



**SENSE WITH SIMPLICITY**

## **FIBER OPTIC SENSORS AND FIBER OPTIC CABLES**



## CLEAR TASK

### User-friendly

In many areas of industrial technology, photoelectric sensors help to control processes and provide efficient methods of detecting the presence and position of objects. Fiber optic sensors and cables are well suited for applications that have space restrictions, temperature extremes, or are located in hazardous areas. Unfortunately, many fiber optic sensors are often very difficult to set up, adjust, operate and maintain. End users need devices that combine performance and flexibility and are easy to operate and configure. These factors were given a high priority throughout the development of these cutting edge devices.

## CLEAR MESSAGE

### User-friendly, economical fiber optic sensors

With their range of attractive product characteristics, the new SU18 and SU19 fiber optic sensors answer the current market requirements. Both the SU18, our standard fiber optic sensor, and the SU19, with a 4-digit, high-resolution diagnostic display, provide quick and easy operation.

For sensor programming, just position the object that is to be detected and press the teach-in button. With the AGC (Automatic Gain Control) automatic switching threshold and amplification, the intelligent fiber optic sensors take care of settings such as switching thresholds and optimum amplification.

An easy to understand display of the programmed values and signals received means there is no need for interpreting different reference values for configuring or checking. Basically, 100% is the output switching threshold so a displayed value of 150% represents 1.5-fold excess gain with respect to the switching output. Better performance makes it easier to mount, which particularly benefits applications where space is at a premium.

## CLEAR REQUIREMENT

### The right fiber optic cable for every requirement

Our large range of fiber-optic cables includes plastic and glass fiber optic cables with a wide variety of sheathing materials. Small fiber optic beams are ideal for detecting tiny objects.

In addition to our broad range of standard fiber optic sensors, we offer application-specific solutions such as extremely flexible, chemically resistant fiber optic cables, cables for high temperatures and other customized fiber optic cables.

With our own development and production facilities, we can quickly and efficiently respond to all customer requirements. We have 35 years of experience in development, production and customer service.





## Fiber optic sensors, series SU19

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Comfort-Line for DIN rail mounting with high resolution percentage display



Thru-beam fiber optic cable	up to 450 mm
Diffuse mode fiber optic cable	up to 150 mm

## Fiber optic sensors, SU18/35 High Power

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Basic-Line for DIN rail mounting and remote applications



Thru-beam fiber optic cable	up to 1500 mm
Diffuse mode fiber optic cable	up to 460 mm

## Fiber optic cable sensors, SU18-standard

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Basic-Line for DIN rail mounting with potentiometer or pushbutton teach-in



Thru-beam fiber optic cable	up to 450 mm
Diffuse mode fiber optic cable	up to 150 mm

## Fiber optic sensors, ML17-LL

Page 8

Cost-Effective with flexible mounting options: Front mounting with M18 thread and side mounting holes



Thru-beam fiber optic cable	up to 336 mm
Diffuse mode fiber optic cable	up to 85 mm

## Fiber optic sensors, MLV41-LL

Page 9

Robust-Line in standard sensor format for glass fiber optic



Thru-beam fiber optic cable	up to 300 mm
Diffuse mode fiber optic cable	up to 150 mm

## Fiber optic sensors, series VL18-LL

Page 9

Cylindrical, in M18 brass housing for glass fiber optic



Thru-beam fiber optic cable	up to 300 mm
Diffuse mode fiber optic cable	up to 70 mm

## Fiber optic sensors, Varikont-M series

Page 9

Robust-Line for hazardous areas such as Ex-Zones 1 and 20



Thru-beam fiber optic cable	up to 400 mm
Diffuse mode fiber optic cable	up to 95 mm

The sensing range specifications for SU18, SU19 and ML17-LL devices refer to the maximum range with a plastic fiber optic cable of 1.5 mm diameter and without lens attachment.

The sensing range details for MLV41-LL, VL18-LL and Varikont devices refer to the maximum range with a plastic glass-fiber optic cable of 2.3 mm diameter.

# COMFORT-LINE: SU19-FIBER OPTIC SENSORS

**Do you want a sensor that is easy to adjust and extremely precise with a display that is easy to understand?**

These SU19 series fiber optic sensors are the most advanced fiber optic devices for particularly demanding applications. They enable the display of data with maximum accuracy and fine adjustment, as with conventional display sensors, but also clearly define actual conditions.

The wiring of the fiber optic sensor via bridge contacts not only minimizes wiring it also saves time and effort. Compared with other devices, SU19 makes replacing equipment on the DIN rail easier and quicker.



**1 Everything's 100% clear: highly precise display for smooth operation**

**2 Clear target detection with just two clicks and AGC (automatic switching threshold and amplification)**

**3 Just 9 mm wide x 62 mm long**

**4 Everything available: 5 modes and timer functions**

## 1 Clear, straightforward display

- Four-digit percentage display enables high precision
- No ambiguity or misinterpretation of different absolute display values
- Unambiguous display of values for sensor status: Percentage display is easily interpreted
  - 100.0% = Output switching threshold (excess gain = 1)
  - 300.0% = Higher signal strength (excess gain = 3)
  - 999.9% = Saturation
- Decimal place provides extra resolution

## 2 Simple adjustment

- Position object and press Teach button: DONE
- Simple, time-saving double-click Teach-In with switch thresholds and amplifier control AGC (Automatic Gain Control)
- Automatic adjustment to application taking all variables into account
- No readjustment needed
- No need to save values for checking
- Reduced minimum sensing distance with automatic amplifier adjustment

## 3 Smallest housing: just 9 mm wide and 62 mm long

- Enables the mounting of more sensors with the same amount of available space
- approx. 20% less space required than other display sensors

## 4 Choice of operating modes

- Automatic mode: 160  $\mu$ s ~ 2 ms
- Standard mode: 160  $\mu$ s
- High Speed mode for fast objects at 30  $\mu$ s
- High Res mode for minimal contrast at 2 ms
- Glass mode for clear object detection at 2 ms
- Adjustable time functions from 1 to 999 ms

### Optional Auto-Teach functions to adapt to your requirements

Simple Teach-In function enables various objects to be learned with just two clicks.

#### Dynamic teach-In

- Detection of moving objects
- Sensor automatically sets best amplification

#### Maximum teach-in

- Learning without object
- Sensor sets maximum sensitivity

#### Position teach-in

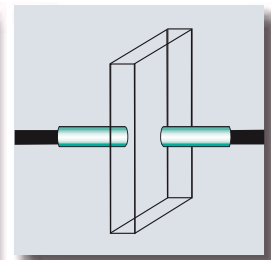
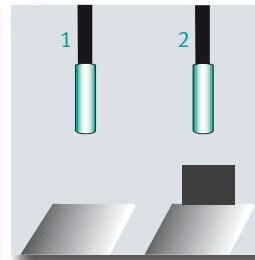
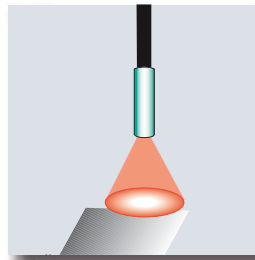
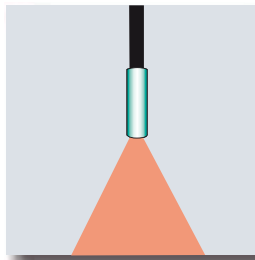
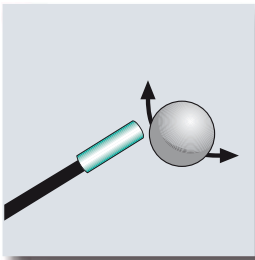
- Learning with precise positioning of objects
- Sensor automatically sets best amplification

#### 2-point teach-in

- Automatic teach-in for optimum amplification (average of 2 values)

#### Glass detection mode

- Detection of transparent objects
- Sensor automatically sets best amplification



### Long-term stable and maintenance-free operation

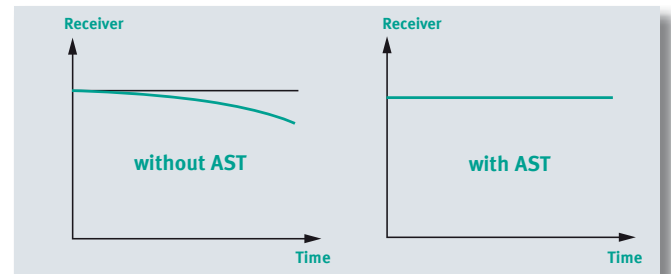
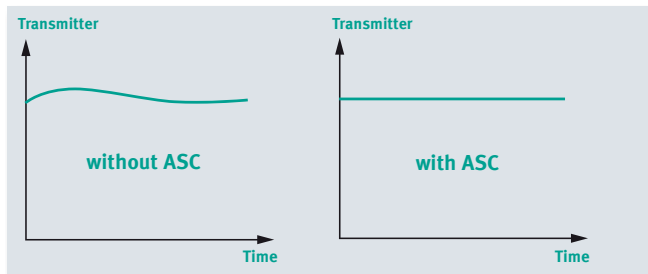
ASC and AST enable long-term detection of low-contrast objects

#### ASC function (automatic signal control)

- Monitors the signal strength transmitted and automatically adjusts the transmitted LED

#### AST function (automatic switching threshold)

- Monitors the signal strength of the receiving diode and automatically regulates amplification (glass mode)



### 5 Simple mounting with special DIN rail fastener

- Simply snap onto DIN rail
- Close the retaining lever
- No tools required

### 6 Simple fiber optic connection with secure fiber optic cable clamping

- Designed for glass fiber or plastic fiber optic cables, diameter 2.2 mm

### 7 4-in-1 output

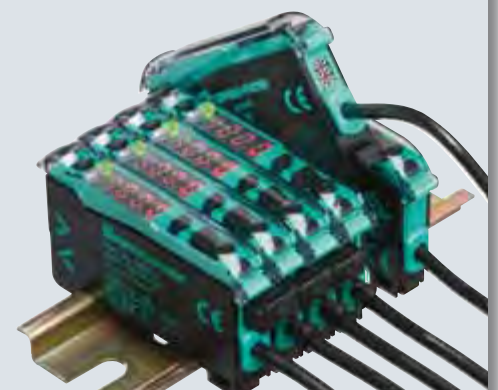
- Enables all 4 combinations of switch polarity and switch logic in one sensor
- Offers increased EMC immunity
- Reduced inventory requirements

### Clear benefits for group mounting

- Gang mounting with cable-saving bridge contacts on the back
- Main unit and expansion unit concept minimizes wiring
- Up to 18 fiber optic sensors can be connected in series without mutual interference
- Fastest response time (160 µs) in series of up to six amplifiers
- Sensors can be removed individually thanks to bridge contacts on the back

4 FOUR OUTPUTS  
IN ONE SENSOR

VISO+







## FOR CLEAR REQUIREMENTS: A CHOICE OF FOUR VERSIONS

### SU18/35 High Power: the most powerful sensor

- High Power version with particularly long range and extremely bright and sharp light spot via PowerBeam
- Basic device with the optical performance of conventional high-end sensors
- Offers the largest sensing ranges possible, or in dusty or dirty environments, the best signal strength in this class
- Operating modes adjustable for adaptation to the working area or amplification of the signal strength: Ultra mode at 5 ms, HighPower mode at 500  $\mu$ s and Standard mode at 160  $\mu$ s

up to 1500 mm (without lenses)

### SU18 Standard: the fastest sensor in its class

- High speed mode for fastest object detection with a switching frequency of 6 kHz and a response time of just 80  $\mu$ s
- High resolution mode for reliable detection of very small differences in contrast
- Normal mode with response time of 160  $\mu$ s

up to 450 mm (without lenses)

- Standard version with teach-in
- High Power version with teach-in

- Standard version with sensitivity adjustment potentiometer
- High Power version with sensitivity adjustment potentiometer



#### Clear target detection with AGC SU18 with teach-in

- Simple and time-saving double-click teach-in with automatic switching threshold and amplification (AGC)
  - Automatic adaptation to the application taking all variables into account
  - No readjustment required
  - Reduced minimum sensing distance
- Auto-teach functions
- Dynamic teach-in for moving objects
  - Maximum teach-in without objects
  - Position teach-in for precise object position
  - 2-point teach-in (SU18/35 High Power)



#### Clear and simple SU18-16 with Sensitivity adjustment potentiometer

- Sensitivity is incrementally adjustable with potentiometer sensitivity adjustment

#### Simple fiber optic cable connection with fiber optic cable locking

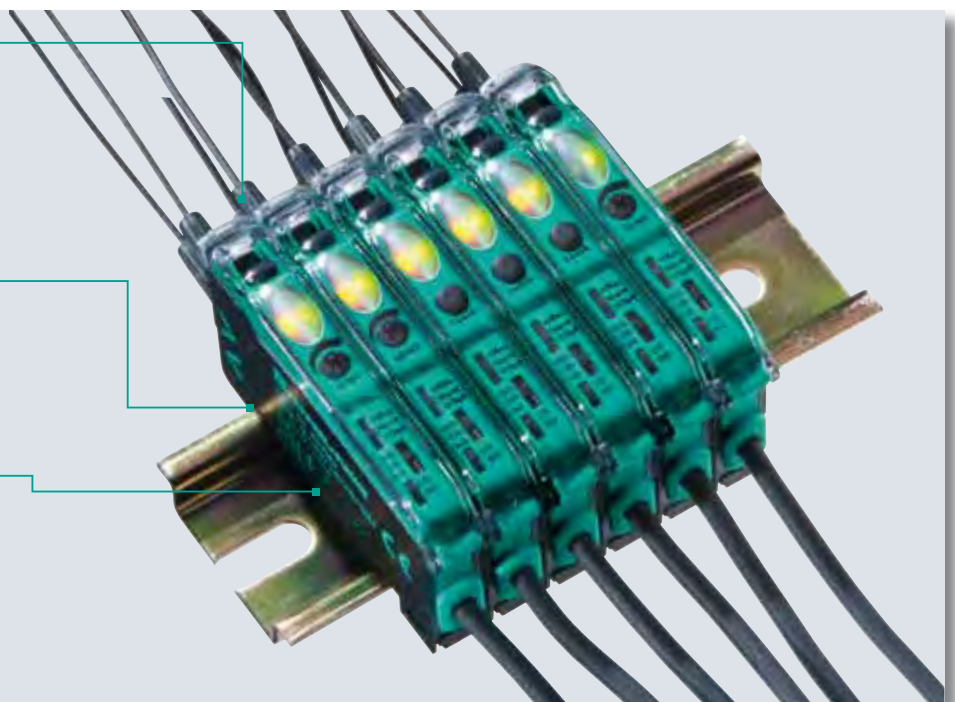
- Suitable for plastic or glass fiber optic cables with 2.2 mm diameter

#### Simple mounting that locks to DIN rail

- Press and click DIN rail mounting
- No tools required

#### Gang mounting no problem

- No mutual interference
- The fiber optic sensors can also be mounted side-by-side



# MORE FIBER OPTIC SENSORS

For harsh ambient conditions where sensors are subject to heat, strong cleaning agents, vibration, shock or impact, or are installed in hazardous areas, there is a choice of practical and ideal fiber optic sensors.

These are the best choice where the fiber optic sensors as well as the fiber optic cables need to withstand such ambient conditions.

**Do you need robust fiber optic sensors for harsh industrial environments?**

## MLV41-LL

- Narrow, robust enclosure, resistant to acids and alkalis
- Very bright and highly visible indicator LEDs
- Simple, incremental sensitivity adjustment
- 4-in-1 output
- Signal strength indicator
- Response time 500  $\mu$ s
- Versions with visible red light or infrared light
- Quick lock attachment of the fiber optic cable
- Glass fiber optic cable rated to 200 °C

4 IN 1  
FOUR OUTPUTS  
ONE SENSOR

**VISO+**



## VL18-LL

- Robust M18 cylindrical brass housing
- Very bright and highly visible indicator LEDs
- Simple, incremental sensitivity adjustment
- Signal strength indicator
- 4-in-1 output
- No mutual interference when mounting multiple units
- Response time 1 ms
- Glass fiber optic cable rated to 200 °C

4 IN 1  
FOUR OUTPUTS  
ONE SENSOR

**VISO+**



## VARIKONT-M OJ500

- Robust housing with rotating head
- Suitable for use in Zone 1 and Zone 20
- Simple, incremental sensitivity adjustment
- Programming switch for various frequencies and off delay
- Signal strength indicator
- No mutual interference when mounting multiple units
- Response time 300  $\mu$ s
- Glass fiber optic cable rated to 200 °C





**Are you looking for a solution to your detection task? We'll solve it.**

Depending on the type of fiber optic sensor, glass or plastic fiber optic cables up to several meters in length are connected to the fiber optic sensors. The advantages of plastic fiber optics cables are their low weight, minimum bending radii and the cables can be cut to length. They are flexible and can be installed easily and inconspicuously.

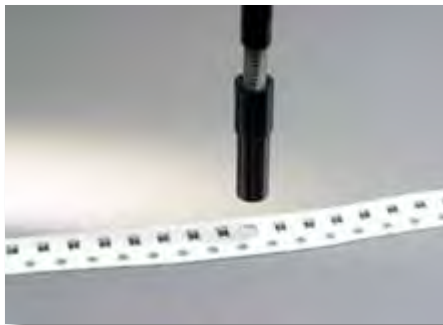
Depending on the application, glass fiber optic cables can be protected with the appropriate sheathing and used in all applications. With a large choice of various heads, these fiber optic cables guarantee mounting in almost every available space.

### Detection of missing SMT components

**Fiber optic sensor: SU18 or SU19**

Fiber optic type: Coaxial fiber optic cable KLR-C09-1.25-2.0-K76 and lens attachment K-LA03

Advantage: Very narrow light beam ideal for small part detection

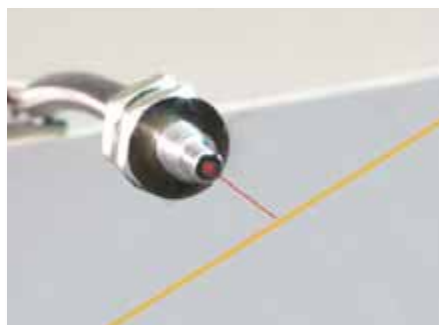


### Reliable bonding wire detection

**Fiber optic sensor SU18 or SU19 in high resolution mode**

Fiber optic type: Coaxial fiber optic cable KLR-C09-1.25-2.0-K76

Advantage: Reliable detection of very small and low contrast objects via high resolution mode

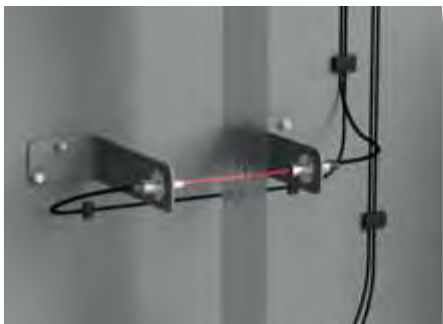


### Stable detection of PCB edges

**Fiber optic sensor: SU18 or SU19**

Fiber optic type: Thru-beam fiber optic cable with array KLE-A16-2.2-2.0-K209

Advantage: Heads and fiber optic cables with wide array light beam ignore holes and slots on PCB



### Clear object detection

**Fiber optic sensor: SU19, high resolution mode or glass mode**

Fiber optic type: Thru-beam fiber optic cable KLE-C01-2.2-2.0-K102

Advantage: Suitable operating modes for reliable clear object detection, automatic monitoring and readjustment (ASC and AST function)



### Parts ejection sensing

**Fiber optic sensor: SU18 or SU19**

Fiber optic type: Array fiber optic cable KLE-A32-2.2-2.0-K142

Advantage: Error-free counting with quick response time of up to 30 µs



### Presence checks in high temperature applications

**Fiber optic sensor: SU18 HighPower**

Fiber optic type: Glass fiber optic cables for high-temperature applications HPF-T055-H  
Advantage: Reliable, long-term stable detection up to 307 °C with minimal maintenance requirements

In applications with particularly restricted mounting space, such as narrow edges, flexible fiber optic cables are the ideal solution. With PVC or PE sheathing, they permit bending radii of as little as 1 mm.

Highly flexible glass fiber optics are the right choice if smaller bending radii or a higher temperature specification of up to 180 °C is required.

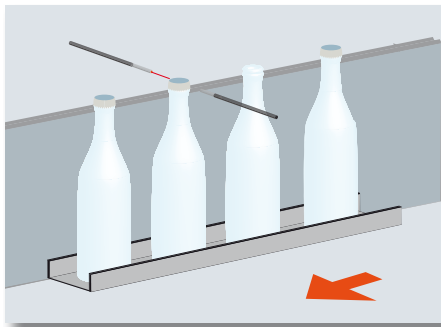
For harsh environments, such as ambient temperatures of up to 300 °C or the use of chemical cleaning agents, fiber optic cables with metal or silicone sheathing are used. The resistance to corrosive environments is a particular feature of these fiber optic cables. Paint-resistant fiber optic cables can be used in painting processes.

#### Presence checks of bottle caps

##### Fiber optic sensor: SU18 or SU19

Fiber optic type: Thru-beam fiber optic cable  
KLE-C01-2.2-2.0-K102

Advantage: Small, precise light spot through use of fiber optic cable

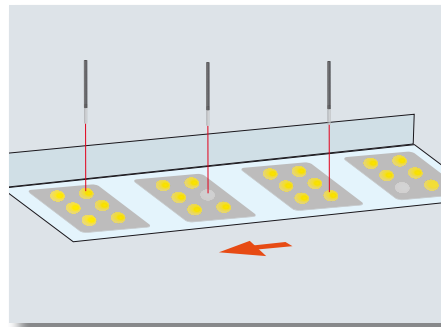


#### Presence check of tablets

##### Fiber optic sensor: SU18 or SU19

Fiber optic type: Diffuse mode fiber optic cable  
KLR-C09-1.25-2.0-K76 with auxiliary lens  
K-LA03

Advantage: Precise detection of tablets with narrow light beam without cross talk

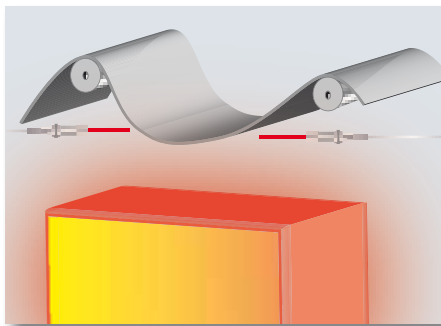
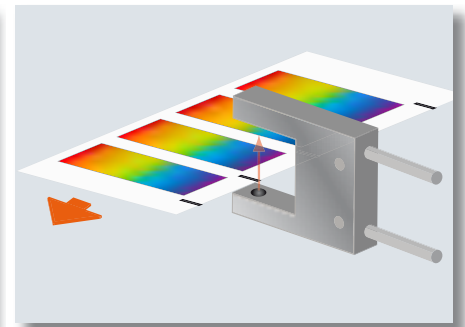


#### Registration mark detection on transparent material

##### Fiber optic sensor: SU18 or SU19

Fiber optic type: Thru-beam fiber optic cable  
with fork head KLE-C02-1.25-2.0-K134

Advantage: Time saving mounting with simple alignment in restricted spaces

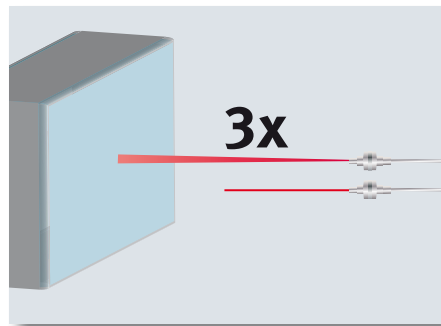


#### Foil detection in high temperature applications

##### Fiber optic sensor: SU18/35 HighPower

Fiber optic type: Thru-beam fiber optic cable  
KLE-C01-2.2-2.0-K102 with auxiliary lens  
K-LA01

Advantage: Foil detection with effective operating ranges over 2 m to prevent damage (melting)

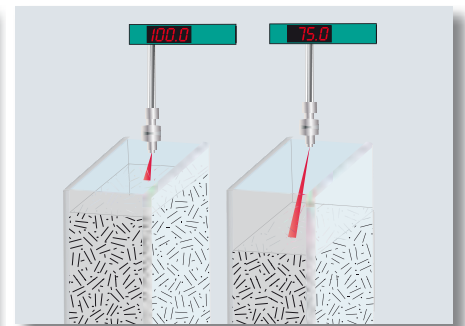


#### Long distance sensing

##### Fiber optic sensor: SU18/35 HighPower

Fiber optic type: Diffuse mode fiber optic cable  
KLR-C02-2.2-2.0-K146

Advantage: Long-term stable detection of moving objects over an extended detection range

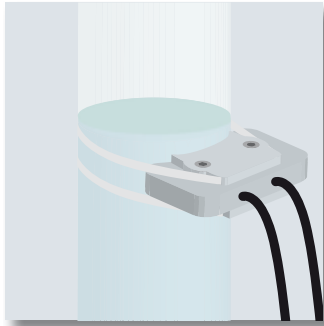


#### Fill level measurement

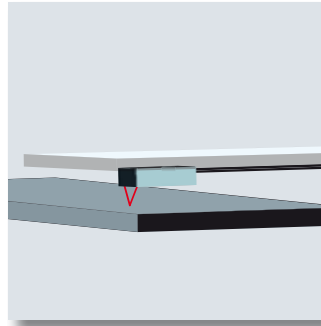
##### Fiber optic sensor: SU19

Fiber optic type: Diffuse mode fiber optic cable  
KLR-C09-1.25-2.0-K176

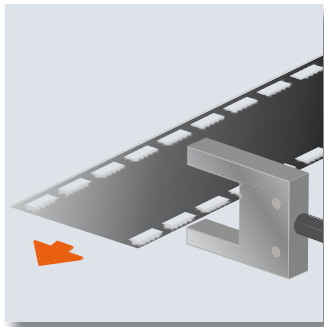
Advantage: Clear, easily interpreted information about the sensor status via the SU19 display



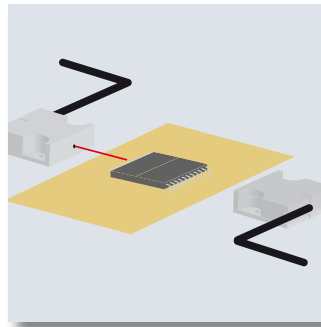
**Fill level measurement of liquids**  
**Fiber optic sensor: SU18 Standard**  
 Fiber optic type: Diffuse mode fiber optic cable  
 KLR-C02-1.25-2.0-K128  
 Advantage: Time and cost-saving installation with standard fiber optic sensor



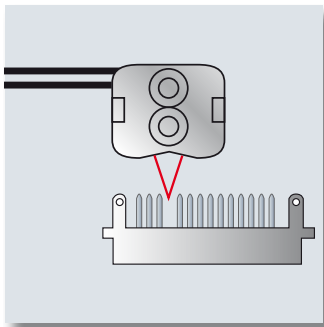
**Flat panel detection in the LCD industry**  
**Fiber optic sensor: SU19, high resolution mode**  
 Fiber optic type: Diffuse mode fiber optic cable  
 KLR-C02-1.3-2.0-K130  
 Advantage: Reliable detection of glass panels in restricted spaces



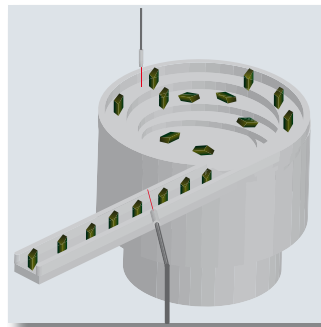
**Mark detection in electronics production**  
**Fiber optic sensor: SU18 Standard, high speed mode**  
 Fiber optic type: Thru-beam fiber optic cable with fork head  
 KLE-C02-1.25-2.0-K135  
 Advantage: Simple installation and accurate detection of marks at high speed



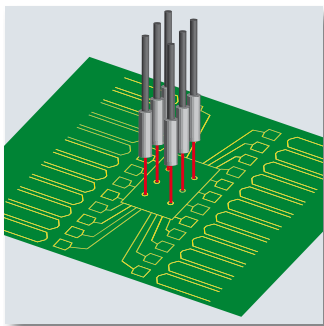
**Microchip detection on carriers**  
**Fiber optic sensor: SU19**  
 Fiber optic type: Thru-beam fiber optic cable KHE-A01-1.0-2.0-K138  
 Advantage: Reliable detection of flat components on carriers



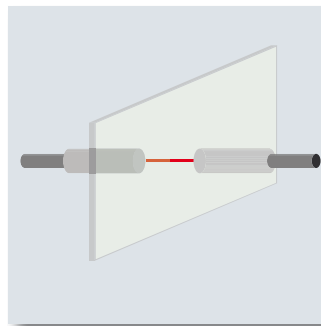
**Presence checks of connector contacts**  
**Fiber optic sensor: SU18 or SU19**  
 Fiber optic type: Diffuse mode fiber optic cable  
 KHR-C02-1.0-2.0-K129  
 Advantage: Reliable detection of very small connector contacts in front of a nearby background



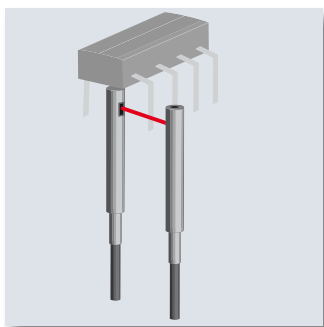
**Small part counting in vibratory bowl feeders**  
**Fiber optic sensor: SU18 Standard, high speed mode**  
 Fiber optic type: Diffuse mode fiber optic cable  
 KLR-C09-1.25-2.0-K76  
 Advantage: Error-free object count with fastest response time



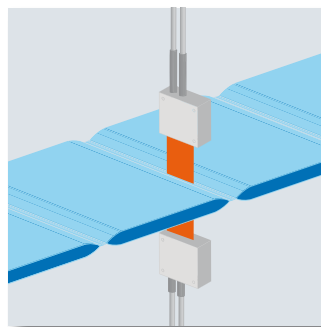
**Detection of microchip orientation**  
**Fiber optic sensor: SU19**  
 Fiber optic type: Diffuse mode fiber optic cable  
 KLR-C06-1.25-2.0-K81  
 Advantage: Mounting of several fiber optic cables directly next to each other without cross talk with fastest response time



**Glass detection with AST function**  
**Fiber optic sensor: SU19**  
 Fiber optic type: Thru-beam fiber optic cable KLE-C01-2.2-2.0-K102  
 Advantage: Maintenance-free operation over an extended period. Long-term stable glass detection in dirty and dusty environments



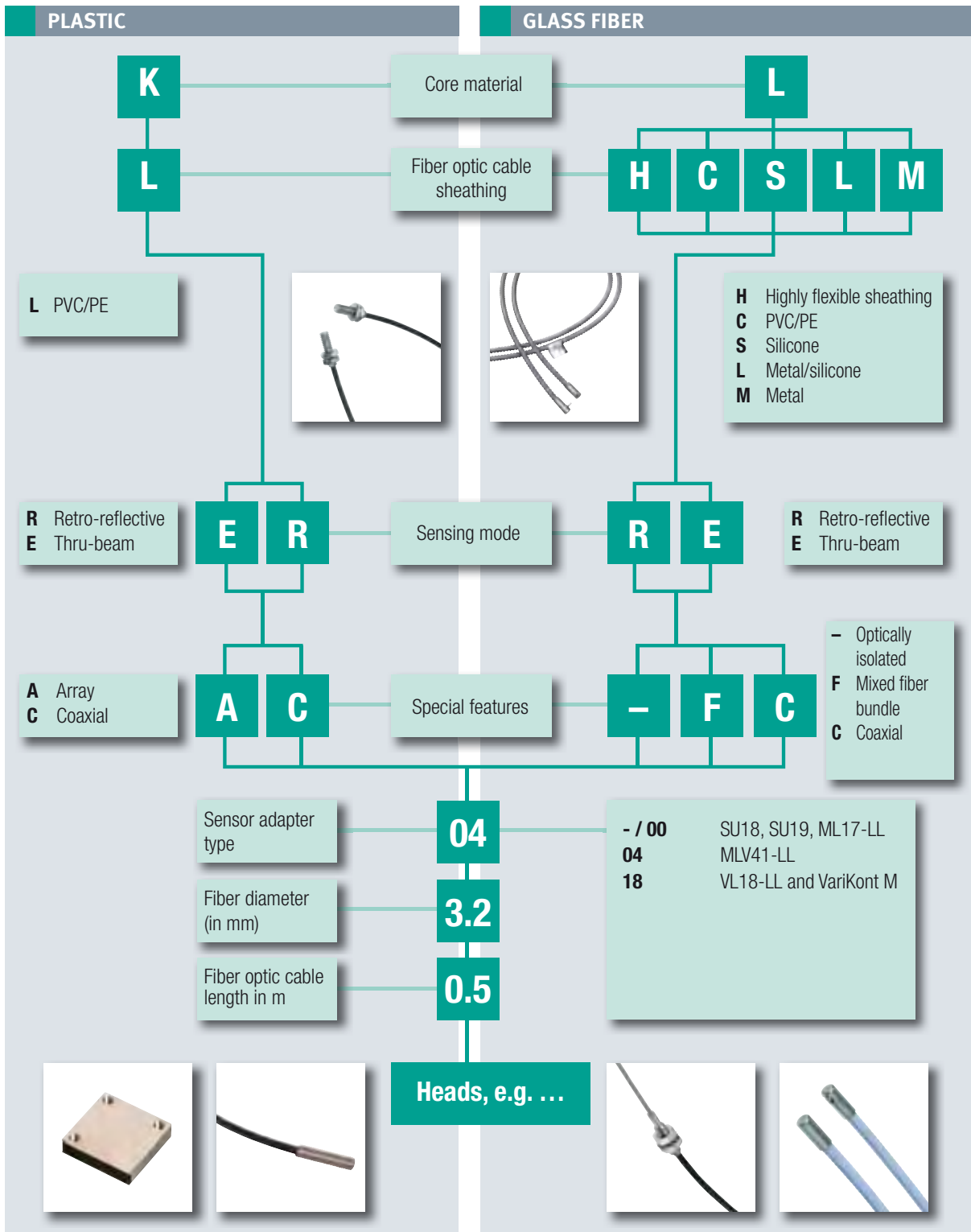
**Control of IC pins**  
**Fiber optic sensor: SU19**  
 Fiber optic type: Thru-beam fiber optic cable with side light exit  
 KHTE-C01-2.2-2.0-K118  
 Advantage: Reliable and space-saving detection in hard to reach areas



**Detection of perforations on packaging webstock**  
**Fiber optic sensor: SU19**  
 Fiber optic type: Thru-beam fiber optic cable KLE-A16-2.2-2.0-K109  
 Advantage: Reliable detection of perforations on a web of unfilled bags at high speeds



# TYPE CODE



## Plastic fiber optics

consist of plastic fibers that are protected in a PVC sheathing. They are lightweight and very flexible and can be used on machines with moving parts. The plastic fibers can be cut to length in the field so the correct length doesn't need to be specified when ordering.

## Glass fiber optics

consist of multiple individual glass fibers with a diameter of approx. 50 µm. Stainless steel, PVC, metal and silicone, or silicone sheathing can be selected depending on the application. Due to the low optical attenuation of glass fibers compared to plastic fibers, increased sensing and operating ranges are possible. The robust mechanical design of the stainless steel sheathing permits use of the cables at temperatures of up to 200 °C.

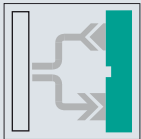
## FIBER OPTIC ACCESSORIES

Pepperl+Fuchs' comprehensive fiber optic cable range is now available with additional high-performance accessories.

- Optional attachable lenses for focusing a light beam or increasing the sensing range
- Metal sleeves to protect plastic fiber optic cable in harsh conditions
- Cutter, for cutting plastic fiber optic cables to length
- Adapter set for connection of fiber optic cables
- Mounting flanges for cylindrical fiber optic cables
- Mounting bracket for simple installation



## WHAT IS A FIBER OPTIC SENSOR?



Fiber optic sensors allow sensing to be located remotely and connected using flexible fiber optic cables made of glass or plastic fibers. The thru-beam principle also permits photoelectric sensors to be implemented as diffuse mode sensors when the transmitter and receiver are angled at the object to be sensed. Thru-beam systems have one fiber optic cable for each transmitter and receiver, while in diffuse systems the light is passed in a single fiber optic cable via separate transmitting and receiving fibers.



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