FUEL DISPENSING AND VAPOUR RECOVERY VALVES

APPLICATIONS FOR FUEL DISPENSING SYSTEMS

To propel a vehicle, a combustible compound is needed. ASCO Numatics is well known as solenoid valve supplier for the dispensers as the combustible compound is:

- Petrol
- Diesel (including vapour recovery)
- Liquefied Petroleum Gas (LPG)
- Compressed Natural Gas (CNG)

With its wide range of solenoid valves, ASCO Numatics is the market leader in fuel dispensing and vapour recovery technology. Working with leading fuel pump manufacturers, ASCO Numatics has assisted in making fuel dispensing the precise operation it is today.

As fuel pump sizes have reduced over the years ASCO Numatics has reduced the size of its valves too.

The development of small encapsulated coils has made the use of large enclosures redundant and reduced costs for pump manufacturers.

Petrol Dispensing Operations

Self Service
For this form of vending ASCO Numatics manufactures Single Stage Solenoid Valves.

Prepaid & Credit Card
For this form of vending ASCO Numatics manufactures Dual Stage Valves with high and low flows.

Blending
For this form of vending ASCO Numatics manufactures Proportional Valves.

In both applications the fuels are stored in pressurised tanks and this has led to the development of an innovative three stage delivery system for LNG applications, and the introduction of the new high pressure valve for CNG applications.

Liquefied Petroleum Gas (LPG)
Also called GPL, LP Gas, or auto gas, is a mixture of hydrocarbon gases used as a fuel in heating appliances and vehicles, and increasingly replacing chlorofluorocarbons as an aerosol propellant and a refrigerant to reduce damage to the ozone layer.

When natural gas is cooled to a temperature of approximately -260° Celsius at atmospheric pressure it condenses to a liquid called Liquefied Natural Gas (LNG). One volume of this liquid takes up about 1/600th the volume of natural gas at a stove burner tip. LNG weighs less than one-half that of water.

LNG is odourless, colourless, noncorrosive, and nontoxic. When vaporized it burns only in concentrations of 5% to 15% when mixed with air. Neither LNG, nor its vapor, can explode in an unconfined environment. A storage cylinder is charged with liquid petroleum gas at high pressure. This is then dispensed at a lower pressure into the vehicle.

ASCO Numatics on/off valves are used at several stages during this process.

Compressed Natural Gas (CNG)
Is a fossil fuel substitute for gasoline (petrol), diesel, or propane fuel. Although its combustion does produce greenhouse gases, it is a more environmentally clean alternative to those fuels, and it is much safer than other fuels in the event of a spill (natural gas is lighter than air, and disperses quickly when released).

Gas from the distribution pipeline is compressed into a cascade storage system. Pressure in the cascade storage is higher than that in the vehicle’s storage.

Typical cascade storage is: 220 bar and vehicle storage 200 bar. In order to make the utilization of the compressor and storage more efficient, fast fill CNG stations usually operate in a three stage cascade storage system.

ASCO Numatics has introduced a compact high pressure solenoid valve to cope with the rigorous demands of Compressed Natural Gas (CNG) dispensing applications.

Available in 3/8” (8 mm) and 1/2” (12 mm) sizes, the rugged valve can handle pressures up to 350 bar. They can be used to open and close the supply from storage tanks on single and multi-bank dispensers. The new CNG dispensing valves can be provided with numerous explosion proof solenoid operators for use in Zone 1/21 - 2/22 according to ATEX 94/9/EC.

Enclosures according to NEMA are also available.
Vapour Recovery

Petrol contains volatile organic compounds (VOCs), which evaporate inside the fuel tank of a vehicle and fill the air space above the liquid fuel. When a vehicle is refuelled, these vapours are forced out from the fuel tank by the incoming fuel and, unless controlled, escape into the atmosphere through the filler neck of the fuel tank. Almost 5% is released into the environment, which may affect the human health.

ASCO Numatics has developed solenoid valves that recover these harmful vapour emissions from the storage tank or from the vending pump while filling the vehicle.

The ‘Stage I’ vapour recovery has been in place for a number of years at storage terminals and at filling stations, to recover vapours that would normally escape into the atmosphere during the filling of storage tanks.

The European Parliament has adopted at first reading, on 5th May 2009, the proposal for a Directive on ‘Stage II’ Petrol Vapour Recovery during refuelling of passenger cars at service stations. The new Directive will require the installation of Stage II petrol vapour recovery systems. See figure 1.

Stage II controls will capture the majority of the emissions emitted from vehicle refuelling at petrol at filling stations.

Vapour recovery can be divided into:

1. **Volumetric Displacement** (no valve required)
   (As fuel is pumped into the vehicle, the volumetric displacement draws the vapours from the vehicle into the storage tank)

2. **Variable Speed Vacuum Pump** and a 2 way on/off valve
   (As fuel is pumped into the vehicle, the valve opens and the vacuum pump starts. The vacuum pump and the fuel are kept at the same flow rate to draw vapours from the car into the storage tank - active system)

3. **Constant Speed Vacuum** and a proportional valve
   (As fuel is pumped into the vehicle, the valve opens to allow vapours to be drawn from the vehicle to the tank. The vacuum pump runs at constant speed and the proportional valve opens and closes to match the flow of fuel.)