The FLEXI line

YOUR FLEXIBLE ACCESSORIES
KEP Technologies is not simply an instrument company, but a full solution provider. We do not claim that a single product is suited for all applications and have with our SETARAM brand developed a range of products with different characteristics to more closely meet your demands. We are confident that with KEP Technologies you will find a solution with the performance you need to get the best understanding of your materials. This being the case no matter which of our below market segments you may work in.

APPLICATIONS

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APPLICATIONS

LIFE SCIENCES
API, Excipients, Drug delivery systems, Proteins, Enzymes, Food, Carbohydrates, Fats, Stability, Polymorphism, Unfolding, Denaturation, Aggregation, Melting, Gel formation, Gelatinization

PROCESS SAFETY
Energetic materials, Propellants, Explosives, Reactants and products of chemical reactions at large scale. Heat capacity, Synthesis reaction, Decomposition, Runaway reaction, Temperature and Pressure rise.

ENERGY & ENVIRONMENT

INORGANIC MATERIALS SCIENCE

ORGANIC MATERIALS SCIENCE
Polymers, Thermoplastics, Thermosets. Glass transition, Oxidation resistance, Heat capacity, Thermal stability, Curing ratio, Transitions

THE KEP TECHNOLOGIES ADVANTAGE
Each FLEXI accessory embodies our “Reimagine Material Characterization” value proposition. It does so by delivering the three core customer benefits of Experimental Control, Instrument Versatility and Quality Results.

We know that solutions that provide these benefits will deliver the highest value to our customers.

In addition to our core customer benefits, we are able to provide customized solutions by harnessing the engineering and project management expertise of our highly skilled organization.

CUSTOMIZED SOLUTIONS
Modular design allows for upgraded and tailored functionality. Access to all previous non-proprietary custom requests. Open access to engineering development team.

THE FLEXI LINE
The FLEXI line is a series of flexible, plug-in accessories. They are designed to operate in environments as different as laboratories, workshops or manufacturing lines.

They are easily connected in line or at line to enhance the capabilities of your instrumentation or process.

You can use the FLEXI accessories to control experimental conditions, or for in-situ measurements.

- Experimental conditions control: for temperature, atmosphere, pressure, relative humidity, etc.
- In-situ measurements: for mass variations (gravimetry) or gas analysis.

All our FLEXI accessories have a robust design for reliable operation and the longest serviceable life.

All have simple connection principles. They can be easily connected, disconnected and reconnected again within any procedure.
Our range of accessories for the characterization of materials under a variety of conditions and across wide application ranges.

**FLEXI LINE**

FLEXI accessories have different levels of control and types of interface. This includes:

- Manual control and visual alarms
- Control panels with display screens
- Signals output for data export
- Software control from a PC or a laptop
- Combinations of two or more of the above

**In Situ Measurement**

- **FLEXI BALANCE**
  - Mass Variation Measurement System

**Experiment Condition Control**

- **FLEXI WET**
  - Wet Gas Generator

- **FLEXI HP MS**
  - High Pressure Mass Spectrometer

- **FLEXI HP 200**
  - High Pressure Control System

- **FLEXI HP 1000**
  - High Pressure Control System

**User Interface**

**GRAVIMETRIC ANALYSIS**
- Designed to measure mass loss and uptakes, for solid-gas reactions.
- Can be coupled to furnaces, climate chambers and other instrumentation.

**EGA – EVOLVED GAS ANALYSIS**
- Combines with any system, even under pressure, to detect and identify gas evolution

**PRESSURE VACUUM**
- Operates under pressure and/or measures and controls pressure

**HUMIDITY**
- Can be coupled to any laboratory instruments or climate chambers for humidity control

**CORROSIVE AND REACTIVE GASES**
- Able to run in various aggressive atmospheres

**TEMPERATURE**
- Controls temperature of industrial or laboratory systems
FLEXI CHILL

POWERFUL AIR COOLED CHILLER FOR MULTIPLE LABORATORY OR INDUSTRIAL APPLICATIONS

Finest design of heat exchangers and cooling fans for high cooling power capabilities

PLUG&PLAY, SIMPLICITY, EASY SETTINGS

- Effortless use with no temperature settings
- Limited maintenance with no refrigerant circuit, i.e. no leaks and potential environmental problems
- Fast connection to various systems or instrumentation

ROBUST DESIGN

Developed in Switzerland by our research and innovation team and CE marked

<table>
<thead>
<tr>
<th>PERFORMANCE</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Cooling capacity</td>
<td>1800 W at RT = 20°C</td>
</tr>
<tr>
<td></td>
<td>1250 W at RT = 30°C</td>
</tr>
<tr>
<td>Pump flowrate</td>
<td>up to 4L/min</td>
</tr>
<tr>
<td>Pump outlet pressure</td>
<td>Up to 1.5 bar</td>
</tr>
<tr>
<td>Tank maximum capacity</td>
<td>5 L</td>
</tr>
<tr>
<td>Temperature range</td>
<td>RT to 70°C</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>GENERAL</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Size (W x D x H)</td>
<td>420 x 420 x 370 mm</td>
</tr>
<tr>
<td></td>
<td>16.5 x 16.5 x 14.6 inch</td>
</tr>
<tr>
<td>Weight</td>
<td>15 kg</td>
</tr>
<tr>
<td></td>
<td>33 lb</td>
</tr>
<tr>
<td>Power supply</td>
<td>110 / 230 V</td>
</tr>
<tr>
<td></td>
<td>50/60 Hz</td>
</tr>
</tbody>
</table>

Schematics of FLEXI CHILL

Instrument protection alarms based on liquid’s level and temperature
- Temp Excess: visual and sound warning alarms
- Temp Prot: Visual warning and pump switches off.

Four powerful axial air fans to bring a large air flow over the heat exchanger to enhance the chiller’s cooling capacity.

Microchannel based heat exchangers (radiators) expertly designed to ensure the best air / liquid heat exchange.

At the back: 8mm standard inlet and outlet connectors. For easy connection to systems in various fields from industry (low power lasers, cutting or engraving machines, welding machines, UV photo printers) to laboratory (analytical instruments and other equipment).

The system is based on a centrifugal pump equipped with a brushless motor.

REIMAGINE MATERIAL CHARACTERIZATION
### FLEXI HP 200

**CAPABLE AND ROBUST HIGH PRESSURE CONTROL SYSTEM**
- Robust design compatible with most pressure control needs of small systems.
- Can control pressure of two systems simultaneously.

**PLUG & PLAY, EASY AND SAFE**
- Convenient and reusable metallic tubing connection.
- Easy operation, manual valves and pressure reducer.
- Handle for easy transportation between usage locations.
- Equipped with an emergency relief system (rupture disk) to avoid uncontrolled overpressure.

### MODE OF OPERATION

**Pressure control**
- By means of a buffer tank.
- The outlet pressure is at maximum equal to the inlet pressure.

**Control mode**
- Constant pressure.

### PERFORMANCE

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Specifications</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maximum Pressure</td>
<td>200 bar</td>
</tr>
<tr>
<td>Pressure display resolution</td>
<td>+/- 0.1 bar</td>
</tr>
<tr>
<td>Outlet pressure stability</td>
<td>The outlet pressure stability depends on the tank temperature stability.</td>
</tr>
<tr>
<td>Gas types</td>
<td>Helium, nitrogen, argon, hydrogen, methane, carbon dioxide, dry hydrogen sulfide.</td>
</tr>
<tr>
<td>Buffer tank volume</td>
<td>300 ml</td>
</tr>
</tbody>
</table>

### GENERAL

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Specifications</th>
</tr>
</thead>
<tbody>
<tr>
<td>Size (W x D x H)</td>
<td>500 x 200 x 450 mm (19.7 x 7.9 x 17.7 inch)</td>
</tr>
<tr>
<td>Weight</td>
<td>15 kg 33 lb</td>
</tr>
<tr>
<td>Power supply</td>
<td>110 / 230 V, 50/60 Hz</td>
</tr>
</tbody>
</table>

*SPECIAL CARE NEEDS TO BE TAKEN WITH THESE GROUP 1 FLUIDS, 'GAS PHASE ONLY.'

**Schematics of FLEXI HP 200**

- Gas inlet, Vacuum pump, and Vent outlet connections incorporating metallic connections with metal gasket for 1/8 inch tubing.
- Indication of the inlet and outlet pressure by two analog pressure gauges.
- Additional digital outlet pressure sensor for more accurate control.
- Two gas outlets to control the pressure of two distinct systems at the same time. They use the same metallic connection principle as the gas inlet.
- Six robust manual valves to manage gas delivery to the tank and to the systems requiring pressure control.
- 300mL buffer tank. The pressure control principle of FLEXI HP 200 is based on the volume difference between this tank and the systems. Small pressure variations in the systems are absorbed by the bigger volume of the buffer compared to the systems' volumes.
- Manually operated pressure reduction and pressure control valve.
**FLEXI HP 1000**

**HIGH ACCURACY AND ULTRA HIGH PRESSURE CONTROL SYSTEM**
- Provided by the combination of an ultra high pressure syringe pump with a large range pressure transducer
- Controls pressure of two systems simultaneously

**PLUG&PLAY, EASY AND SAFE**
- Convenient and reusable metallic tubing connection
- Easy operation, with touchscreen control for valves operation and control settings
- Equipped with an emergency relief system (rupture disk) to avoid uncontrolled overpressure

**MODE OF OPERATION**
- Pressure control
  - By means of a motorized high pressure pump
  - The outlet pressure can be superior to the inlet pressure
- Control mode
  - Constant pressure, pressure steps

**PERFORMANCE**
- **Maximum Pressure**: 1000 bar
- **Pressure setpoint resolution**: +/- 0.1 bar
- **Outlet pressure stability**: The outlet pressure stability is ensured by the syringe pump
- **Gas types**: Helium, nitrogen, argon, hydrogen, methane, carbon dioxide, dry hydrogen sulfide
- **Syringe pump volume**: up to 56 ml

**GENERAL**
- **Size (W x D x H)**: 470 x 600 x 290 mm
  - 18.5 x 23.6 x 11.4 inch
- **Weight**: 40 kg
  - 90 lb
- **Power supply**: 230 V
  - 50 Hz

*Special care needs to be taken with these group 1 fluids*

**Schematics of FLEXI HP 1000**
- One gas inlet, two gas outlet connections incorporating metallic connections with metal gasket for 1/8 inch tubing.
- The combination of an ultra high pressure syringe pump with a high accuracy pressure transducer is at the core of FLEXI HP 1000.
- The pump pressurizes the inlet gas until the pressure setpoint is reached. This principle also allows reaching an outlet pressure which is greater than the inlet pressure.
- The movements of the pump’s piston compensate for pressure variations, even those due to ambient temperature changes.
- Touchscreen user interface for pressure or flow rate setpoints, pneumatic valves operation, and live data display.
- Vacuum and emergency relief system (rupture disk) connections on the back of the instrument.
**FLEXI WET**

**HIGH VERSATILITY AND ACCURACY WET GAS GENERATOR**
for multiple laboratory or industrial applications
- Accurate wet conditions control
- From simple setpoint to sophisticated programming
- Operation with various types of gases

**PLUG&PLAY, SIMPLICITY, EASY SETTINGS**
- Easily transportable
- Simple connection system to any laboratory instruments or climate chambers
- Simple and convenient user interface

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### PERFORMANCE (GAS)

<table>
<thead>
<tr>
<th>Pre-calibrated for various gases</th>
<th>Air, helium, nitrogen, carbon dioxide, argon</th>
</tr>
</thead>
<tbody>
<tr>
<td>Flow Rate</td>
<td>FLEXI WET 50  3 to 50 ml/min</td>
</tr>
<tr>
<td></td>
<td>FLEXI WET 200  10 to 200 ml/min</td>
</tr>
<tr>
<td>Heated Transfer line</td>
<td>Ambient to 100°C</td>
</tr>
</tbody>
</table>

### PERFORMANCE (HUMIDITY)

| Gas humidity               | Ambient to 50 °C  0% RH; 5-95% RH |
|                           | 50 to 70 °C  0% RH; 5-90% RH       |
| Humidity profile generation| Constant RH, steps, ramps           |
| Autonomy                  | > 1000 hours*                       |
| Accuracy                  | +/- 0.8% RH                          |
| Stability                 | +/- 0.3% RH                          |
| External RH probe         | Optional                              |

### GENERAL

<table>
<thead>
<tr>
<th>Size (W x D x H)</th>
<th>420 x 330 x 350 mm</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>16.5 x 20.9 x 13.8 inch</td>
</tr>
<tr>
<td>Weight</td>
<td>22 kg</td>
</tr>
<tr>
<td></td>
<td>49 lb</td>
</tr>
<tr>
<td>Power supply</td>
<td>110 / 230 V</td>
</tr>
<tr>
<td></td>
<td>50/60 Hz</td>
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*operations with dry gas: isolation of the saturator using an automatic valve switch, at 70°C, 90% RH and 20 ml/min

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**A convenient user interface,** allows for:
- Selecting temperature, humidity, and flowrate setpoints
- Programming temperature, relative humidity (RH), and flowrate profiles by sequences
- The RH sequences can be constant RH, RH steps, RH ramps

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**FLEXI WET is based on the simple principle of mixing a dry gas line and a wet gas line.** Each line is equipped with an electrovalve and a mass flow controller MFC.

**Both lines meet in a thermostated mixing chamber, equipped with a humidity probe.**

The temperature, relative humidity, and gas flow rates, are integrated in a PID control loop.

It adjusts continuously the mixed gas’ humidity to the setpoint.

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**The humidity probe is chosen for its great accuracy.** As an option, it can be calibrated and certified by a metrology institute.

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**FLEXI WET is provided with a heated line to transfer the mixed gas to the system’s inlet.** Heating helps provide a better RH control by avoiding water condensation during the transfer.

The transfer line is equipped with a standard 1/8 inch fitting for a fast and easy connection.
FLEXI BALANCE

HIGH ACCURACY HANG DOWN SYMMETRICAL BEAM BALANCE
With continuous sample mass variation measurement
Signal stability ideal to perform long term experiments
High loading capacity up to 100g with different models

EASY ADAPTATION AND INSTALLATION
Standard connection flanges, with possible customization to special furnaces, reactors, climate chambers or larger instruments.
Easy adaptation to gloveboxes.
Motorized balance lift available.

EASY TO USE
Software controlled from a PC or a laptop, data treatment software available. Possible on-request adaptation to other acquisition systems

FLEXI BALANCE uses a well proven technology based on an horizontal beam and an electro-optical equilibration system. Any sample mass variation is immediately detected, measured and compensated to keep the beam always perfectly horizontal.

The balance cover is tightly closed for operations under vacuum, but it is still easily removable.

Schematics of FLEXI BALANCE

Thin metallic or ceramic thread is suspended on this balance hook. The sample is hung on this thread, inside the user’s system (e.g. furnace, reactor or instrument). This technology offers the best interaction between the sample and the system’s atmosphere environment.

MODEL HIGH SENSITIVITY HIGH VERSATILITY HIGH CAPACITY FULLY SYMMETRICAL

<table>
<thead>
<tr>
<th>Technology</th>
<th>Sample + counterweights</th>
<th>Sample + reference sample</th>
</tr>
</thead>
<tbody>
<tr>
<td>Benefits</td>
<td>low drift and high precision</td>
<td>with AUTO TARE feature for increasing experimental flexibility</td>
</tr>
</tbody>
</table>

PERFORMANCE (HUMIDITY)

<table>
<thead>
<tr>
<th>Measuring range (mg)</th>
<th>Small</th>
<th>+/- 5</th>
<th>+/- 200</th>
<th>+/- 300</th>
<th>+/- 20</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Large</td>
<td>+/- 50</td>
<td>+/- 2 000</td>
<td>+/- 3 000</td>
<td>+/- 200</td>
</tr>
<tr>
<td>Maximum loading capacity (g)</td>
<td>35</td>
<td>35</td>
<td>100</td>
<td>35</td>
<td></td>
</tr>
<tr>
<td>Mass signal noise (µg)*</td>
<td>5</td>
<td>0.5</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mass signal accuracy (%)*</td>
<td>+/- 0.2°</td>
<td>+/- 0.4°</td>
<td>0.025°</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

GENERAL

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<thead>
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*a at room temperature, equilibrium conditions, \(^1\)based on a 5mg standard reference weight, \(^2\)based on a 40mg standard reference weight
REAL-TIME ANALYSIS OF GAS COMPOSITION AT HIGH PRESSURE

It uses a quadrupole mass spectrometer including:

• a proprietary gas dosing manifold for gas sampling from vacuum to 200 bar
• a standard gas flow mode for continuous gas sampling at atmospheric pressure

PLUG & PLAY, EASY SETTINGs

• can be connected to third party instruments, reactors or to climate chambers
• virtually avoids gas condensation before detection using a temperature controlled transfer line
• 6 modes available for enhanced control of scans and data

<table>
<thead>
<tr>
<th>EQUIPMENT</th>
<th>Residual Gas Analyzer</th>
<th>Quadrupole mass spectrometer</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Filament</td>
<td>Unique long life, dual thoriated</td>
</tr>
<tr>
<td></td>
<td>Detector</td>
<td>Faraday cup</td>
</tr>
<tr>
<td></td>
<td>Electron Multiplier</td>
<td>Optional state-of-the-art, multi-channel, continuous-dyne node electron multiplier (EM) for detection down to 1×10⁻¹⁴ mbar with increased longevity and stability</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>MODE OF OPERATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dose</td>
</tr>
<tr>
<td>Flow</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>PERFORMANCE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mass range</td>
</tr>
<tr>
<td>Resolution</td>
</tr>
<tr>
<td>Pressure range</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
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<tbody>
<tr>
<td>Size (W x D x H)</td>
</tr>
<tr>
<td>Weight</td>
</tr>
<tr>
<td>Gas supply</td>
</tr>
<tr>
<td>Power supply</td>
</tr>
</tbody>
</table>

Sophisticated software control of scan and data acquisition allows various scan modes and includes automatic gas identification based on stored spectra from a standard reference library.

Temperature control panel for three heating zones (transfer line, gas manifold, high vacuum zone)

Panel for selecting operation mode: Dose or Flow

Panel for pneumonic valves status display and control of the manual valve for the flow mode

Sophisticated software control of scan and data acquisition allows various scan modes and includes automatic gas identification based on stored spectra from a standard reference library.