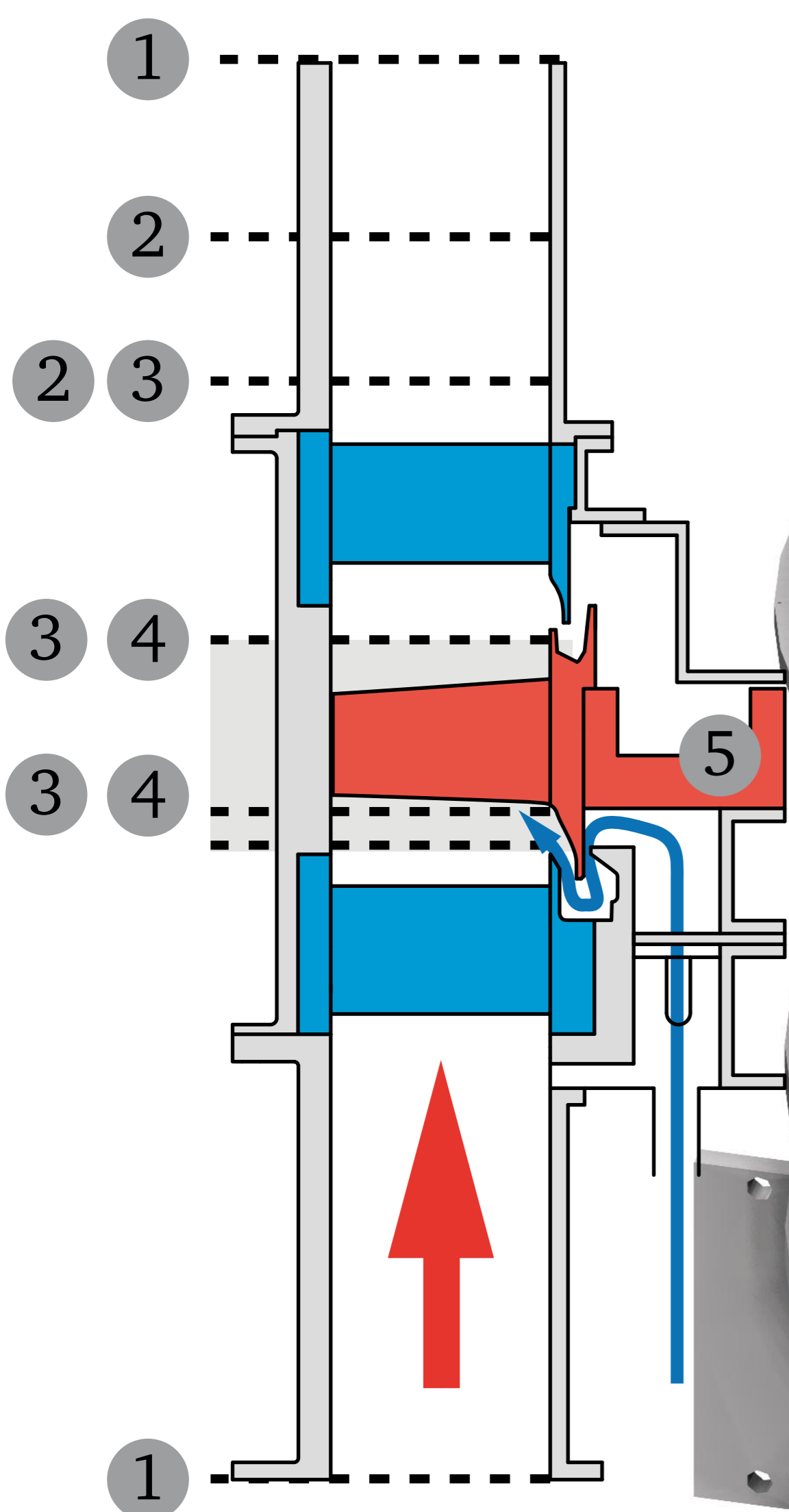
TECHNISCHE  
UNIVERSITÄT  
DARMSTADT

### Rig description

The High Reynolds Number Turbine Rig is a 1.5-stage low Mach large scale turbine test facility operated in quasi open loop. The measurement section is positioned vertically allowing excellent access for the application of various stationary and transient measurement techniques. Both stator rows are separately traversable allowing the detailed investigation of the flow field using casing fixed probes. The rotor disk is equipped with a torquemeter al-

lowing efficiency measurements. The actual rotational speed including the exact angular position of the rotating parts is detected by a forked photoelectric sensor allowing highly accurate measurements in the rotor relative frame. The rig was recently equipped with a secondary air system to investigate rim seal main flow interaction.

lowing efficiency measurements. The actual rotational speed including the exact angular position of the rotating parts is detected by a forked photoelectric sensor allowing highly accurate measurements in the rotor relative frame. The rig was recently equipped with a secondary air system to investigate rim seal main flow interaction.



SAFETY BRAKE

NGV 2  
(45 BLADES,  
TRAVERSABLE)

TORQUEMETER

ROTOR  
(30 BLADES)

NGV 1  
(45 BLADES,  
TRAVERSABLE)

RIM SEAL AIR  
SUPPLY  
(with Pre Swirl Nozzles)

ELECTRIC MOTOR/  
GENERATOR

### Applied measurement techniques

- ① – Total Temp. and Pressure Rakes
- ② – Five Hole Probes
- ③ – Hot Wire Anemometry
- ④ – Fast Response Aerodynamic Probes
- ⑤ – Torque and Rotational Speed
- Particle Image Velocimetry

Massflow	7.4 kg/s
Rotational Speed	1500 rpm
Reynolds Number	290,000
Inlet Temperature	323.15 K
Pressure Ratio	1.08
Blade height	100 mm
Rotor Aspect Ratio	1.3
Injection rate	up to 2 %
Hub diameter	881 mm