Thermal-Vacuum Chamber

Specification

- Chamber volume: **length 51cm and Ø49cm**
- Operation temperature range: **-65°C and +95°C** with ±1°C accuracy
- Operation pressure capability: **10^{-5} Pa – 10^{-3} Pa** with ±30% accuracy
- **10 different type PT100 temperature sensors**, with at least 0.1°C accuracy
- Average heating velocity: **1.5°C/min (±0.5°C)**
- Average cooling velocity: **0.5°C/min (±0.3°C)**

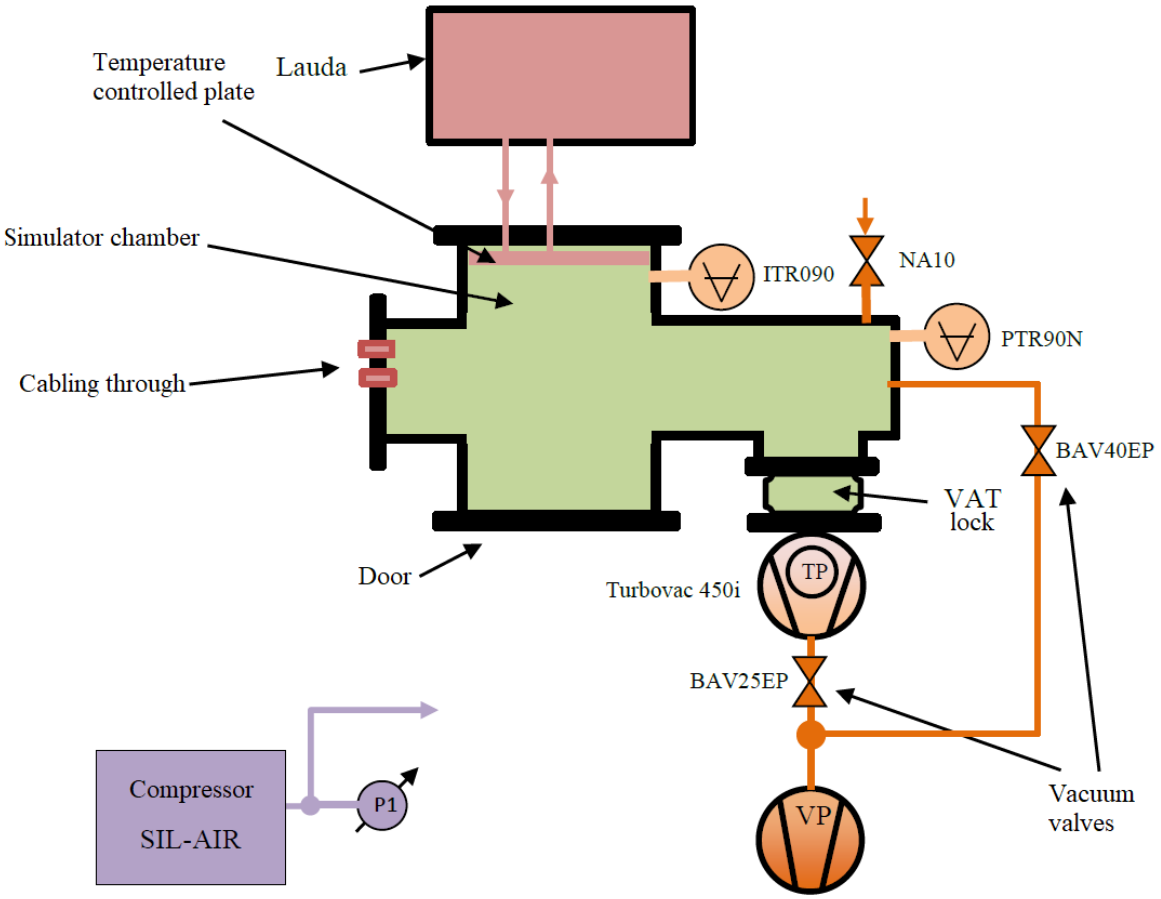
The T-VAC Chamber is designed for specific space environment test activities following the applicable ECSS standards. The chamber is operated within the Space Research Laboratory of the Centre for Energy Research (MTA EK).

The deep vacuum within the chamber (pressure below 10^{-3}Pa) is reached using a dedicated vacuum system containing a rotary and a turbo vacuum pump. The chamber has a cilindrical free volume (length 51cm and Ø49cm) with an adapter plate for fixing the tested item. The temperature of this adapter plate can be controlled in the operation temperature range (-65°C and +95°C). The temperature control is performed by a LAUDA heater/cooler equipment filled up with Kryo-60 liquid. The controlled temperature point can be selected by the user.

The control of the T-VAC system is realised by a dedicated control software (using PLC control). The whole T-VAC simulation system can be operated using dedicated PC program (called SpaceSim). The test sequence (temperaturee profile, switch on/off, data acquistion details, etc.) can be programmed via the PC program in all details. Every measurement data (pressure monitoring, temperature monitoring, warning and error logs, voltage and current measurements in specific cases) is saved and archived with the predefined logging rate (up to 1 Hz). The real-time data visualization is also possible.

Vacuum system	**Rotary vacuum pump & Turbo vacuum pump**
Minimum range	10^{-5}Pa – 10^{5}Pa
Temperature range and pressure with empty chamber	[-65; +95]°C below 10^{-3} Pa
Default accuracy of temperature monitoring	±0.5 °C
Max. default accuracy of the pressure monitoring	±30%
No. of temperature sensors inside	up to 10 pieces

The vacuum – and gastechnology graph of the T-VAC Chamber

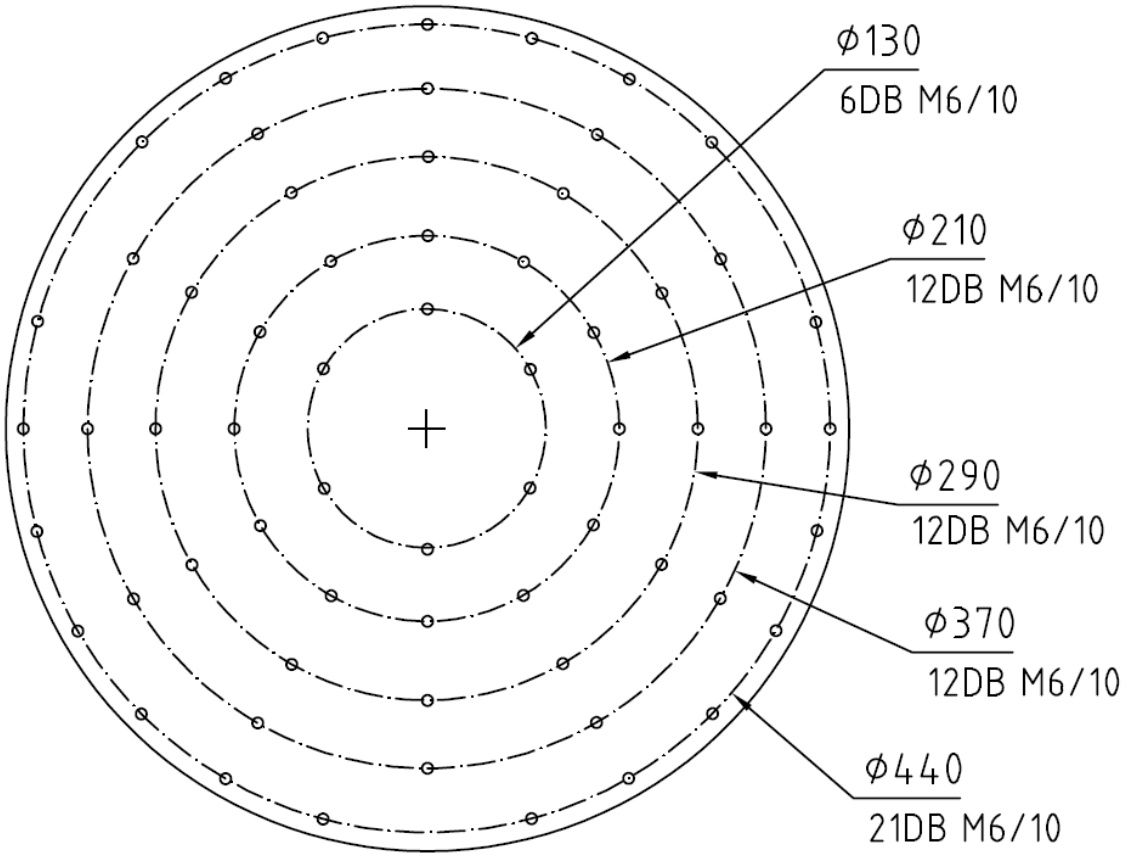


The ITR090 pressure sensor is inside the chamber, and the PTR90N pressure sensor is at the attachment point of the turbomolecular pump.

Automatic control of the vacuum system

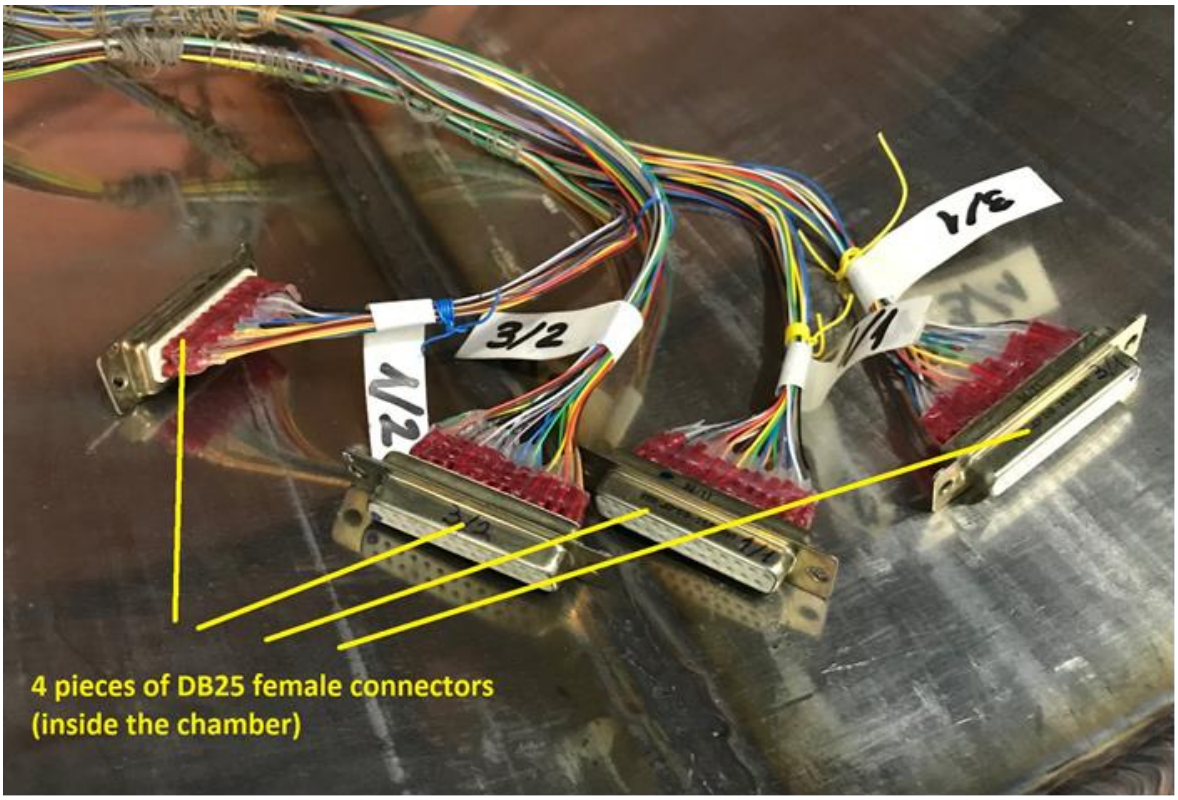
- Start cycle either with button or PC
- Programmable controller
- Emergency stop
- Error messages transmitted to PC
- Condition feedback
- Underpressure from athmospheic pressure to vacuum with automatic valve changes
- Security cut-off in case of a power failure

The mechanical interface of the T-VAC Chamber



The fixing plate is in the back of the chamber. The fixing points are placed with distance given on the picture above. M6/10 screws can be used for fixing.

The electrical interfaces of the T-VAC Chamber

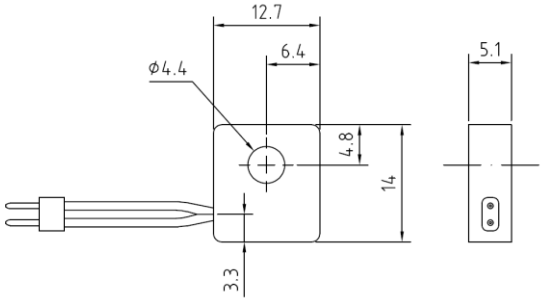


As default 4 pieces of DB25 female connectors are available inside the chamber for electrical interface connections. Outside the chamber the type of the interfaces are DB25 male.

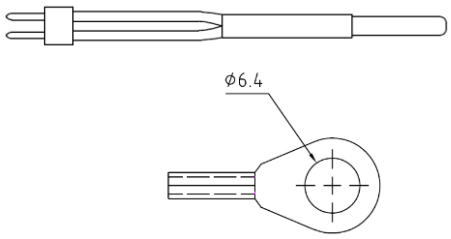
Available temperature sensors

There are six flat (type A) and four cylindrical sensors (type B), which can be use for T-VAC testing as described here.

TYPE A TEMPERATURE SENSOR



TYPE B TEMPERATURE SENSOR



Sensor type	Sensor manufacturer ID	No. of sensors	Range	Accuracy
Type A	LakeShore PT-103-AM	5	[-259; 600] °C	±0.5°C
	LakeShore PT-103-AM-14H	1	[-259; 600] °C	±0.1°C
Type B	LakeShore PT-103	3	[-259; 600] °C	±0.5°C
	LakeShore PT-103-14H	1	[-259; 600] °C	±0.1°C