MAXICLAVE

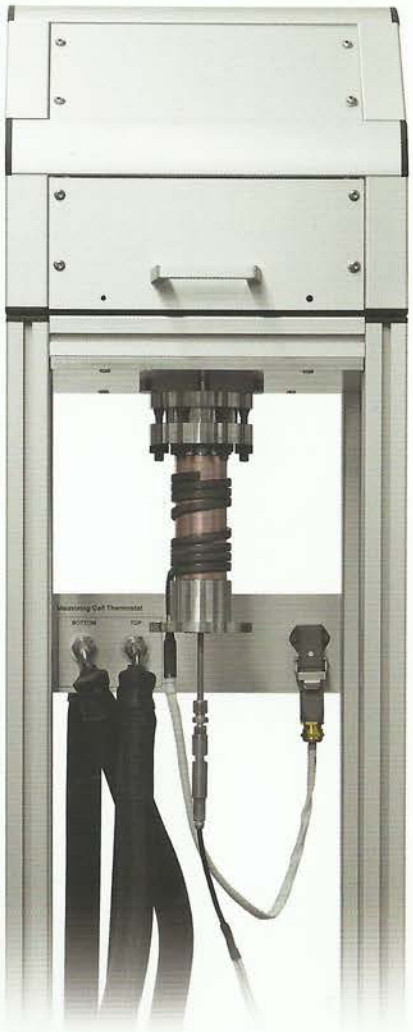
HIGH PRESSURE AUTOCLAVES



RUBOTHERM

MEASURE BEYOND THE LIMITS

HIGH PRESSURE AUTOCLAVES



Rubotherm's product line Maxi**CLAVE** consists of autoclaves for high pressure and/or high temperature applications with different specifications and internal volumes.
From a simple pressure vessel for gas solubility measurements to a sophisticated cold wall reactor for corrosion measurements at highest temperatures and high pressures: an extensive library of different pressure vessel types is the basis for a wide variety of customizable autoclaves.

During the last decade Rubotherm has accumulated the arguably most specialized high pressure know-how among the international manufactures of analytical instrumentation. This lead to perfectly designed analytical instruments for high pressure applications – all of these certainly following the newest pressure vessel safety regulations and approved by European's certified technical inspection agency (TÜV).

The Maxi**CLAVE** product line is the essence of this experience for customers needing custom-made autoclaves and reactors to suit their ambiguous research needs.

The Maxi**CLAVE** reactors are equipped with standard gas connections (Swagelok®, SITEC®) allowing easy combination and integration with existing laboratory systems. Typical applications are:

- Supercritical fluids (extraction, reactions)
- Solubility and absorption measurements
- Pyrolysis
- Gasification of organic materials
- Catalysis testing
- High temperature corrosion studies
- Gas adsorption / desorption (PSA, TSA)
- Gas storage material testing
- Gas separation



The Maxi**CLAVE** reactors fit perfectly with Rubotherm's Flexi**DOSE** gas & vapor dosing and pressure controlling systems.
A combination of these two devices results in an automatically operated, flexible applicable laboratory scale reactor system.



The Maxi**CLAVE** product line is divided into two basic layouts. The pressure resistant wall of the **hot wall reactor** is heated to the same temperature as the sample by an external heating device. Whereas in the **cold wall reactor** the heating device is located inside the reactor and heats the sample directly while the pressure resistant wall is cooled.



HOT WALL REACTORS

The hot wall reactors are pressure vessels made of temperature and corrosion resistant high strength special alloys.

The temperature of the reactors can be controlled by different types of thermostats. Low temperatures are realized by cooling with liquid nitrogen or cold nitrogen gas. Accurate temperature control in the room temperature range is performed by refrigerated liquid circulators. Higher temperatures are realized by different electrical heaters / furnaces.

Typical specifications of the Maxi**CLAVE** hot wall reactors are provided in the table on the back page of this brochure.

COLD WALL REACTORS

The cold wall reactors are pressure vessels with large inner volume being separated in a smaller measuring area and the bigger inside heating zone. A thin walled ceramics tube separates the heater and the measuring area where the sample is located. The potentially corrosive reaction atmosphere is inside the ceramics tube in contact with the sample. The tubular space outside with heater and thermal isolation is pressurized to the same pressure as the reaction atmosphere by an inert gas. The high pressure outside wall can be cooled by means of an external cooling medium. Inside the pressure vessel and in a thermal isolation material block a high temperature heater is concentrating the heating power to the sample area in the center of the reactor. The perfect design and manufacture allows the complete separation of the two atmospheres by the ceramics tube, avoiding dilution of the reaction atmosphere by the pressurizing gas inside the reactor.



In the cold wall reactors the reaction atmosphere is only in contact with the corrosion resistant ceramic materials in the high temperature zone of the reactor. As a result of that high pressure and temperature combinations with corrosive atmospheres are possible.

Typical specifications of the Maxi**CLAVE** cold wall reactors are provided in the table on the back page of this brochure.

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In the two tables below typical technical data of the Maxi**CLAVE** reactors are summarized. This product line is to a wide extend subject of customization. Autoclaves with different specifications than these mentioned in the tables can be designed.

MAXI**CLAVE** HOT WALL REACTORS

Type	P_{MAX}	T	Inner Diameter	Heated Length
HP-HT	100 bar	RT ... 1000°C	20 mm	150 mm
HP-LT	150 bar	-196°C ... 400°C	30 mm	100 mm
HP	150 bar	RT ... 750°C	20 mm	150 mm
HP II	350 bar	RT ... 750°C	20 mm	150 mm
HP III	700 bar	RT ... 150°C	30 mm	230 mm

Customized hot wall reactors have been realized for example for much lower temperatures (-269°C) or higher pressures (1000 bar) as well as with larger inner volumes.
Please inquire about the possible specification modifications!

MAXI**CLAVE** COLD WALL REACTORS

Type	P_{MAX}	T	Inner Diameter	Heated Length
HP-ST	100 bar	RT ... 1100°C	15 mm	125 mm
MP-ST	40 bar	RT ... 1100°C	28 mm	150 mm
MP-HT	30 bar	RT ... 1200°C	28 mm	150 mm
MP-HT II	20 bar	RT ... 1300°C	28 mm	150 mm

Customized cold wall reactors have been realized for example with larger inner volume or with an additional core heater to support the outer heater for highly kinetic pyrolysis measurements with tubular shaped samples.
Please inquire about the possible specification modifications!

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