THE MOST
ADVANCED SYSTEM
FOR MEASUREMENT OF
CATALYTIC ACTIVITY

Microactivity Effi

PID ENG&TECH
a micromeritics® company

01

MICROACTIVITY EFFI

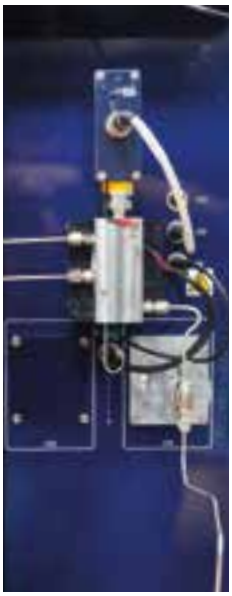
The Microactivity Effi is a compact and advanced modular and completely automated laboratory system for measurement of catalytic activity and selectivity.

It is a world Reference Reactor used by scientists at Research Centers and Universities worldwide.

- The standard unit can be adapted for different catalytic tests through different configurations and options.
- Real time results with very high level of accuracy and reproducibility.
- Programming of series of experiment with data acquisition and graphics capabilities.
- Up to 1100 ºC, depending on the material of reactors.
- Up to 200 bar as optional.

STANDARD SPECIFICATIONS

- 3 x high precision mass flow controllers with digital communications.
- Preinstallation of liquid feed line.
- 1 SS316 tubular reactor, 9.1 mm ID with easy loading of up to 3.3 cc catalyst. Thermocouple placed directly in catalyst bed.
- Maximum working pressure up to 100 ± 0.1 bar based on micrometric servo-controlled valve design. PED 2014/68/UE, high-pressure certification.
- Maximum working temperature up to 1100 ± 1 ºC (depending on reactor material, SS316 as standard. 9,1 mm ID x 300 mm length, 20 µm porous plate.
- All layout inside hot box made with hot air convector. Maximum temperature up to 200 ± 1 ºC.
- Automatic six-port reactor bypass valve.
- High pressure Liquid/Gas separator (L1) with capacitive level sensor and very low dead volume (less than 1 cc), allowing real time results without accumulation. Level control valve (LCV) based on micrometric servo-controlled valve.
- Independent safety levels separate from PC. User-defined functions for alarms.
- PC with user-friendly software with real time supervision and program recipes.



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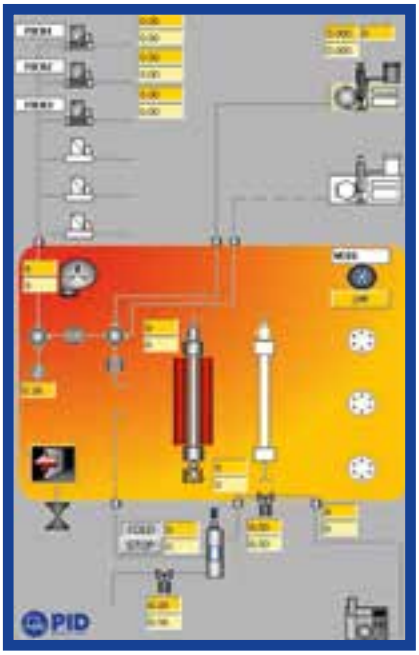
TOUCH SCREEN



All parameters can be easily changed and controlled by the PLC touch screen.

PROCESS@ SOFTWARE AND EXPERIMENT VIEWER

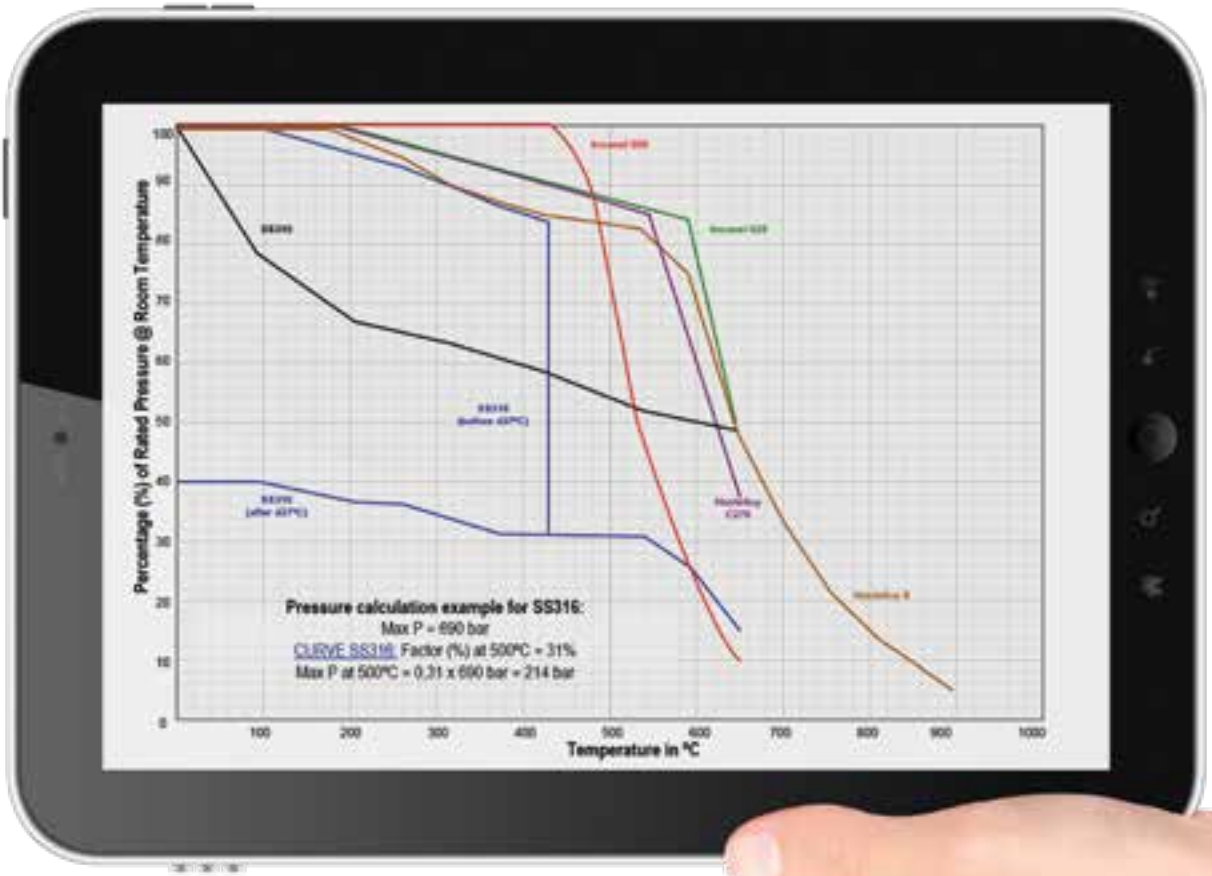
- Process@ is a user-friendly real-time SCADA software based on LabVIEW and digital communications.
- Session table for automatic devices changes. Easy programming of conditional lines for more efficient experiments.
- Monitoring and data acquisition for process and control values.
- Graphs capabilities.
- All parameters are saved in a log file for later graphical representation and data treatment. Easy export to spreadsheets.

REACTOR MATERIAL AND SIZES

	Inside x Outside diameter: 9.1x14.3 mm (Std), 13.1x19.1 mm*, 17.5x25.4 mm*				
	Max. temperature (°C)	Max. pressure (BAR)	Max. P (BAR) @ 500 °C	Max. P (BAR) @ 650 °C	Max. P (BAR) @ 790 °C
SS316 (Std)	800	690	214	104	
Hastelloy X*	1200	617	525	308	100
Hastelloy C276*	1093	418	364	155	
Inconel 600*	1212	356	243	36	
Inconel 625*	980	827	728	414	
SS310*	1100	441	262	241	

23.8 mm ID reactor available

* Optional
Std: standard



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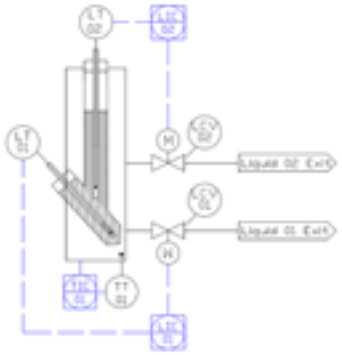
OPTIONAL CONFIGURATION

GTL configuration

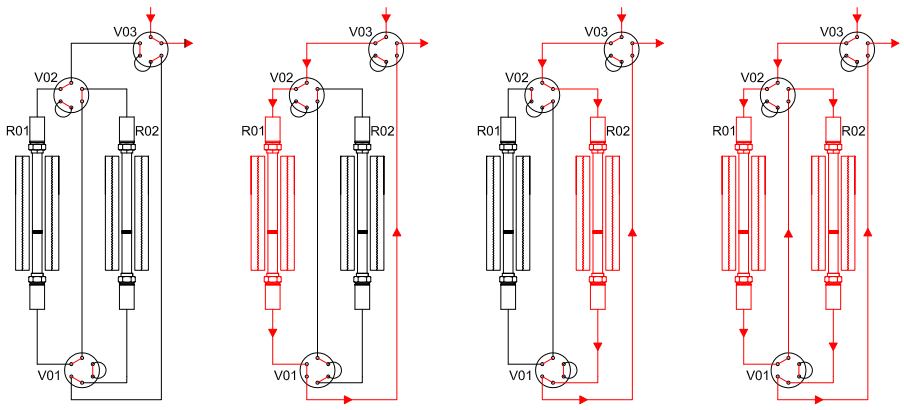
High pressure L/L/G separator with very low dead volume (less than 1 cc each phase) for separation and collection of 2 non miscible liquid products.



2 reactors

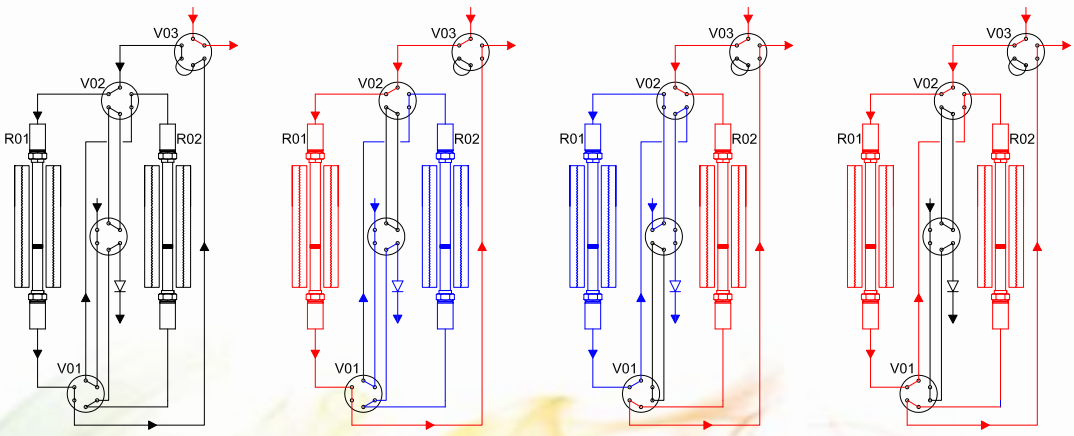
1_Duo configuration

- 2 fixed bed reactors.
- Possibility to switch between reactor 1 or reactor 2 and serial connection.
- Optionally a 2nd PCV can make the reactor 1 work at higher pressure than reactor 2.
- Optionally an additional MFC fed to reactor 2 to modify the composition coming from reactor 1.



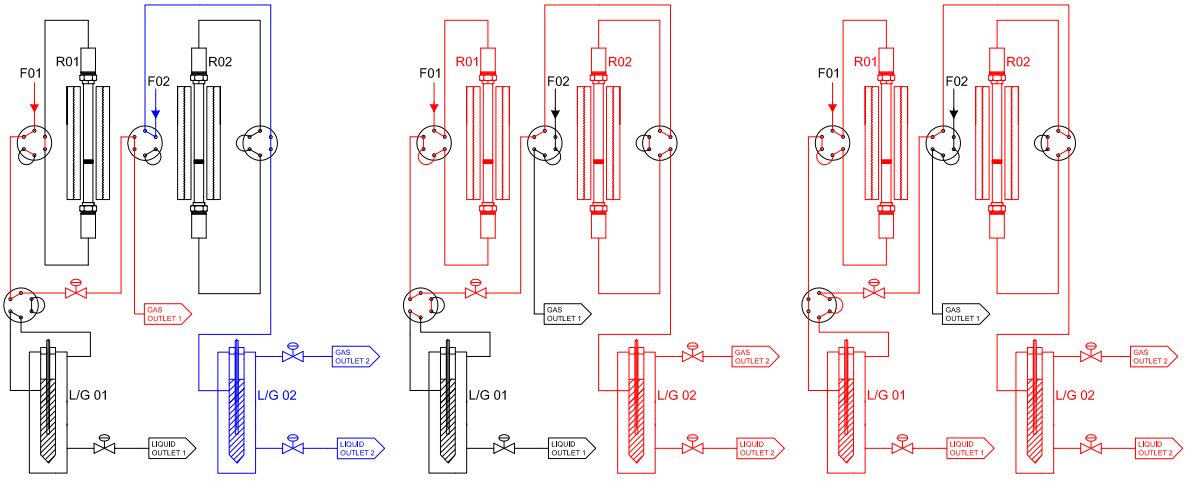
2_Twin configuration

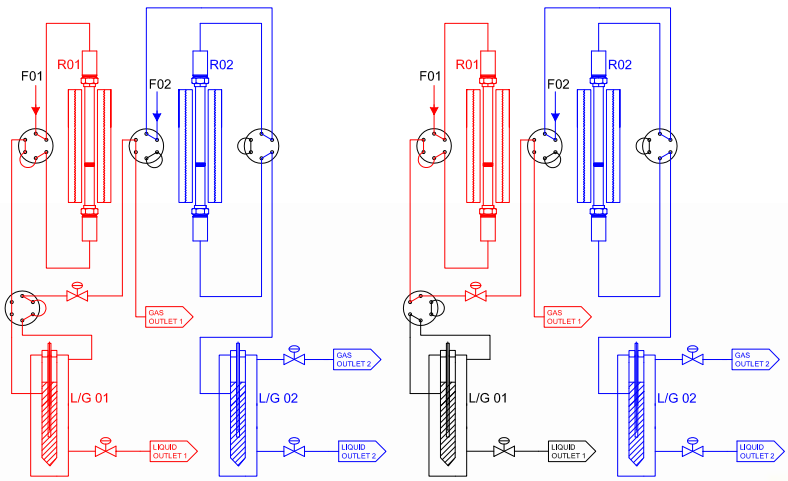
- 2 fixed bed reactors, one for reaction for pressures up 100 bar, one for regeneration at atmospheric pressure.
- 1 x MFC for regeneration.
- Possibility of serial connection.
- Optionally a 2nd PCV can make both reactors work at the same pressure, avoiding re-pressurization when switching reactors.



3_Parallel configuration (includes serial mode)

- Complete parallel reactor system.
- 2 MFC per reactor.
- Independent feed each reactor.
- Independent working conditions, high pressure, high temperature applications.
- 1 x HP L/G separator (L1) each reactor (total 2).
- Possibility of serial connection.
- Automatic bypass valve for L/G separator bypassing, sending all products from reactor 1 to to reactor 2.
- Optionally an automatic switching valve in the gas outlets for GC/vent selection.





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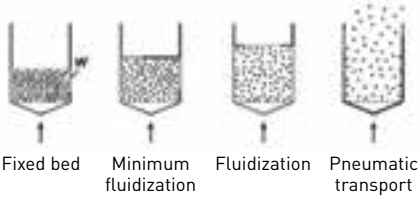
OPTIONAL EQUIPMENT

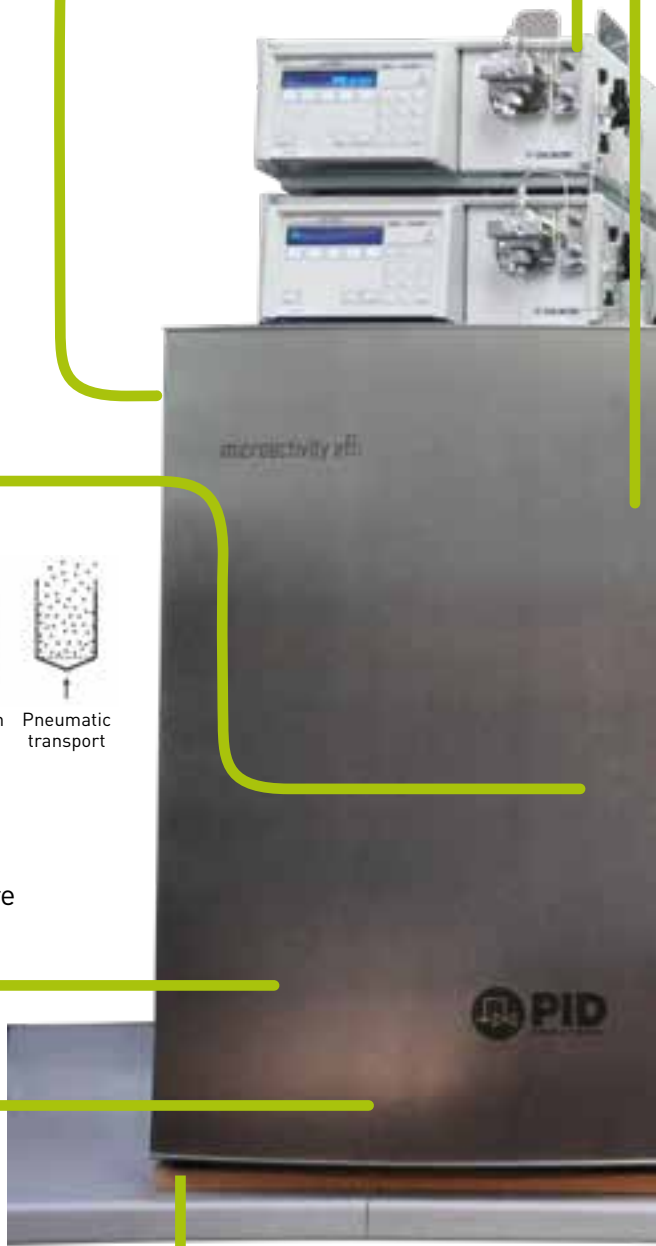
Mass flow meter in the gas outlet
for mass balance calculations.

Automatic six port valves
for different purposes
L/G separator bypass
Up/down flow selection.



Fluidized bed reactor
with differential pressure
measurement.

Wax trap temperature controlled
for heavy hydrocarbons collection
just at reactor outlet (F-T).



High pressure
200 bar operation
as an option.

Liquid feed
Up to 2 HPLC pumps 0.02 – 5 ml/min. Heated option up to 90 ºC for heavy liquids.

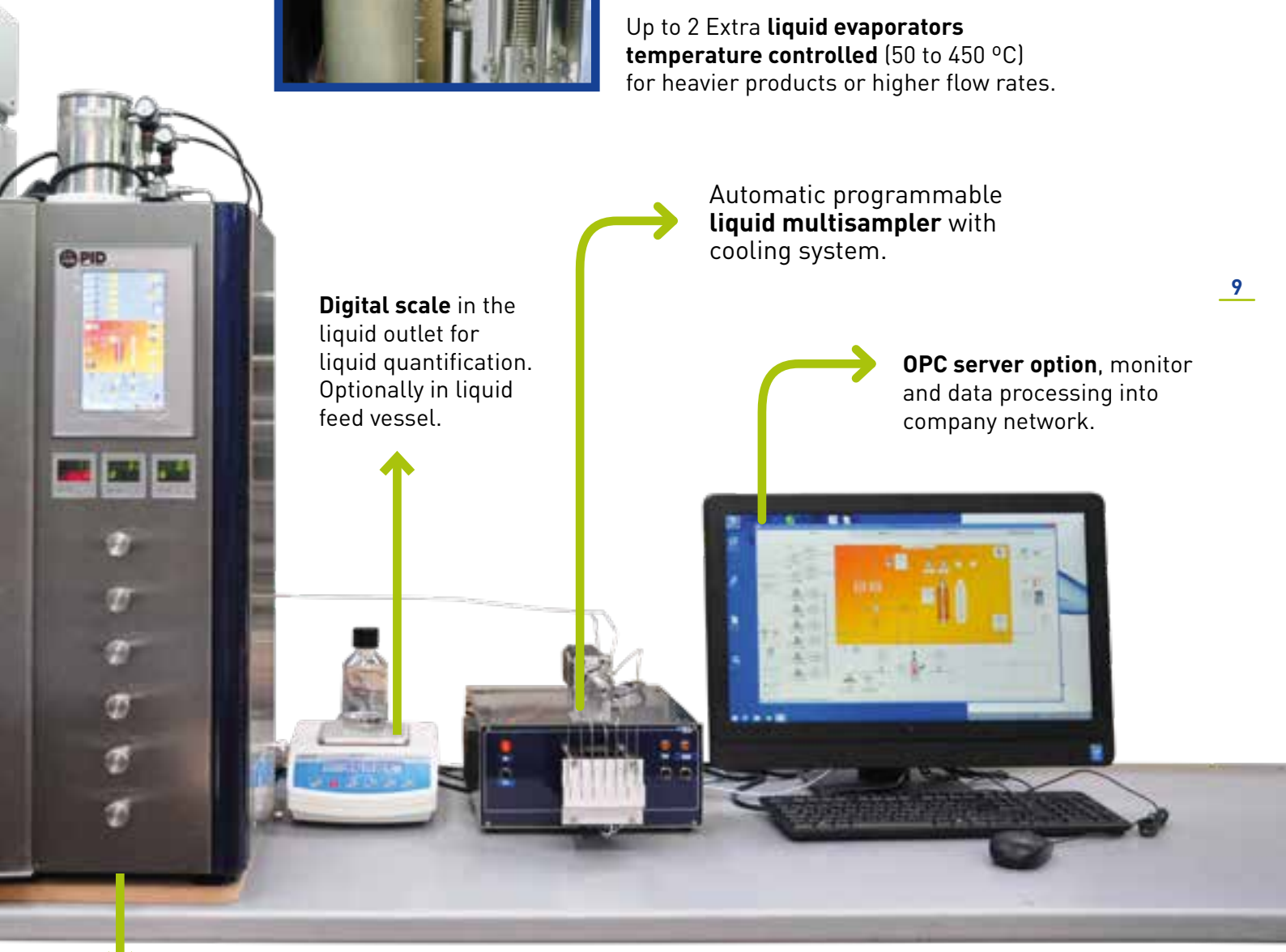
Also Syringe pump for very low and accurate flow (from 0,01 µL/min).

Up to 2 Extra **liquid evaporators temperature controlled** (50 to 450 ºC) for heavier products or higher flow rates.

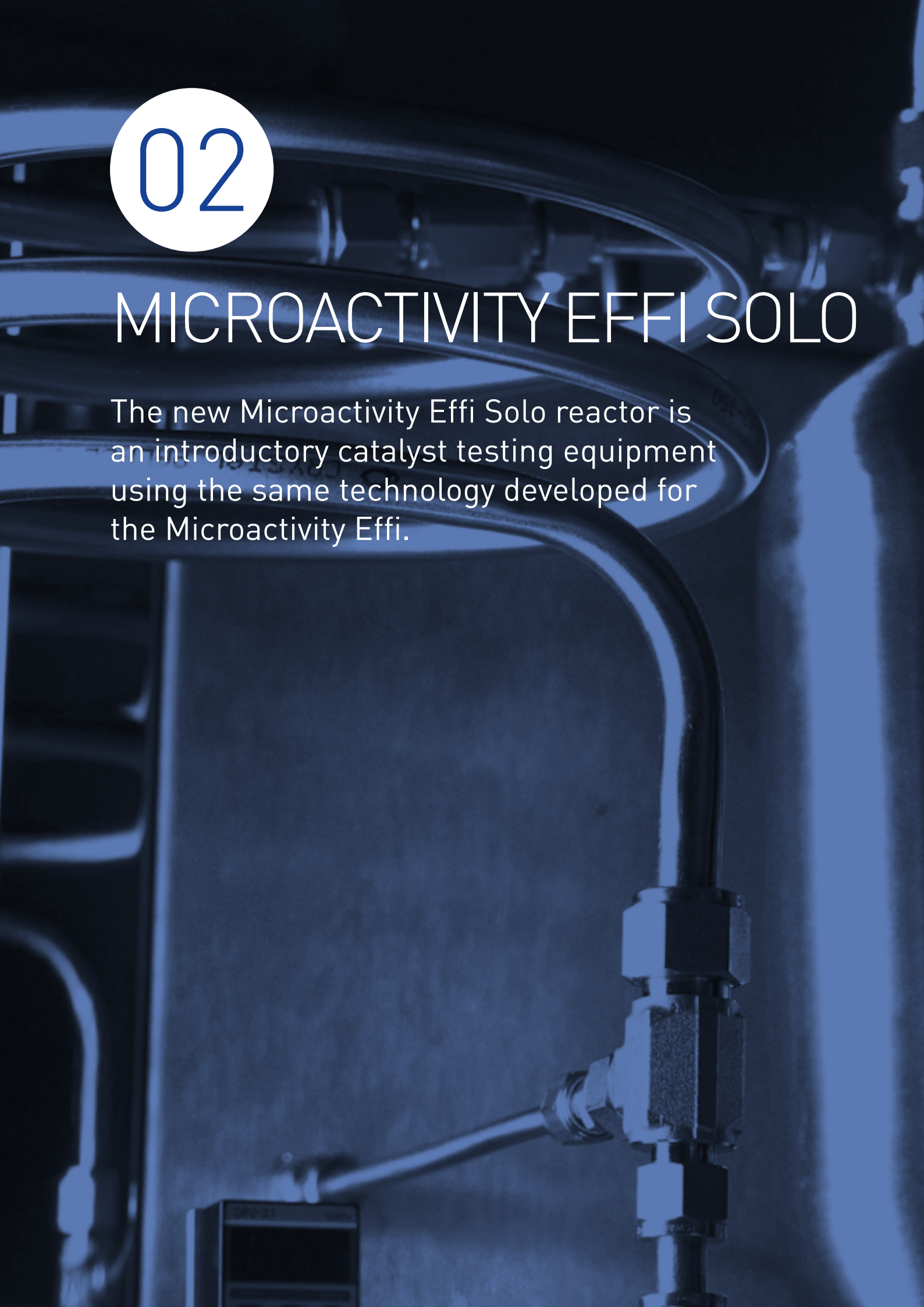
Automatic programmable **liquid multisampler** with cooling system.

Digital scale in the liquid outlet for liquid quantification. Optionally in liquid feed vessel.

OPC server option, monitor and data processing into company network.



Gas feed
Up to 6 MFCs, 3 as standard.
Easy calibration for other gases.



02

MICROACTIVITY EFFI SOLO

The new Microactivity Effi Solo reactor is an introductory catalyst testing equipment using the same technology developed for the Microactivity Effi.

COMPARATIVE TABLE

	MA EFFI SOLO		MA EFFI	
	Standard	Optional	Standard	Optional
Number of reactors	1	-	1	2
HP L/G separator (L1)	-	Optional	Included	2
HP L/L/G separator (L2, i.e. FT)	-	-	-	1
Temperature	Max. 800 °C with SS316 reactor	Max. 1100 °C with special alloys	Max. 800 °C with SS316 reactor	Max. 1100 °C with special alloys
Pressure	Atmospheric	100 bar	100 bar	200 bar
Gas feed	2 MFC	Up to 4 MFC	3 MFC	Up to 6 MFC
Liquid feed	-	1 HPLC pump	-	Up to 2 HPLC pump (or syringe)
Heated liquid feed and head pump	-	1	-	2
Scale	-	1	-	2
Mass flow Meter in the gas outlet	-	1	-	2
Reactor bypass valve	Manual	Automatic	Automatic	N/A
L/G separator bypass valve	-	-	-	Optional
Up/Down flow selection valve	-	-	-	Optional
Reactor size (metallic)	9.1mm ID	Smaller (7.9mm and 5.1mm ID)	9.1mm ID	Smaller and bigger (5.1, 7.9, 13.1, 17.5 and 23.8mm ID)
Quartz reactor	-	Optional	-	Optional
Special alloys	-	Optional	-	Optional
Wax trap	-	-	-	2
Fluidized bed reactor	-	-	-	Optional
Liquid Multisampler	-	-	-	2

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