

## INTRODUCTION

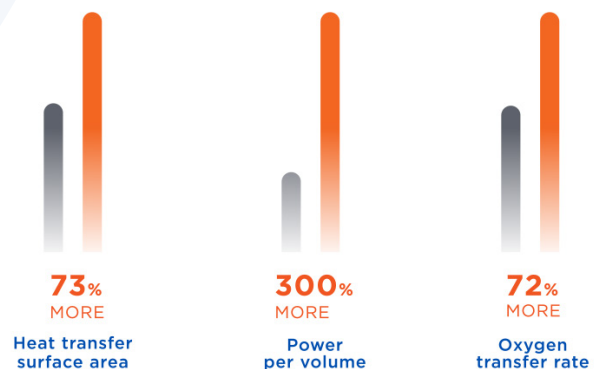
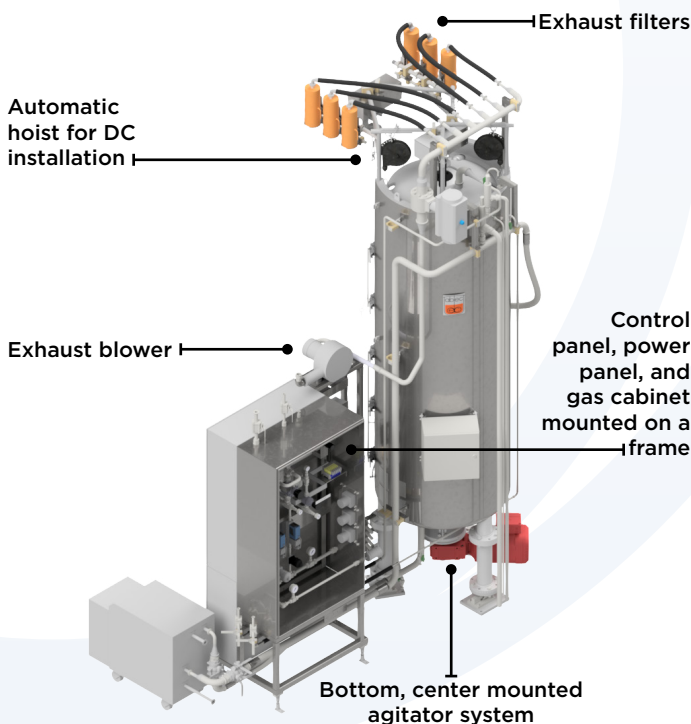
ABEC's Custom Single Run (CSR) single-use Fermenters and Disposable Containers (DC) set an industry benchmark in productivity with superior performance, resulting in customer benefits such as cost, flexibility, and time-to-market. CSR Fermenter design overcomes the demands of microbial processing in single-use by leveraging ABEC's long history of stainless steel reactor design, maximizing heat transfer surface area, and customizing the system. The ABEC CSR Fermenter can uniquely support high oxygen transfer rates (OTR) similar to stainless steel systems due to superior power input and gas handling. This capability paired with the industry's largest single use microbial production, enables ABEC CSR Fermenters to successfully scale and transfer processes in single use starting at 25L up to 1,000L working volumes.

## BENEFIT

- Highest productivity/yield
- Seamless technology transfer and scalability
- Lowest COGS
- Lowest supply chain risk

## UNIQUE FEATURES

- Customizable sizes and the only available commercial-scale production volumes in single use
- Maximum heat transfer surface area
- Strategic exhaust design
- Highly customizable system and DC to suit process and facility needs
- Global, in-house manufacturing of all equipment and consumables
- Efficient Disposable Container (DC) loading and unloading
- Temperature control option via dimpled jacket
- Stainless baffles welded to sidewalls of CSR holder
- Non-proprietary control system options
- Transparent supply chain with multiple Qualified Suppliers



Superior performance compared to others in the industry

## Typical Specifications

ABEC's CSR systems are customizable to meet specific process and operational requirements. Typical design elements and specification ranges are shown.

<b>Working Volumes</b>	Customizable: 25L up to 1,000L
<b>Turndown Ratios</b>	Customizable
<b>Agitator Mounting</b>	Bottom Center
<b>Agitator Motor Coupling</b>	Mechanical
<b>Agitator Seal</b>	Mechanical/SiC
<b>No. Baffles</b>	Up to 4
<b>Gassing</b>	Up to 2 VVM
<b>Impeller Type</b>	Customizable: Radial flow (Rushton) and/or axial flow (Hydrofoil or Marine) impellers
<b>Tip Speed</b>	Up to 5.0 m/s (980 ft/min)
<b>Spargers</b>	Customizable: Ring Type: 0.5 to 3.2 mm
<b>Performance @ 1,000L Vw</b>	OTR > 350 mmol L <sup>-1</sup> h <sup>-1</sup>
<b>Disposable Container (DC) Materials of Construction</b>	Film: RENOLIT SOLMED Infuflex 9101 Multilayer LDPE/EVOH Impellers: HDPE Seal Housing, Shaft Coupling: LDPE Agitator Shaft: 316L SS
<b>Process Controls</b>	Customizable: Open architecture via Emerson, Rockwell, or Siemens hardware and software
<b>Process Monitoring</b>	Customizable: Single use or traditional sensor technology pH, DO, antifoam (non-invasive), pCO <sub>2</sub> , optical density, conductivity



50L, 300L & 1,000L Vw CSR Fermenter train

CSR Rushton impellers offer reliable performance and maximize system power input