Efficient Industrial Production & Superior Chemical Flexibility
HigH productivity
Accessing high production volumes in flow, Plantrix® allows the user to produce at the tonne-scale, for the execution of highly profitable processes.

HigH cHemical flexibility
Plantrix® reactors are made of EKasic® SiC, which makes the reactors suitable for both acidic and alkaline materials, allowing a wide range of processes to be executed including high exothermic reactions. The cost-optimized modular industrial reactor concept enables the free combination or exchange of mixer, residence and quench modules to tailor the system to the chemistry.

Less scale-up risk
Plantrix® completes an easy-to-scale product range extending from micro-structured laboratory equipment (Labtrix®) to meso-structured lab-scale production systems (KiloFlow®), allowing more predictable scale-up compared to batch.

Handling of solids
Using millimeter channel dimensions, Plantrix® tolerates the use of particles in the process streams up to 100 µm.

Increased safety
Safely control ‘extreme’ reaction conditions at the tonne-scale, within a small footprint system.

Environmentally friendly production
Accessing high yielding Flow Chemistry processes at the tonne-scale reduces the degree of downstream separation/purification steps required and reduces the consumption of raw materials and energy – enabling the development of sustainable processes.

* EKasic® is a registered trademark of ESK Ceramics GmbH & Co. KG.
EKASIC® SILICON CARBIDE MAKES THE DIFFERENCE

The material properties of EKasic® SiC exhibit superior performance regardless of the handled medium. This makes the Plantrix® Industrial Flow Reactor, with EKasic® SiC modules, the perfect device for multi-purpose chemical applications.

EKasic® SiC exhibits:
- Excellent chemical resistance against aggressive acids and alkalis
- Temperature resistance up to 1500 °C
- Thermal conductivity five times higher than stainless steel

Plantrix® is the best solution for a wide range of chemical processes including very challenging reactions such as:
- Fast, highly exothermic reactions
- Reactions with aggressive media
- Reactions employing unstable intermediates
- Hazardous reactions
Efficient Industrial Production & Superior Chemical Flexibility
The Plantrix® Industrial Flow Reactor comprises of EKasic® SiC modules housed within a SS frame. Connections with feed lines and service media are made using Swagelok fittings. The process fluids flow in meso-channels and are heated or cooled with integrated heat exchangers using a service media. The standard Plantrix® system comprises of two EKasic® modules, a mixer (MRX) and a residence time (MRH-I), affording access to $A + (B + C) = P_1$ type reactions. Upgrades are available to expand the number of modules employed to increase reaction times, system productivity or to enable the addition of a quench input.

Plantrix® is based on a modular reactor concept and can be delivered in varying reactor volumes ranging from 2.9 ml towards 5 litres per reactor system, with system volumes of 31.2 ml for the MR260 and 201.6 ml for the MR500 offered as a standard set-up. The different reactor modules can be installed within the holder by the customer on-site, enabling the system to be tailored to a specific process - with variations in terms of mixing time, residence time and quench possible. Separate add on modules are available and installation/de-installation of these modules can be readily performed by the Customer to expand or alter the configuration.

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**PLANTRIX® MODULE HOLDER**

The Plantrix® holder is a SS frame in which individual EKasic® SiC modules are stacked, enabling connections to the service media, process feed lines and product outlet to be made. The frame is fabricated from SS and the modules are clamped using tension bolts and disk springs. The holder can be equipped with a different number, and type, of modules depending on the reaction/process under investigation. The holder is user-configurable; giving long-term user flexibility.

The EKasic® SiC modules are connected in series within the holder by means of non-wetted PEEK plates that contain a PTFE/perfluoroelastomer flow guide (wetted) with a negligible volume. Perfluoroelastomer o-rings are used for sealing the process and service fluid guides – alternative o-ring materials can be considered on request.

**CUSTOMIZATION**

The Plantrix® configurations described, enable the user to select both the number and type of modules employed, flexibly tailoring the flow reactor to the process of interest. The unique holder construction also allows, with an upgrade, the use of two thermal zones. This enables, for example, mixing and residence time processes to be performed at independent temperatures.

Further to the standard Plantrix® modules offered, customized designs can be developed upon request.

**SPECIFICATIONS**

The Plantrix® Industrial Flow Reactor is available in two sizes, termed the MR260 (260 mm in height) and MR500 (500 mm in height) series. In each size, the standard Plantrix® systems are configured for an A + (B + C) = P1 reaction at a single temperature; the standard operating parameters for Plantrix® are summarized below.

<table>
<thead>
<tr>
<th>Specification</th>
<th>Plantrix® MR260</th>
<th>Plantrix® MR500</th>
</tr>
</thead>
<tbody>
<tr>
<td>Channel Dimensions (mm)</td>
<td>2.0 x 2.0</td>
<td>3.5 x 3.5</td>
</tr>
<tr>
<td>Temperature Range (°C)</td>
<td>-30 to 200</td>
<td>-30 to 200</td>
</tr>
<tr>
<td>ΔT (Service - Process) (°C)</td>
<td>&lt; 70</td>
<td>&lt; 70</td>
</tr>
<tr>
<td>Maximum Operating Pressure - Service Fluid (bar)</td>
<td>6</td>
<td>6</td>
</tr>
<tr>
<td>Maximum Operating Pressure - Process Fluid (bar)</td>
<td>25 (&lt; 100 °C)</td>
<td>25 (&lt; 100 °C)</td>
</tr>
<tr>
<td></td>
<td>16 (≤ 200 °C)</td>
<td>16 (≤ 200 °C)</td>
</tr>
<tr>
<td>Module Dimensions (mm)</td>
<td>110 x 260</td>
<td>200 x 500</td>
</tr>
</tbody>
</table>

Due to its volume and maximum operating pressure, Plantrix® is classified to category ‘Article 3 Paragraph 3’ of the Pressure Equipment Directive. Its design has been verified according to the Pressure Equipment Directive and the AD Standard – AD 2000 datasheets and certified by the German TüV. The device complies with sound engineering practices and is supplied with a manufacturer’s declaration and a declaration of conformity.