Hydrogenation Reactor Pressure Control

Stability in demanding conditions





Equilibar back pressure regulators are ideal to control reactor pressure due to their high precision, wide flow range, and two-phase flow capability.

Hydrogenation is a chemical reaction between a compound and hydrogen.

In the fine chemicals industry, hydrogenation is commonly performed in a fixed-bed catalytic reactor. An unsaturated hydrocarbon, such as an alkene or alkyne, is reduced in the presence of hydrogen to form a saturated (or more saturated) hydrocarbon.

These reactions are often performed at elevated temperature and pressure to increase the density of the hydrogen and increase the rate of reaction. The control of reactor pressure is often critical, and can be difficult due to aggressive chemicals, high temperature and pressure, and the presence of mixed phase reactants.

The Equilibar® back pressure regulator is a dome-loaded back pressure regulator which excels in demanding applications such as reactor pressure control.

In the schematic shown to the right, unsaturated hydrocarbon is injected via a liquid control valve.Hydrogen gas is injected into the reactor using aMass Flow Controller (MFC). A fixed bedheterogeneous catalysis reactor accelerates the hydrogenation process.

The Equilibar back pressure regulator controls thereactor pressure accurately through either manualor computer control. In the schematic, amanual pilot regulator controls nitrogen Pressureto apply the 1:1 set-point to the BPR.

For computer automation applications, ahigh pressure Electronicpressure regulator wouldcommand the nitrogen pressure to control the hydrogenation process precisely according to the programmed cycle steps.

