Laser Tachometer 2

The laser tachometer is a non-contact instrument allowing users to measure the angular velocity of a rotating component whose surface is fitted with a striped target consisting of alternate white and black sectors. Analogous to the scanning of a toothed wheel with a magnetic sensor, the electronic unit outputs a TTL pulse train whose frequency is proportional to the angular velocity of the striped target. Use of visible light allows the user to easily aim the red-coloured beam spot onto the target. The electronic unit contains a signal processor which continuously monitors the received light and adapts to various degrees of target reflectivity. Different operating modes are available depending on the measurement task at hand.

Operating Principle

The complete tachometer system consists of an electronic unit and a passive sensing head connected via two, optically-coupled, fibre optic cables. The electronic unit contains a power-regulated emitter diode with 650 nm wavelength. The output power at the sensor head is < 1 mW. Laser light is fed to the optical head by the fibre optic cable. It is then collimated by the transmitting optics and directed at the target. A portion of the light reflected by the target is collected by the optical head‘s receiver system. This light is fed back to the electronic unit‘s receiving diode via the fibre optic cable, where the control circuit compensates for varying sensing distances and degrees of surface reflection.

A signal processor in the receiving electronics continuously measures the change in reflectivity from dark to bright areas of the target. These results are shown on the array of “Signal“ LEDs and serve internally for dynamic adjustment of the receiving circuit. When “Bright Sector“ and “Dark Sector“ are indicated by the LEDs, the receiving electronics are able to process the light received and error-free measurement is possible.

There are two operating modes. Using the “Select“ switch either continuous readjustment of the receiving circuit (“Dynamic“) or selection of a fixed parameter set (“Static“) may be set.

The “Status“ LED array indicates the chosen mode of the electronic unit. A learning mode can be employed to create a so-called parameter set. The parameters and the operating mode may then be saved in flash memory. The advantages of using parameter sets are twofold: phase errors may be avoided and signal ‘spikes‘ during start-up may be eliminated.

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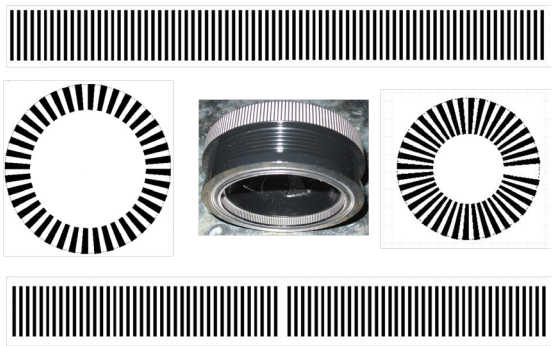
The two lower LEDs (“Sensor“) indicate the input bright / dark transition rate.
As with all rotec sensors, power requirement is provided by the ROTEC system via the standard 8-pin cable.
The laser device has a highly bundled light intensity. Users should thus apply precaution to avoid health damage.

Sensor Cable
The sensor cable is completely enclosed by a steel tube, the optical head has a covering flange for protective reasons. Attachment of the sensor head is done with an M10x1 outer thread with a length of 10 mm.
The maximum opening angle of the sensor optics is 12.5 mrad. This results in a laser dot of 1 mm diameter at a distance of 80 mm between laser head and target.
Example: A disc the size of a CD can be fitted with a structure of 450 bars when the laser head is set at a distance of 20 mm to the disc.



Technical Specifications

- class 2 laser device
- wave length: 650 ± 10 nm
- laser power: < 1 mW
- target frequency range in static mode:
  0 Hz to 40 kHz
- output signal:
  - square wave TTL
  - puls width 180 ns
- target line width:
  1 mm at 80 mm target distance
- length of sensor cable: 5 m
- min. line width under optimal conditions:
  0.15 mm (equal to 0.3 mm period)
- accessories (optional):
  - M14 thread adapter
  - attachment with 90° mirror

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