Microactivity Reference
The MICROACTIVITY-Reference is an automatic and computerized laboratory reactor for reactions of catalytic microactivity with reactor bypass, preheater evaporator, pressure control valve and other process layouts in hot box, which avoids the possible condensation of volatile products, at the time that preheats the reactants efficiently.

The MICROACTIVITY-Reference consists of an ATMOSPHERIC PRESSURE BASIC UNIT and some series of EXTRA PACKAGES that improve or modify its efficiency. It is a single structure that contains the electronic unit, control and MFCs system and includes the hot box where the reactor and process valves are located. The system has local control and on-line remote control, based on TCP/IP Ethernet communications with distributed control structure. A complete and elaborated security system is integrated in microprocessor, independent of the computer.

For reactions at high pressure that involve separation of gases and liquids, a new system of level control of the condensed liquid is introduced with almost no dead volume (0.3 ml), so that the sample of the liquid outlet is the condensed product mixture formed at the very last minutes of reaction. A variety of reactions has been carried out in our reactors: Hydrocracking, Hydrotreating, Isomerization, Hydrogenation, Hydrodesulfurization (HDS), Oxidation, Hydrodenitrogenation (HDN), Polymerization, Reforming (aromatization), steam reforming, etc. Strategic alliances with our customers have induced to some of the most important technological solutions not present for a variety of catalytic processes.

### EXTRA PACKAGES

**MFC:** 4th, 5th and/or 6th MFCs with power supply and valves.

**PRES:** High Pressure Unit includes pressure control system, based on micrometric servo-controlled valve, 100 bar max, +/-0.2 bar, 210°C. PIDEngTech patented design. PID loop controller.

**PUMP:** Gilson HPLC liquid pump, 0.01-5 mL/min, 400 bar. Digital communications.

**LEVEL:** Liquid/gas separator with level control for operation with liquids and gases at high pressure in continuous mode; zero dead volume, based on micrometric valve servo-controlled and capacitive sensor level with approx. 0.3 cc dead volume with precision +/-0.1 cc in level control. 100 bars. PID EngTech patented design.

**TWO LIQUID PHASES SEPARATOR:** New upgraded application for use in Fisher-Tropsch (GTL) reactions. At real time separation at high pressure is obtained Water + Hydrocarbons + gases.

**SCALE:** Scale for weighting liquid output in real time. Digital communications module.

**MFM:** MFM in exit gas line (for on-line and in real time supervising procedures).

**VICI:** 2nd VICI valve, 6 ports, 2 positions. Only for special purposes.

**REAC:** Construction materials of the reactor: Hastelloy C or X, Incoloy, Titanium, and special dimensions (d= 5.2 or 13.1 mm).

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**Microactivity Reference**

**ATMOSPHERIC PRESSURE BASIC UNIT**
- Tubular reactor Autoclave Engineers 700°C with porous plate
- Thermocouple, directly in catalyst bed
- Hotbox 170°C
- VICI valve 6 ports, for reactor bypass.
- 3 MFCs, Hi-Tech Bronkhorst
- Thermoelectric unit for liquids condenser / separator.
- Microprocessor for security integrated system
- 2 Control loops for temperature
- 6 Control devices for MFCs.
- Work pressure in atmospheric basic unit: 1 bar.
- Design pressure: 100bar
- Layout, fittings and valves in inox 316L, very low dead volume

**HIGH PRESSURE BASIC UNIT**
Atmospheric Pressure Basic Unit &:
- Pressure control system, based on servocontrolled micrometric valve by 1st precision stepper motor
- PID Eng&tech patented design
- 100 bar max. ± 0.2 bar
- Control loop and 100 bar pressure transducer
- Digital communications

**HIGH PRESSURE UNIT WITH LIQUID-GAS SEPARATOR**
High Pressure Basic Unit &:
- Liquid/gas separator with level control, in continuous mode, based on servo-controlled micrometric valve and capacitive sensor level with approx. 0.3cc dead volume
- PID Eng&Tech patented design
- Cooling by Peltier thermoelectric effect
- Control loop and capacitive sensor
- Digital communications
- Two models: L1 or L2 (two phases)

**EXTRA PACKAGES**
- HPLC Gilson pump, 400 bar, 0.01-5 ml/min
- Up to 4, 5 or 6 Mass Flow Controllers
- Scale in liquid outlet
- Mass Flow Meter in gas outlet
- Construction materials or reactor dimensions
- 2nd VICI-Valco valve for special proposals

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