AccuStar

Fluid Level Sensors

DESCRIPTION

Engineering Principle

Major components of the AccuStar Fluid Level Sensor are the housing, float, springs, a samarium cobalt magnet, and the Hall Effect sensor. The springs attach the float to the outside housing through three helical leaves. The spring rate of the helical springs is relatively low in an axial direction. However, they are very stiff in a radial direction. This prevents the float from making contact with the outside housing.

Another unique feature of the design is the capability to calibrate the sensor to best meet the operating parameters of each application. Calibrations include trimming the strength of the magnet to provide the correct output for the specific fluid level conditions being measured. With the addition of selected resistors on the printed circuit board we are also able to calibrate for mechanical tolerances, buoyancy of the float, and tolerances associated with the Hall Effect device. Gain and null adjusts on the chip itself enable us to further trim and customize the sensor to your application.

How It Works

The heart of the sensor is a uniquely suspended float element whose buoyancy causes slight relative motion. This small movement of the magnet-topped float, in relationship to a Hall Effect device, provides a definitive indication of fluid level with exceptional repeatability.

The electronics (Hall Effect) are mounted in the top of the housing, approximately 0.150" from the cobalt magnet, which is secured to the top of the float. The float is suspended within the mounting tube by a pair of springs, top and bottom. The springs, which are rigid radially, but relatively flexible longitudinally, position the float and allow smooth movement without the usual stiction, hysteresis, and wear associated with conventional float sensors. (The AccuStar Fluid Level Sensor can be adapted to a wide range of measurement requirements by changing the spring constants and lengthening the float and mounting tube.)

Fluid enters through a series of intake holes in the bottom of the sensor. The hole diameters are sized smaller than the float to housing clearance so that the largest foreign particles to enter the sensor will not jam the float or cause "stiction." Slots near the top of the sensor allow air to escape as fluid rises. The slots are positioned so as to maintain an air bubble around the magnet at the maximum stroke distance of the float. This is an added security measure to prevent any magnetic particles present in the fluid from contaminating the magnet.

As fluid enters the bottom of the sensor the float moves axially toward the Hall Effect device. The result is an output signal proportional to the fluid level. The DC voltage output is about 1 volt at empty and 4 volts at full. Throughout this range, the relative motion of the float is just 0.070" in either direction.

FEATURES

- ✦ Electronic Device Provides a Definitive Indication of Fluid Level
- ✦ Accurately Measures Fluid Levels Under Static and Dynamic Conditions
- ✦ Measures Fluid Density, Therefore, Fluid May Be Either Hot or Cold. Eliminates the Need for Temperature Compensation in Order to Get an Accurate Level Reading
- ✦ Will operate at temperatures of 150°C (302°F)
- ✦ Replaces Less Capable Thermistors and Reed Switches
- ✦ Patented Design. Simple, Rugged, and Reliable!
- ✦ Cost Effective. Can Save Thousands In Premature Repair Costs Resulting From Operating at Low Oil Levels.
- ✦ Easily Customized to Fit into a Wide Range of Application Possibilities

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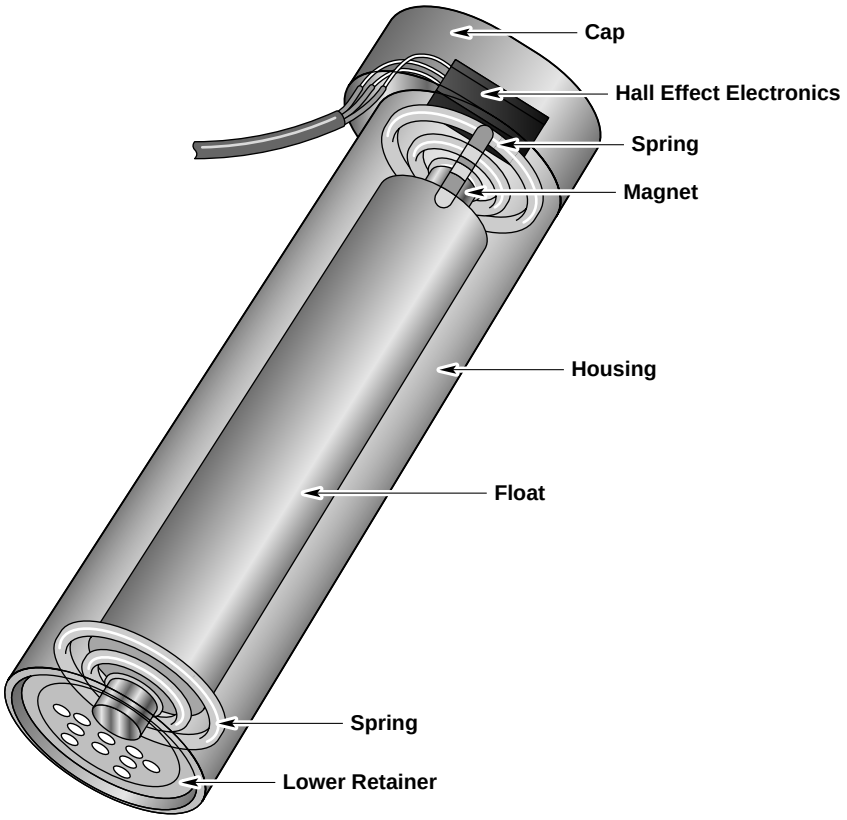
APPLICATIONS

- Truck, Automotive, Marine, and Off-Highway Vehicles Engines
- Transmissions
- Industrial Speed Reducers
- Hydraulic Reservoirs
- Air Compressors
- Turbine Engines
- Generators

BENEFITS

- Prevent damage to vehicles/equipment caused by low fluid levels. Automatic shutdown or reduced vehicle/equipment capability could be accomplished through a control system using the output from the AccuStar Fluid Level Sensor (limit rpm, allowed transmission ranges, hydraulic pressures, etc.)
- Fluid levels can be monitored and stored in memory and retrieved at a later date to provide information useful in developing fluid level consumption. This information could also be used in determining warranty coverage on equipment or machinery.
- Reduced time required to check the fluid levels of vehicles.

diagram



specifications

Repeatability	±3 mm
Output	Ratiometric analog
Power	5 VDC
Operating Temperature	150°C (302°F) Excursions to 165°C (329°F)
Case	Liquid crystal polymer
Size	Model shown here 4.5" length, 1.125" dia. (Adaptable to your application requirements.)

ordering information

Consult factory for your particular application.