

Delphi Electronic Gasoline Exhaust Gas Recirculation Valves

Delphi Electronic Gasoline Exhaust Gas Recirculation (EGR) Valves re-circulate metered amounts of exhaust gas into the engine's intake system to help limit the formation of nitrogen oxide (NO_x) emissions. Delphi offers a family of gasoline EGR valves featuring pintle/seat configuration and based on a proven electronically actuated gasoline exhaust gas recirculation valve technology.

Delphi Electronic Gasoline Exhaust Gas Recirculation Valves are available with solenoid, torque motor, or direct current (DC) motor actuators to help meet individual customer requirements for force, response, cost and leak.

Delphi also offers an EGR valve that can help manufacturers reduce NO_x emissions in gasoline direct injection (GDI) spray stratified engine programs. Due to their lean burn operation, these engines typically generate more NO_x. Delphi developed an EGR valve for the industry's first GDI spray stratified application, which is now in production.

► Benefits

- Robust valve design provides carbon resistance, durability and long life, high quality and engine control module controllability.
- High opening and closing force actuators minimize impact of corrosion and help provide high quality, durability and long life. They have ECM-compatible drivers. Delphi offers a range of actuators to meet customer application requirements.
- Pintle position sensor includes a resistive strip for improved durability and improved resistance to moisture intrusion for linear solenoid actuator models.
- Non-contacted pintle position sensor (Hall Sensor) is available for torque motor actuator models.
- Bushing system achieves extremely low external leak for shaft bushing type systems.
- Shield and bushing system provides reduced hysteresis and better position/flow controllability. It also reduces variation in EGR delivery to help reduce emissions.
- Fast valve opening and closing response time enhances engine control module controllability and helps lower emissions as a result of the reduction in exhaust gas lag time.
- Low internal and external leak designs help improve engine performance and lower emissions.
- Stainless steel valves and components provide robust performance and resistance to corrosion, high temperatures and wear.
- Modular valves offer design flexibility to meet a full range of customer requirements.



Delphi Dual Torque Motor EGR for GDI Spray Stratified Engines



Delphi Linear EGR-1 Valve

▶ **Typical Applications**

Delphi Electronic Gasoline Exhaust Gas Recirculation Valves are designed for all gasoline engines to help manufacturers meet exhaust emissions requirements and fuel economy mandates in North America, Europe and Asia. Delphi's high power and small package High Value Linear EGR Valve is ready for customer requirements for higher flow rate and restricted package applications.

▶ **Performance Advantages**

Delphi Electronic Gasoline Exhaust Gas Recirculation Valves feature a robust design that helps to inhibit carbon contamination (coking), which can adversely affect pintle operation. Fast open and close response times help customers meet controllability requirements, while low internal and external leak performance helps minimize exhaust emissions and enables precise engine calibration, all in an efficient and cost-effective package.

Delphi recognizes that one of the most effective ways to reduce NO_x output in a gasoline engine is to lower cylinder temperatures. This can be accomplished very effectively by limiting the amount of oxygen in the combustion chamber. Thus, Delphi's EGR valves re-circulate controlled amounts of inert gases into the intake system where they mix with incoming air. The result is to help lower the combustion temperature below the level at which NO_x is formed.

The amount of re-circulated gas in the combustion chamber is dependent on operating conditions, but Delphi's continuously variable EGR valves allow:

- High EGR flow for cruising and mid-range operation
- Low EGR flow for low speed and light load conditions
- No EGR flow during engine warm-up, idle, and wide-open throttle

Delphi can support a wide variety of gasoline EGR program requirements globally through engineering facilities in Rochester, NY, USA; Bascharge, Luxembourg; and Daegu, Korea.



Delphi Linear EGR-2 Valve



Delphi High Value Linear EGR Valve

▶ The Delphi Advantage

Delphi has partnered with Korea Delphi Automotive Systems Corporation (KDAC) to strengthen its design and development capabilities for future gasoline EGR valves and to increase its global engineering resources.

As a global leader in engine management systems technology, Delphi can help manufacturers around the world meet engine emissions requirements, improve fuel economy and enhance performance. Delphi is a source for high value solutions and our expertise is built into every product. Delphi's flexible engineering approach encourages collaboration. And, Delphi has a thorough understanding of markets around the world and a global network of resources.