A117

Inductive sensors
induSENSOR


Hydraulic cylinder

Active suspension cylinder

Modern, mobile cranes are always employed when heavy loads must be lifted quickly and at various locations. They are used, for example, in the recovery of broken-down trucks. The field of operation is not restricted to metalled roads, but also includes deployment in open terrain. Therefore, these cranes possess an adaptive design of running gear in which the suspension of each independent axle can be adapted to the relevant terrain. This is implemented using a suspension cylinder which is fitted with a displacement sensor. The sensor acquires the cylinder stroke and consequently enables the best possible adaptation to the form of the terrain. The active closed-loop control is especially important when the vehicle moves from the rough terrain back onto the road. The axles must then be adjusted to the flat road by moving all the cylinders to their normal positions. For this, the exact displacement measure- ment of the hydraulic cylinders is decisive. Especially for this application, Micro-Epsilon has developed a displacement sensor which is integrated into the cylinder and directly acquires the piston position. Of course, the sensors must be designed for the high peak pressures in the cylinder. Due to the installation in the cylinder, the sensor is however protected against external damage. A compact design is especially important, since the installed length of the cylinder is specified and an extension just for displacement measurement would not be accepted. The sensor itself operates according to the eddycurrent loss principle i.e. eddy currents are induced in an aluminum tube embedded in the piston. Since no mechanical contact takes place between the sensor and the piston, the sensor is completely wear-free and therefore needs no maintenance. The integrated electronic system converts the displacement signal into an electrical signal which is used by the controller for closed-loop control. The measurement principle does not require any magnet, so the risk of collecting metal swarf is eliminated. It has been possible through successive optimisation to offer high quality sensors in large quantity at low prices, so that a broad application in hydraulic cylinders has become possible.

Requirements for the measurement system

- Measuring range: 220mm and 260mm
- Linearity: typical ±0.5% FSO
- Resolution: 0.1mm
- Dynamics: 150Hz (-3dB)
- Temperature range: -40...+85°C
- Temperature stability: < ±0.02%/K FSO
- Medium: hydraulic oil to 450bar
- Protection class: IP67

Advantages

- Short sensor design, but with a large measurement range
- Pressure-proof, rugged sensor for integration
- Non-contact measurement principle without magnet


Sensor and aluminum tube


Example of mounting in a hydraulic cylinder

Micro-Epsilon Messtechnik GmbH & Co. KG A member of micro-epsilon group

Tel. +49 8542/168-0 | www.micro-epsilon.com | info@micro-epsilon.com | Modifications reserved / 9781117-A021056GKE