

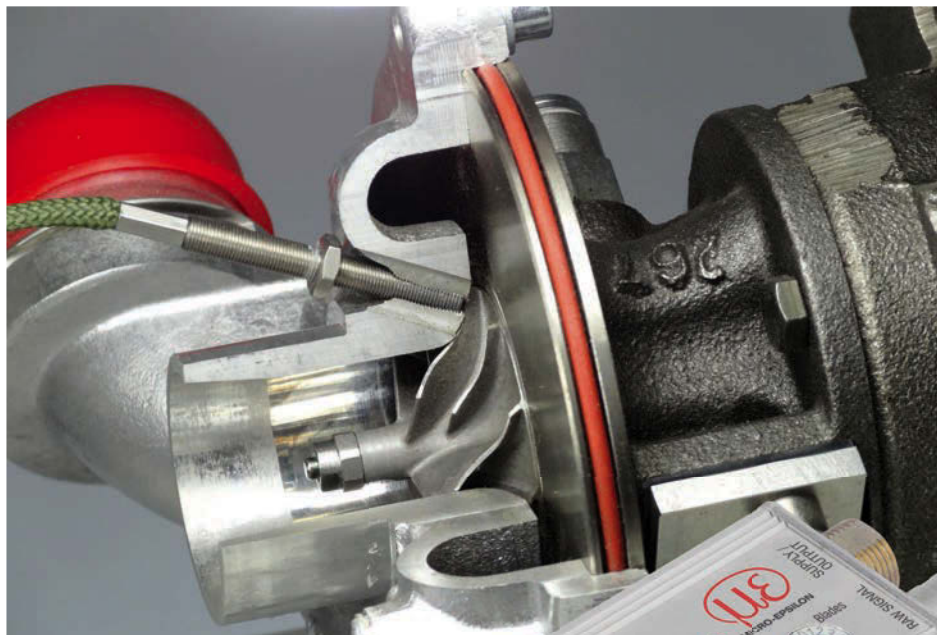
Speed measurement

A NEW GENERATION OF TURBOCHARGER ROTATION SPEED SENSORS FOR TEST-CELL AND ON-VEHICLE TESTING ENABLES MORE PRECISE MEASUREMENTS ON TURBOCHARGER BLADES MADE FROM TITANIUM OR ALUMINUM

The turboSPEED DZ140 speed sensor is the fourth and latest generation of revolution-counting sensors for turbochargers manufactured by Micro-Epsilon. The high-tech measuring system reaches maximum interference immunity in harsh test bench conditions and in road tests. The built-in temperature measurement also offers the opportunity for a true ambient temperature measurement of the sensor, while a new electronic circuit boosts signal levels from the sensor and also dramatically improves circuit shielding to give the sensor EMC levels of immunity that are several factors higher than existing devices in the marketplace.

The system has been designed to replace the sensor mounted in the turbo housing without having to recalibrate the system electronics. Like its predecessor, the turboSPEED DZ136, the turboSPEED DZ140 eddy-current measurement system is immune to the effects of oil, dirt and carbon particles that can be found in the engine, and which affect the measurement output quality of other measurement principles, particularly capacitive and optical measurement technologies.

The turboSPEED DZ140 speed sensor uses the eddy-current measuring principle, which is used in applications measuring electrically conducting materials that may have ferromagnetic or non-ferromagnetic properties. A coil is potted in a sensor case and energized by a high-frequency alternating current. The electromagnetic field from the coil generates eddy currents in the turbocharger blade, while every blade generates a pulse. The controller identifies the speed (analog 0-5V) by considering the number of blades. The turboSPEED DZ140 works with speed ranges from 200rpm through to 400,000rpm. The eddy-current technique is highly suitable for miniaturization, so the miniature sensor design (3mm diameter) simplifies the mounting on the turbocharger unit.



The sensor system (right) for counting turbocharger revolutions has been optimized for thin blades made from thin aluminum or titanium on the turbine wheel (above)

The turboSPEED DZ140 works with distance targets of up to 2.2mm. The blade material (aluminum or titan) can be set up in the sensor and no modification of the compressor wheel is required. The sensor has a status LED and can be operated from outside without opening the controller housing, so that the sensor adjustment and setup can be made easily. All the settings are made at the front end of the controller. The number of blades, the sensitivity and the speed range are all selected at the front end of the controller. While positioning the sensor, LEDs on the controller help by showing the distance to the measuring object, preventing incorrect sensor positioning. The high operating temperature of the sensor, up to 285°C, enables a wide application field in motor development and testing, such as test bench operation and road tests.



Micro-Epsilon has been developing non-contact displacement measurement and infrared temperature sensors for automotive and motorsport applications for 45 years. These sensors are used in almost every conceivable area of a vehicle, as well as for R&D, test cells, production and for on-vehicle testing. Applications range from measuring the wear on brake discs and clutches through to measuring turbocharger speeds, engine piston displacement, valve lift and ride height, as well as monitoring the temperature profile of tires. ○