SENSE WITH SIMPLICITY

FIBER OPTIC SENSORS
AND FIBER OPTIC CABLES

PEPPERL+FUCHS

SENSING YOUR NEEDS

FIBER OPTIC SENSORS FROM PEPPERL+FUCHS

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.

CONTENTS

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.

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 µs ~ 2 ms
- Standard mode: 160 µs
- High Speed mode for fast objects at 30 µs
- 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
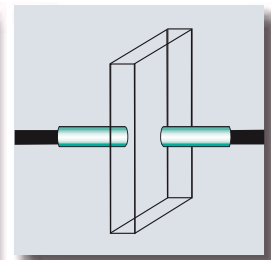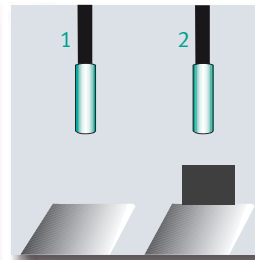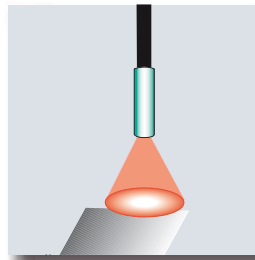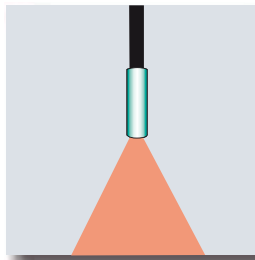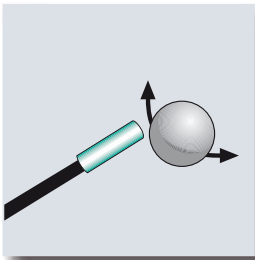- Sensor sets maximum sensitivity

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)
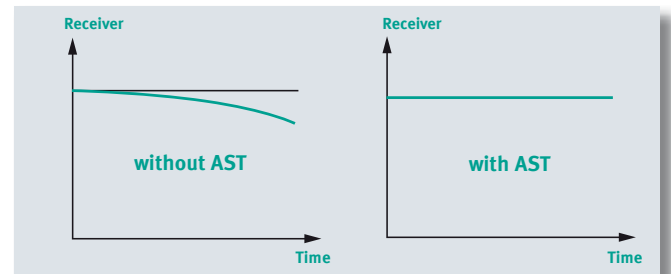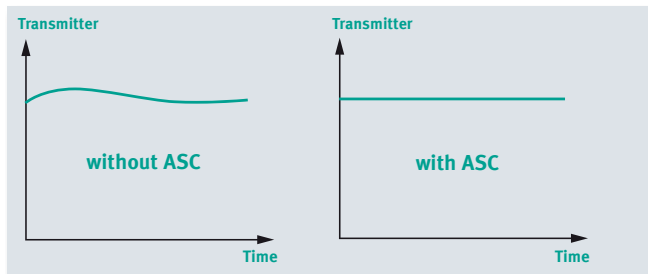
5 **Simple mounting with special DIN rail fastener**
- Simply snap onto DIN rail
- Close the retaining lever
- No tools required

**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
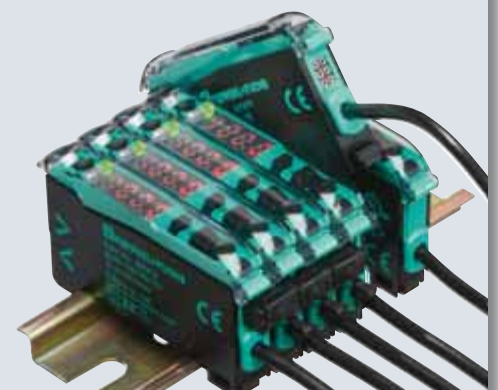
Do you need a precise sensor that can be adjusted quickly for basic applications.

The cost-effective SU18 series standard fiber optic sensors are suitable for numerous applications where 7-segment displays are not necessary. The highly visible dual display helps with the setup of the sensor, monitors signal stability, and during operation indicates if a critical excess gain value is reached, if dirt or dust collect on the cable. Users can easily switch between three operating modes by DIP switch, without further programming.
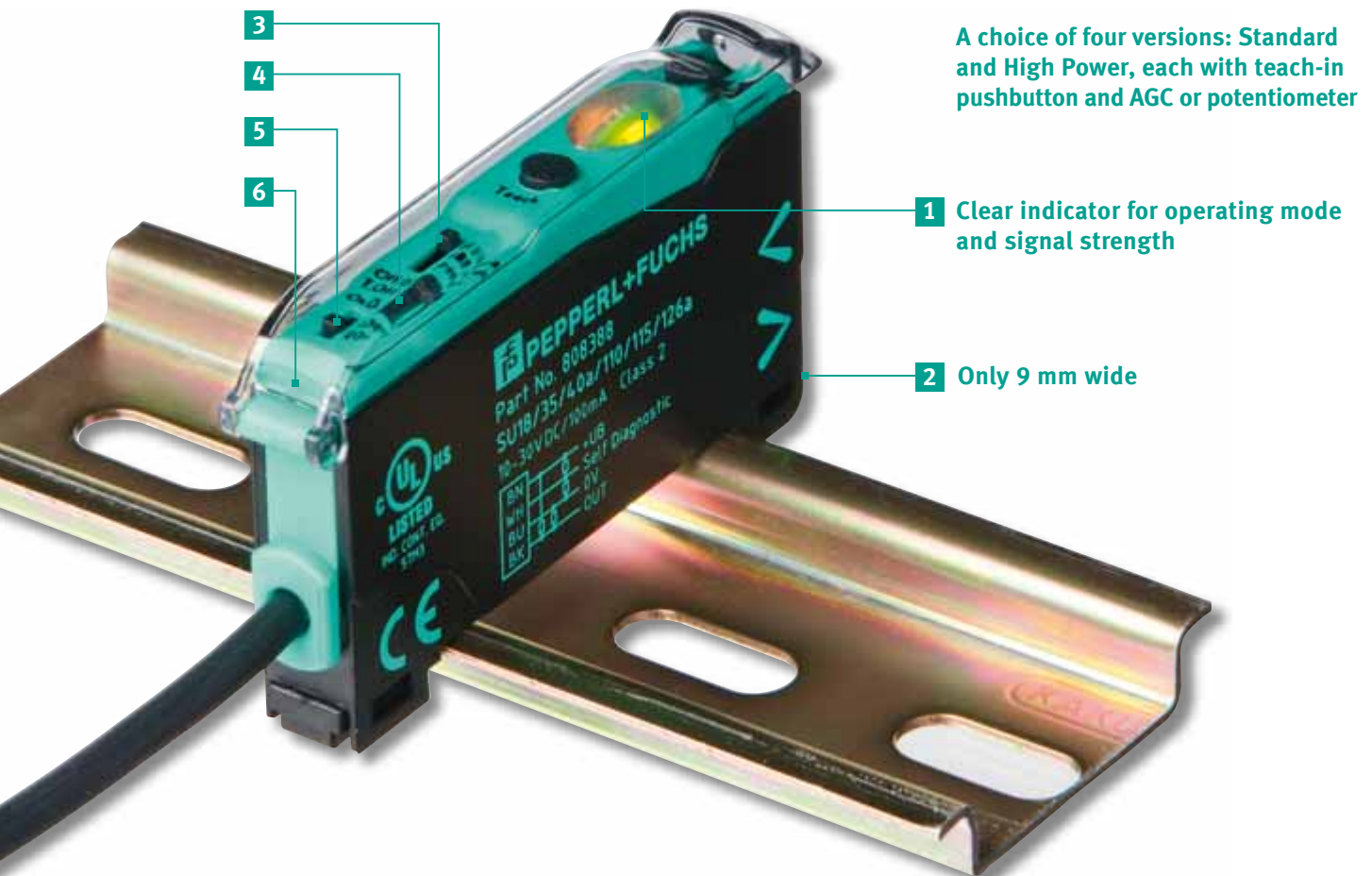
A choice of four versions: Standard and High Power, each with teach-in pushbutton and AGC or potentiometer

1 Clear indicator for operating mode and signal strength

2 Only 9 mm wide

1 **Clear indication of the operating modes and signal stability**
- Large and very bright multi-function display
- Green LED for operating voltage, undervoltage and short circuit conditions
- Yellow LED for switching state and marginal stability control

2 **Smallest housing width, only 9 mm**
- Enables the mounting of more sensors with the same amount of available space

3 **Various response times available**
- Adapts to your requirements with selectable operating modes

4 **Adjustable timer functions**
- Timer off, ON delay or OFF delay (40 ms) selectable

5 **Light-on/dark-on switch**

6 **4-in-1 output**
- Enables all 4 combinations of switch polarity and switch logic in one sensor
- Offers increased EMC immunity
- Reduces inventory requirements

4 FOUR OUTPUTS IN 1 ONE SENSOR

VISO

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 µs and Standard mode at 160 µs

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 µs
- High resolution mode for reliable detection of very small differences in contrast
- Normal mode with response time of 160 µs

up to 450 mm (without lenses)

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

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)

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

Clear and simple
SU18-16 with Sensitivity adjustment potentiometer
- Sensitivity is incrementally adjustable with potentiometer sensitivity adjustment

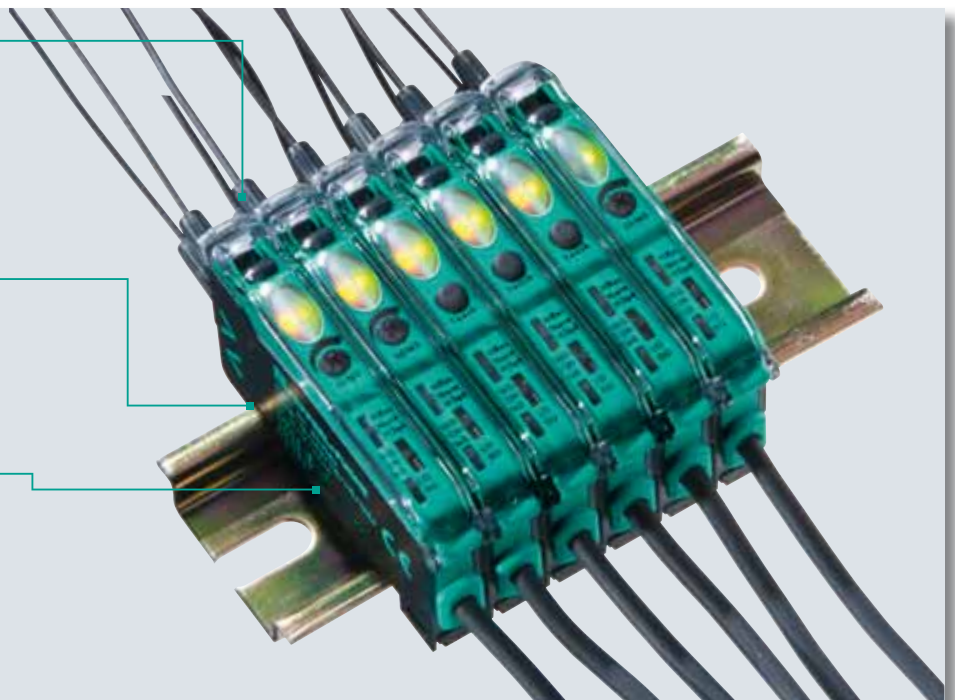**Simple fiber optic cable connection with fiber optic cable locking**
- Suitable for plastic or glass fiber optic cables with 2.2 mm diameter

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

Do you need a cost-effective and compact fiber optic sensor with flexible mounting options?

This series is the best choice for standard applications where no DIN rail is required.
The ML17-LL Cost-efficient Line impresses with its compact design and flexible mounting options via front M18 threading and side mounting holes.
These sensors not only impress with their compact dimensions, but also with their innovative connection concept that permits simple and safe connection of fiber optic cables. A simple screwdriver is the only tool required for connection. Plates or adapters are not required. A 1/4-turn of the fiber optic interlock fastens the fiber optic cable quickly and securely. This makes setup simple and fast.
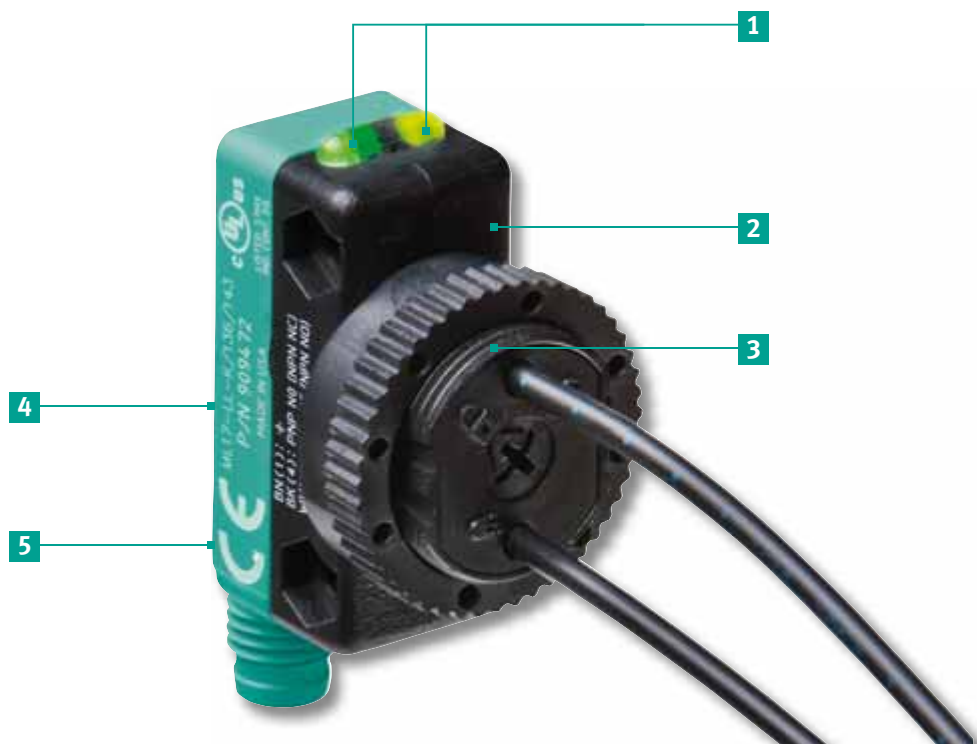
1 Clear indication of the operating modes and signal stability
- Very bright and highly visible indicator LEDs
- Green LED for operating voltage and short circuit indication
- Yellow LED for light received status and stability control

2 Small but good
- Compact, watertight plastic housing
- Enables optimum use of space
- Flexible mounting

3 Simple connection enables fast setup
- For connection of plastic fiber optic cables
- Just a standard screwdriver required
- Open or close fiber optic interlock with a 1/4 turn

4 Clear and simple:
- Simple, incremental sensitivity adjustment

5 4-in-1 output
- Enables all 4 combinations of switch polarity and switch logic in one sensor
- Offers increased EMC immunity
- Response time 1 ms
- Cost savings due to inventory reduction

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 μs
- Versions with visible red light or infrared light
- Quick lock attachment of the fiber optic cable
- Glass fiber optic cable rated to 200 °C

FOUR OUTPUTS 4-IN-1 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

FOUR OUTPUTS 4-IN-1 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 μs
- Glass fiber optic cable rated to 200 °C

9
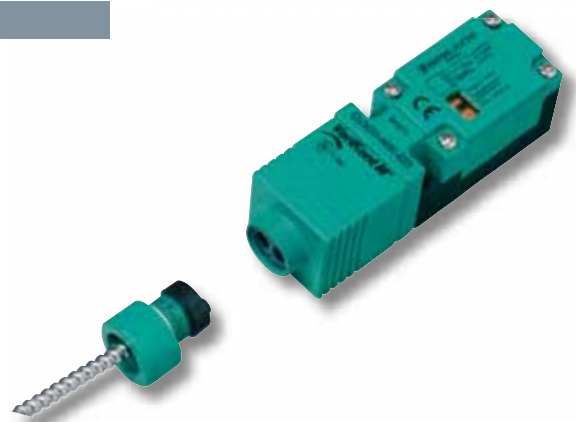
Are you looking for a solution to your detection task? We'll solve it.

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
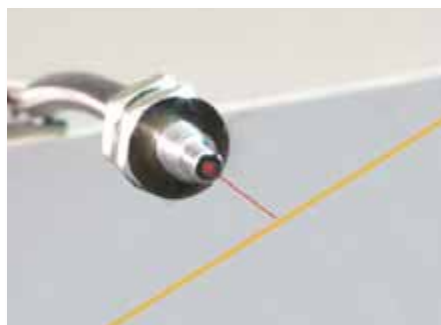Advantage: Very narrow light beam ideal for small part detection
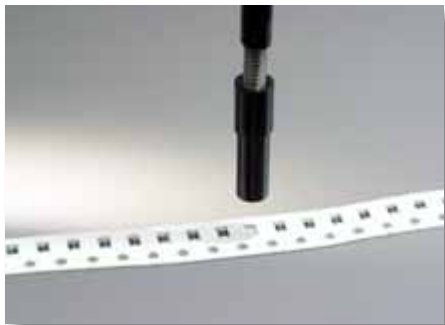
Reliable bonding wire detection

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
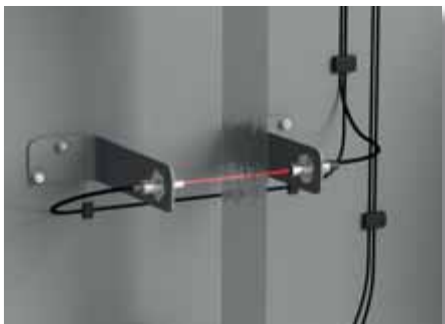
Stable detection of PCB edges

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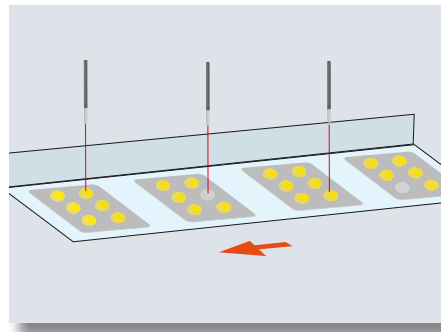Advantage: Small, precise light spot through use of fiber optic cable
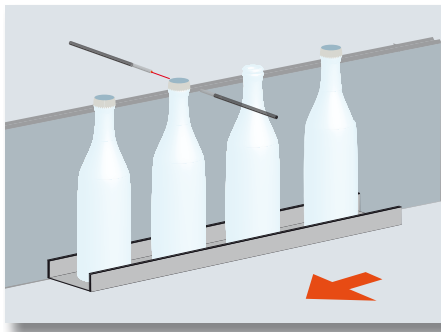
Presence check of tablets

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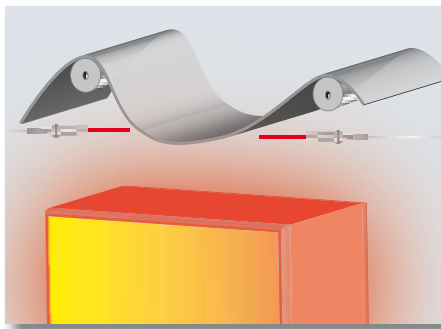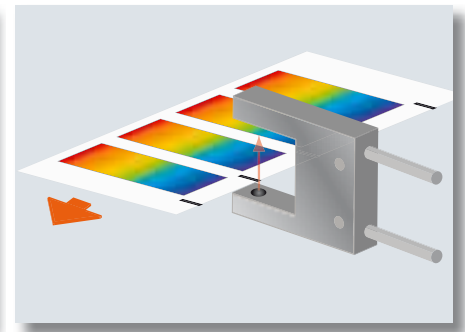Advantage: Precise detection of tablets with narrow light beam without cross talk

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
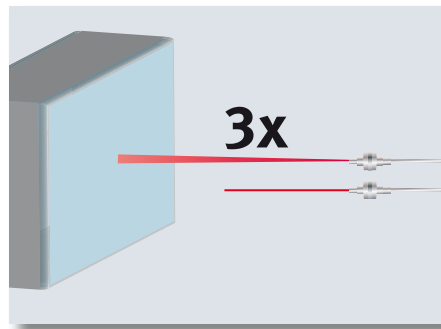

Foil detection in high temperature applications
Fiber optic sensor: SU18/35 HighPower
Fiber optic type: Thru-beam fiber optic cable KLE-C01-2.2-2.0-K102 with auxiliary lens K-LA01
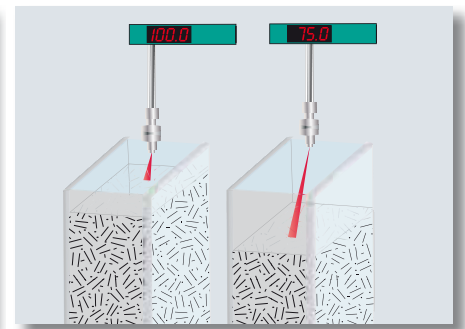Advantage: Foil detection with effective operating ranges over 2 m to prevent damage (melting)

Long distance sensing
Fiber optic sensor: SU18/35 HighPower
Fiber optic type: Diffuse mode fiber optic cable KLR-C02-2.2-2.0-K146
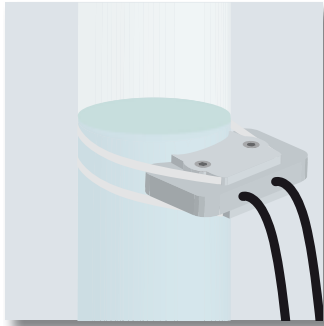Advantage: Long-term stable detection of moving objects over an extended detection range

### 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
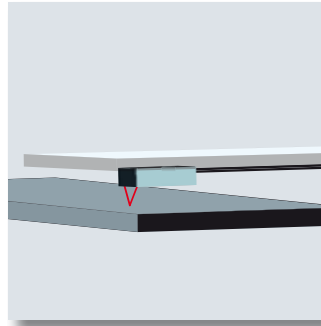
Flat panel detection in the LCD industry

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
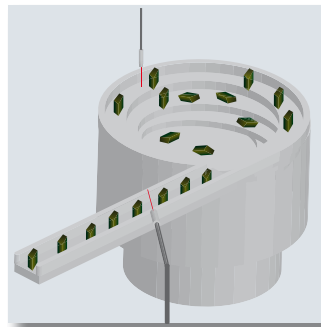glass panels in restricted spaces
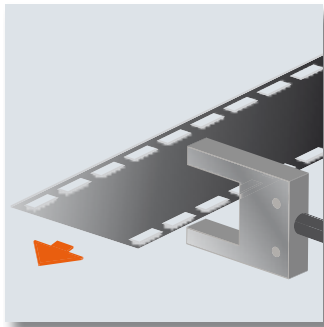
Mark detection in electronics production

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
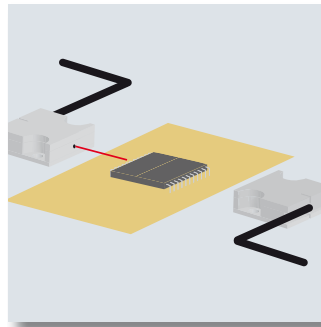
Microchip detection on carriers

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
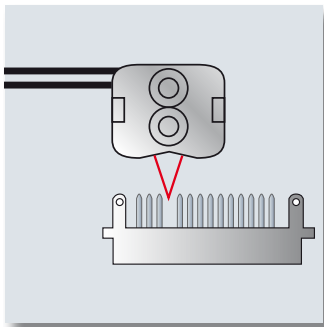
Presence checks of connector contacts

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
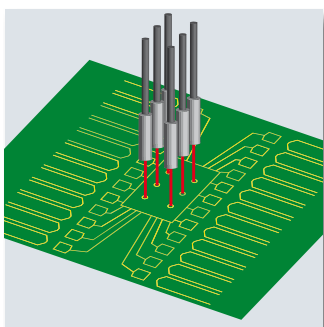
Detection of microchip orientation

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
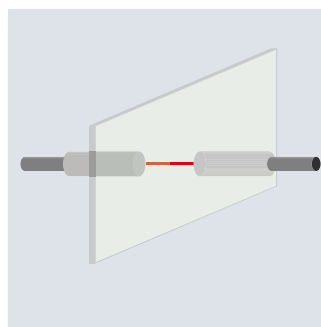
Glass detection with AST function

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
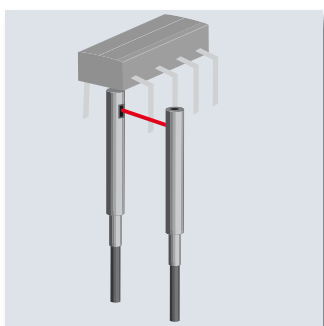
Control of IC pins

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
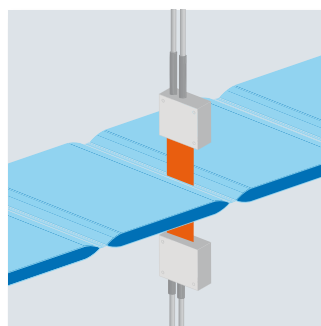
Detection of perforations on packaging webstock

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

K — Core material — **L**

L — Fiber optic cable sheathing — **H C S L M**

L PVC/PE

H	Highly flexible sheathing
C	PVC/PE
S	Silicone
L	Metal/silicone
M	Metal

E R — Sensing mode — **R E**

R	Retro-reflective
E	Thru-beam

R	Retro-reflective
E	Thru-beam

A C — Special features — **– F C**

A	Array
C	Coaxial

–	Optically isolated
F	Mixed fiber bundle
C	Coaxial

Sensor adapter type — **04**

Fiber diameter (in mm) — **3.2**

Fiber optic cable length in m — **0.5**

- / 00	SU18, SU19, ML17-LL
04	MLV41-LL
18	VL18-LL and VariKont M

Heads, e.g. …

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 ºC.

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?
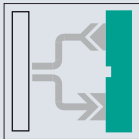
Fiber optic sensors allow sensing to be located remotely and connected using flexible fiber optic cables made of glass or plastic fibers. The thru-beam principle also permits photoelectric sensors to be implemented as diffuse mode sensors when the transmitter and receiver are angled at the object to 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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