Fiber-optic sensors and cables

Fiber-optic sensors and fiber-optic cables for a wide range of applications

FL 70

from Page 489

- *High-end fiber-optic sensor with 4-digit display*
- *Cuboid housing for DIN-rail mounting*
- *PNP, NPN or analogue output options*
- *Communication prevents mutual interference*

FMS 18 / FMS 30

from Page 495

- *Fiber-optic sensors in robust full-metal housings for harsh operating conditions*
- *Large selection of robust fiber-optic cables*
- *PNP, NPN or analogue output options*

Fiber-optic cables – standard

from Page 505

- *Wide range of photoelectric sensor and diffuse sensor variants*
- *Fiber-optic cables with lateral light exit for restricted spaces*
- *Diffuse sensors and photoelectric through-beam sensors with long ranges*
- *Robust fiber and sheath materials for harsh operating conditions*

Fiber-optic cables – focused optics

from Page 533

- *Precise, small light spot for small-part detection*
- *Adjustable scanning distance and light spot size*

Fiber-optic cable systems from SensoPart are the solution when installation space is restricted or operating conditions are hot or dirty. Robust sheath and fiber materials in the fiber-optic cable also offer excellent protection against aggressive chemicals. The sensors are protected in a switching cabinet or at a safe distance, while the fiber-optic cable heads are mounted in the immediate vicinity of the target objects. The large selection of different cable heads opens up numerous application possibilities for our customers as well as providing a high level of flexibility regarding mounting.

Some fiber-optic cable systems from SensoPart cover the same applications as conventional optical sensors. Depending on the customer's application, they are available as photoelectric sensors or diffuse sensors. Whereby the powerful fiber-optic sensors ensure high levels of functionality and reliability.

High flexibility and low weight on the gripper of a robot, aggressive detergents in the pharmaceutical or food industries, red-hot objects, minimal light spot dimensions for the detection of small parts, strip edge control, or the detection of liquids and levels in pipes and vessels – high-quality fiber-optic cable systems from SensoPart are predestined for use in all these applications.

Applications in which differing detection tasks have to be carried out in the smallest of spaces often pose the risk of mutual interference. This can lead to unwanted spurious switching. No problem for the FL 70 series: it has a communication interface that ensures that several FL 70 sensors can be synchronised and always switch correctly. The communication takes place fully automatically after battery installation, without any additional adjustment effort for customers. In other words, extremely simple installation and precise detection in the smallest of spaces.

Fiber-optic cables – light strips

from Page 537

- *Photoelectric sensor and diffuse sensor variants*
- *Variety of light strip widths and ranges*

Fiber-optic cables – special

from Page 543

- *Bendable fiber-optic cable tips for particularly restricted installation conditions*
- *Prism scanner for filling level measurement*
- *V-scanner for small objects or liquid and level measurements*
- *Fork sensors in small housings*

Fiber-optic cables – accessories

from Page 549

- *Ancillary lenses for extending ranges*
- *Cutting tool for shortening and bending fiber-optic cables*

TYPICAL SENSOPART

- Powerful & variable FL 70 fiber-optic cable sensors
- FMS serie: powerful sensors for extreme demands
- Wide range of fiber-optic cables for standard applications or individual customer requirements
- Numerous adjustment possibilities: stable or dynamic teach-in, external control line, accuracy and speed adjustment, timing functions
- Intelligent fiber-optic sensor and cable mounting solutions for easy installation and adjustment
- Reliable operation without mutual interference thanks to communication between FL 70 devices

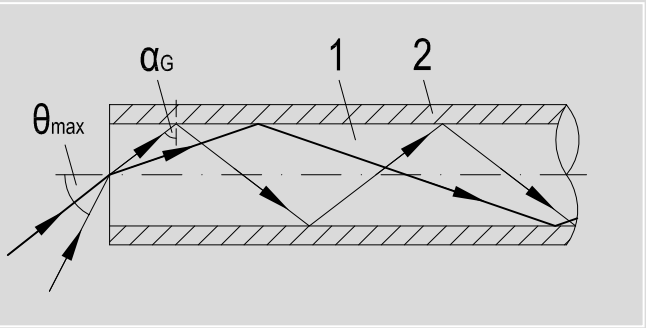
Fiber-optic cable sensors

System description

How fiber-optic cables function

Light guidance is based on the physical effect of total reflection, whereby light coupled into a glass fiber is repeatedly reflected back into the glass fiber from the boundary surface. The major advantage of this technology is that the light can be transported over long distances with almost no loss.

Fiber-optic sensors use this principle to bring the transmitted light to an inaccessible location and take up the reflected light again to return it to the sensor, mounted where more space is available. This technology, which can also be used for the detection of very small objects, is characterised by precision and reliability.



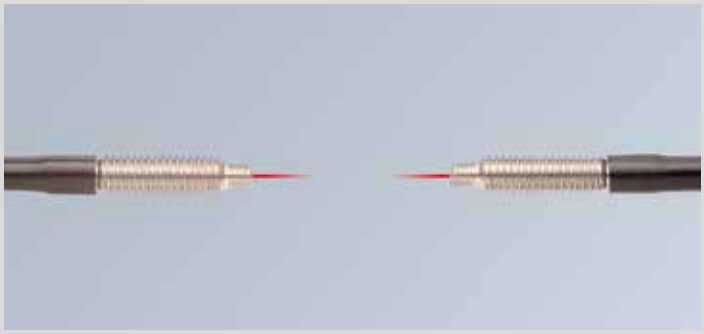
Light guidance in fiber-optic cable
The light is transported in the fiber-optic cable in an axial direction as a result of total reflection at the boundary surface between the sheath (2) and the core (1). The size of the limit angle of the total reflection (α_G) defines the acceptance angle of the fiber-optic cable (θ_{max}). Light hitting the face of the fiber at this or a smaller angle is transported in the fiber-optic cable.

Fiber-optic cable materials

Fiber-optic cables differ in the transmission material used – glass or plastic. SensoPart offers the so-called fiber material in both variants. Glass fibers are highly resistant to chemicals and high temperatures. Suitable metal or silicone sheath materials allow the use of glass fibers in harsh environmental and process conditions. Larger glass-fiber cross-sections offer high functional reserves and reliability, even in dusty and dirty environments.

Fiber-optic cables as photoelectric through-beam sensors

The transmission and receiver fiber-optic cables of photoelectric through-beam sensors run in two separate fiber-optic cables. Both fiber-optic cables are optically connected to the sensor via a coupling. Whereby one fiber-optic cable transports the transmission light from the sensor to the detection location while the other, opposite, fiber-optic cable transports the light back to the receiver. The sensor switches if the light path between the two facing fiber-optic cable heads is interrupted by an object. Relatively long ranges are achieved with photoelectric through-beam sensors.



The photoelectric sensor type
Transmitter cables and receiver cables are laid in two separate sheaths and are connected to the appropriate optical component of the sensor via a coupling.

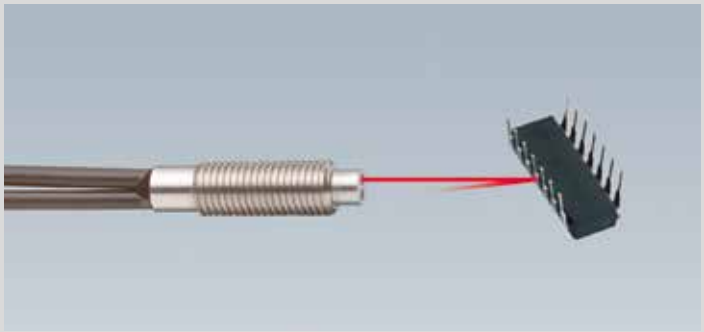
The fiber-optic cable as photoelectric diffuse sensor

In the photoelectric diffuse sensor variant, the transmitter and receiver cables are combined in one light exit sheath. While one of the fiber-optic cable strands is connected with the transmitter, the other strand transports the light reflected from the target object back to the sensor's receiver. The sensor switches.

The advantages of this cable arrangement lie in the very low space requirement and reduced mounting effort. The fiber-optic cable heads must be brought close to the target object because of the detection principle used. Expanded ranges can be achieved by using larger glass-fiber cross-sections.

Parallel vs. coaxial fibers

In the case of scanner fiber-optic cables, one also differentiates between two different fiber arrangements. In the standard design, the transmitter and receiver fibers run parallel, in coaxial fiber-optic cables the receiver fibers are arranged concentrically around the transmission fibers. When using supplementary optics for focusing (c.f. P. 552) the coaxial design offers application advantages, namely a smaller light spot, in particular, and thus improved small-part detection.



The photoelectric diffuse sensor type
In photoelectric diffuse sensor versions the transmission and receiver fibers are combined in a single cable and disgorge in a light exit sleeve.

The fiber-optic cable head – numerous different tips

Compact designs of machines and plant with extremely restricted spaces – access to the target objects is often difficult. But the heads of the fiber-optic cables are as varied as the tasks. Particularly fine or bendable fiber-optic cable heads and highly flexible fiber-optic cables provide access in these situations. Fiber-optic cable heads with a lateral light exit that deflect the light by 90° in the smallest of spaces provide assistance in restricted or blocked spaces, in particular. The use of fiber-optic cables together with appropriate cable heads provides flexibility with moving machine parts, low weight, and high impact and vibration resistance – ensuring trouble-free and reliable function.