



Ferrofluid-Tiltensor

Graef-Elektronik

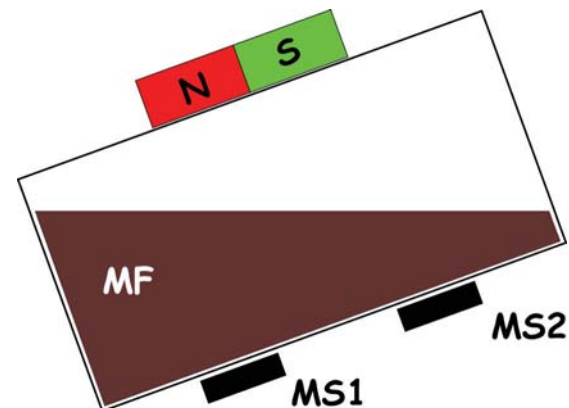
Ing.-Büro für Messtechnik



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BACKGROUND and BASICS

- Here is the solution for replacement of hazardous mercury tilt switches which are already prohibited by the european RoHS-directive!
- A easy and wearfree measurement of tilt or acceleration is now possible with this new sensor assembly. In contrast to MEMS only standard microsystem technology is sufficient for custom OEM sensor cells - even in smaller production runs.
- Markets include safety equipment for mobile machines (e.g. cranes, fork lift trucks and lift platforms) as well as simple detectors for automotive body control.



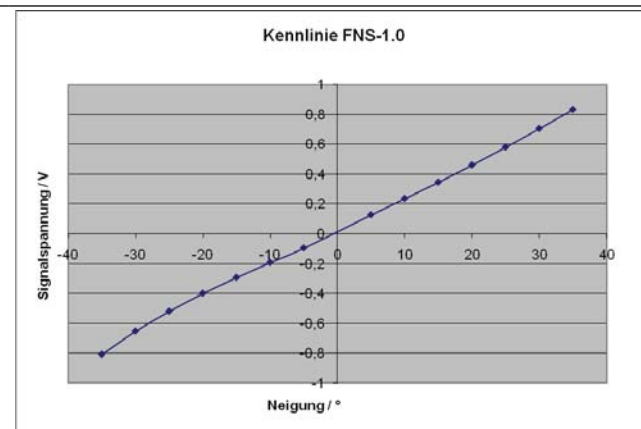
CONCEPT and SOLUTION

- A hermetically sealed cavity is filled with a magnetic fluid MF (e.g. Ferrofluid TM, Ferrotec). A magnet above or underneath the cavity produces a weak magnetic field which is symmetrical if the assembly is in its horizontal zero position. Two magnetic sensor chips MS1, MS2 (based on usual magnetoresistive or hall-effect technology) detect the same field strength, so the difference of their signals is zero.
- When the assembly is tilted off zero, the magnetic fluid still follows the gravity. The magnetic field is 'bend' towards the fluid, thus it becomes unsymmetrical referred to the assembly. The signals of the two magnetic sensor chips are now different and a measure of the tilt angle.



STATUS and OUTLOOK

- The sensor principle was successfully demonstrated with a working samples. Its characteristic curve and temperature drift were already evaluated.
- A patent for this technology (DE 102006007900B49) was granted early in 2008. Some further development is planned to go towards a smaller ceramic hybrid circuit concept and the possibility to use non-electrical reedswitches as sensor elements.
- We are looking for a licencing partner who has the readiness to continue R&D and set-up production.



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