

Stirrer Options

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Turbine Type Impellers

Parr reactors are usually equipped with turbine type impellers which produce an excellent mixing action over the range of stirring speeds at which these reactors typically operate. These impellers are made in four- blade and six-blade styles, with the smaller four-blade impellers used only on Micro and Mini Reactors. These impellers, for reactors with 300 mL volume or greater, may be positioned anywhere on the stirring shaft, with one impeller usually located near the bottom of the vessel to keep solids up in suspension and a second impeller positioned near the base of the vortex to pull reactant gases down into the liquid phase. These impellers generally provide excellent mixing for systems with effective viscosities up to approximately 25,000 centipoise with a 16 in-lb magnetic drive or up to 50,000 cP with 60 in-lb magnetic drive.

Anchor Stirrers

Anchor stirrers are available in several configurations for use with moderate to high viscosity materials. This type of stirrer usually works best in vessels with an inside depth to diameter ratio of 1.5 to 1 or less. They are intended to operate at relatively slow speeds and generally require a heavy duty drive system capable of generating and delivering sufficient torque to the agitator. Footless magnetic drives work well with anchor or spiral stirrers. Three basic types are offered:

1. A U-shaped, flat bar anchor.
2. A flat blade, paddle type anchor.
3. A two-arm or three-arm, self centering anchor with PTFE wiper blades.

All of these designs may not be appropriate or available for each reactor size. Please contact the Parr Technical Service Department for assistance in selecting an anchor stirrer suitable for the intended operating volume and viscosities.

Spiral Stirrers

Spiral stirrers can be installed in any 1 liter, 2 liter or 1 gallon reactor to produce a positive down thrust or upward thrust action when working with viscous polymers or other high viscosity mixtures. They work best in floor stand reactors with adjustable speed, heavy duty drive systems. Either left-hand (down thrust) or right hand (upward thrust) spirals are available. The down thrust spiral is generally preferred for heavy suspensions.

Gas Entrainment Impellers

Parr offers a new series of gas entrainment impellers for users who want to obtain maximum gas dispersion into a liquid system. This is obtained with a unique impeller attached to a hollow stirring shaft through which gases are continuously recirculated from the head space above the liquid thru the impeller into the liquid phase. As with all impellers, the speed of the stirrer creates a vacuum at the tip of the impeller. Gas enters openings near the top of the shaft and is pulled through dispersion ports located at the tips of the impellers. In the Parr system with dispersion ports located at the very tips of the impellers, the higher the stirring speed – the higher the vacuum – and the higher the driving force for this very effective gas dispersion system. These impellers are offered as a complete package which includes the impeller, the hollow shaft with coupling, and any required foot bearings and brackets for the intended reaction. The baffles are a separate option which must be ordered individually. Since these gas entrainment impellers operate best in the 1000 - 1200 rpm range, users will want to ensure that their stirrer drive system is set up to deliver these operating speeds, alternate pulleys and belts are available to convert existing reactor systems.

Baffles

Because it is the relative speed of the tip of the impeller to the liquid phase that governs the mass transfer, baffles, which impede the rotation of the liquid with the impeller, can greatly enhance the operation of these gas entrainment impellers. While some natural baffling is provided by the internal thermowell, dip tube and cooling coils, the removable baffles listed in the table are recommended for use with these gas entrainment impellers. These baffles may also be beneficial with the more traditional turbine type impellers for certain applications.



Paddle Type
Impeller

Anchor Stirrer

Anchor Type
Impeller with
Wiper Blades



Gas
Entrainment
Impeller

Turbine Type
Impeller

Spiral Agitator

