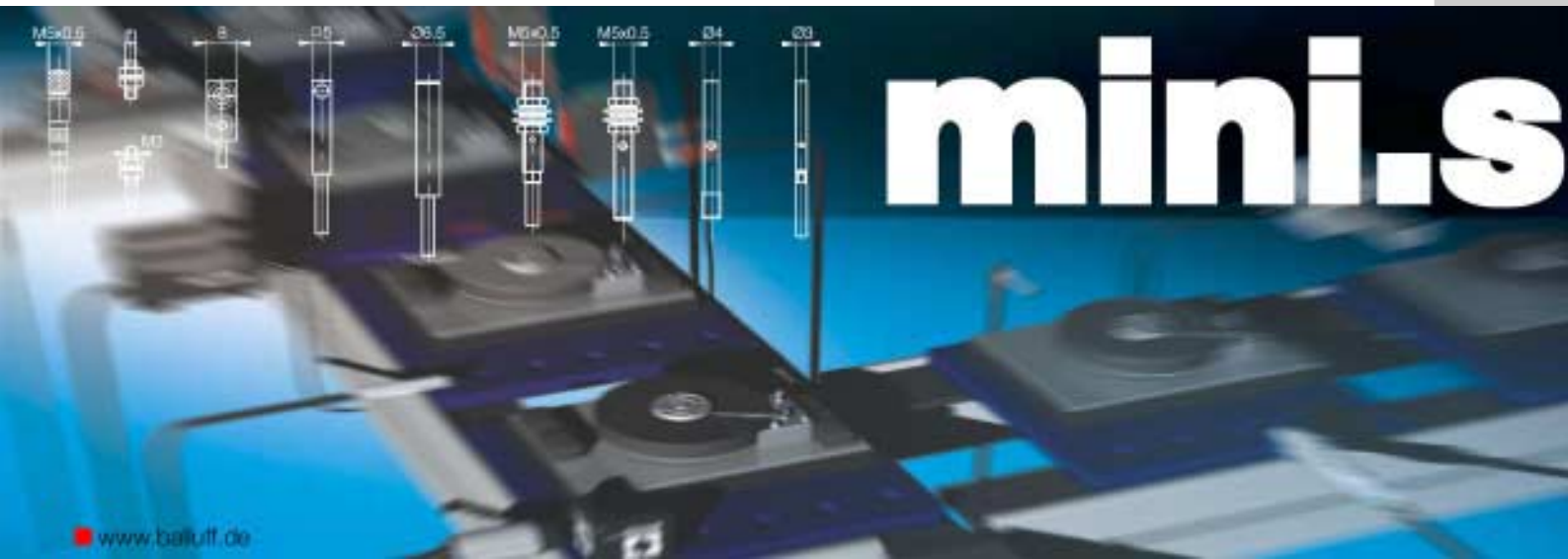


# BALLUFF

## mini.s – the new sensor dimension





Along with technological progress comes the need for space-saving miniaturized sensors. With in automated assembly, handling or the manufacturing of electrical and electronic components, the trend is towards smaller and smallest form factors. Highly dynamic applications such as robot gripper arms require mini-components – including the sensors – with low weight and a small footprint.



**mini.s**



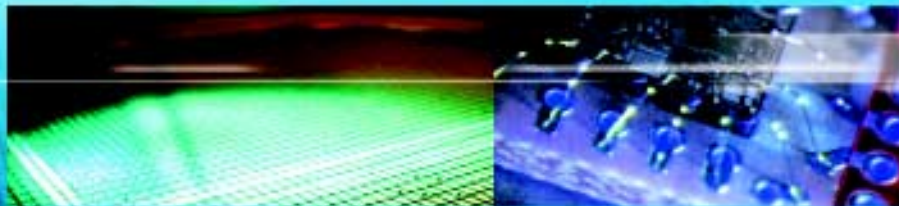
# **mini.s – the new sensor dimension**

... the establishment of a concept







# Miniaturization – Sensor expertise by Balluff

Layout leads the way



ASIC's and the use of the most modern layout technologies have always been Balluff's guarantee that the miniaturization of our sensors keeps pace with new demands. We use hybrid as well as chip-on-board technologies on circuit boards. Wire bond and flip-chip technologies allow us to bring a whole range of the smallest possible sensors to market for a variety of applications. Because the smaller the sensor, the greater the application flexibility.

	SO	<b>1982</b>
	TAB	<b>1991</b>
	COB	<b>1994</b>
	FCOB	<b>2002</b>



## mini.s – the models

Inductive Sensors

**BES**

Magnetic Field Sensors

**BMF**

Optoelectronic Sensors

**BOS**

Slot Sensors

**BGL**

Optical Distance Sensors with Analog Output

**BOD**

Analog Sensors

**BAW**

Magneto-Inductive Travel Sensor

**BIL**

Identification Systems

**BIS**

## New: M5 connector + Ø 4 mm sensor

mini.s

### BES – Mini-Housing, Maxi-Switching Distance

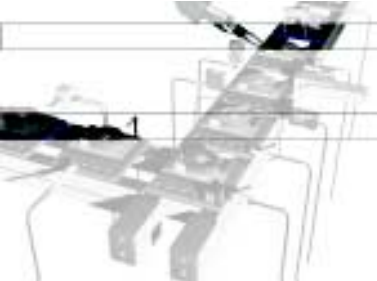
The compact inductive sensors with mini-housing and maxi-switching distance: They simplify installation and setup. For example a Ø 3 mm housing with 1 mm switching distance, or Ø 4 mm housing with 1.5 mm switching distance.

- Miniature housings Ø 3 mm, Ø 4 mm, M5×0.5, 5×5, 4×8, Ø 6.5 mm
- Stainless steel housing
- M8 and M5 connector
- Integrated LED indicator
- Great sensing distance

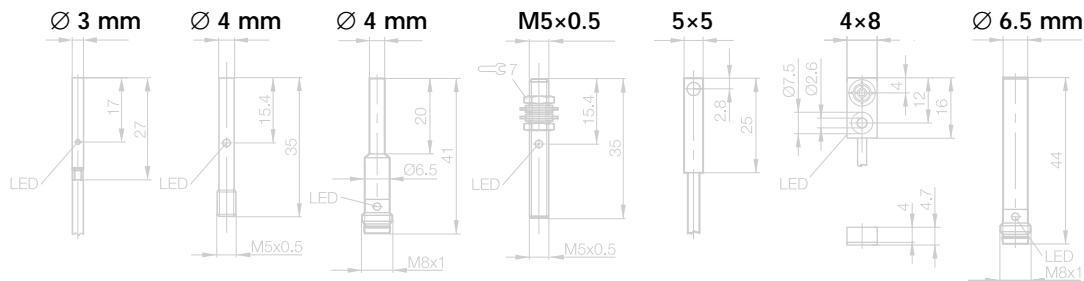
### Applications

- Assembly
- Handling
- Electronics manufacturing
- Micro-mechanics

# BES



# mini.s – inductive sensors



Inductive Sensors

**BES**

**BMF**

**BOS**

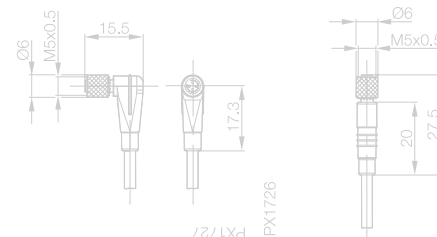
**BGL**

**BOD**

**BAW**

**BIL**

**BIS**





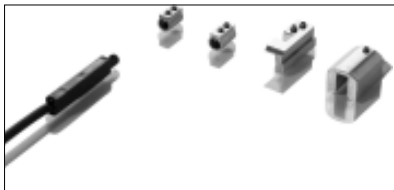
## mini.s – magnetic field sensors

### BMF 303 –

#### Variety in miniaturization

Small size, large application potential.

- Disappear completely into the slot
- Nothing protrudes, nothing gets in the way
- Modern sensor principle (GMR)
- Mounting brackets available for all standard cylinder types
- Available with M5 connector



### BMF 103 – Compact for short-stroke cylinders

Especially for position sensing of pneumatic short-stroke cylinders. Housing width in piston travel direction just 9 mm.

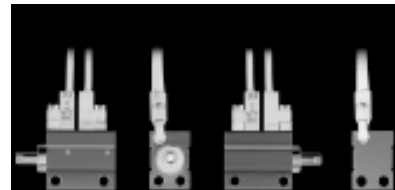
- Modern sensor principle (GMR)
- Mounting elements available for virtually any slot type
- Extremely short housings
- Available with M5 connector



### Applications

End-of-stroke sensing on pneumatic cylinders.

- Detecting gripper positions
- Position sensing in linear drives

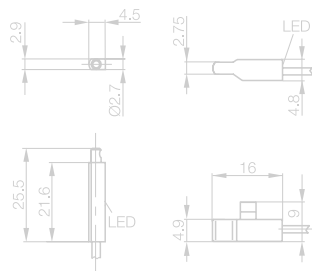






# BMF<sup>103/303</sup>

Magnetic Field Sensors



**BES**

**BMF**

**BOS**

**BGL**

**BOD**

**BAW**

**BIL**

**BIS**

**mini.s**



# BOS

## mini.s – optoelectronic sensors

### BOS 6K

The miniature series with maximum functionality features small-part detection and the highest switching precision: flexible sensors for the rapidly expanding assembly industry.

- High-Tech in the smallest space
- innovative laser technology for long sensing ranges
- Teach-in calibration
- Background suppression with red light or laser
- Complete series with a variety of sensor systems

### BOS 12M

The tubular standard series for flexible applications. Optimum price/performance ratio. Simple to install in a bore hole. Variety of versions for any automation task.

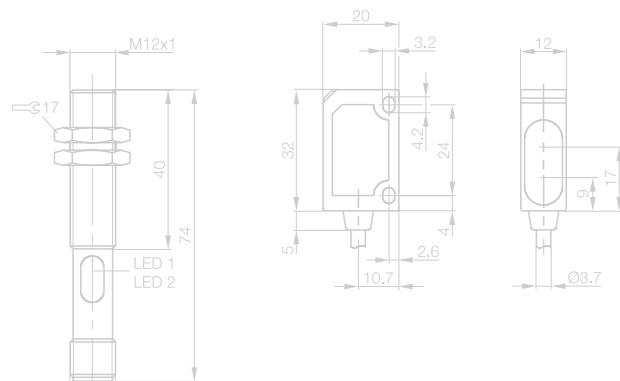
### BOS 26K

If the resolution of the normal sensors with background suppression is insufficient, the BOS 26K is your answer: Rectilinear series. Maximum range for versatile applications. Red laser light makes object positioning easier, background suppression enables detection of the smallest targets.

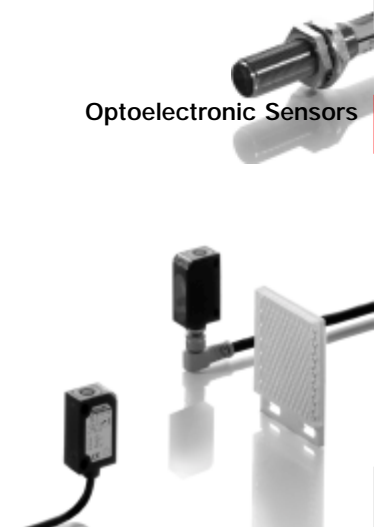
### Applications

- Industrial automation requiring more than standard sensors
- Detail sensing in general and circuit board assembly processes
- Precise position sensing with sensors from the BOS series





Optoelectronic Sensors

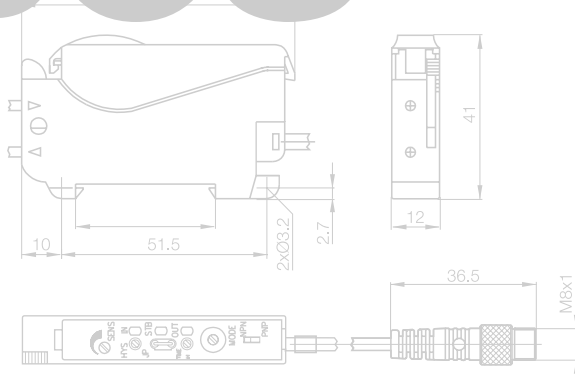


BES
BMF
<b>BOS</b>
BGL
BOD
BAW
BIL
BIS

# mini.s



# BOS



## BOS 74K, BOS 20K – Miniature sensors with fiber optics

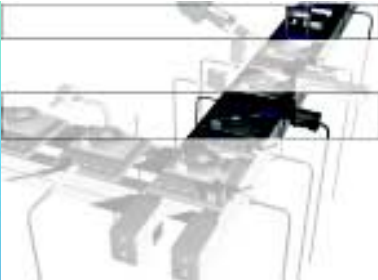
Basic units with plastic fiber optic cables offer maximum flexibility with the smallest dimensions: optimal for small parts, constantly changing objects and tight mounting spaces.

- Compact fiber optics
- Large selection of fiber end fittings
- BOS 74K: Basic unit with flexible potentiometer calibration and variable ancillary functions
- BOS 20K: Teach-in version for rapid and reliable startup at the press of a button

## Applications

- Detail sensing in semiconductor manufacturing processes
- Small parts sensing in material conveying of miniature components
- Object detection with miniature grippers

**BALLUFF**



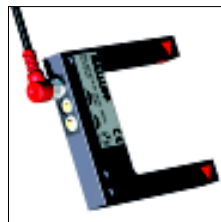
# BGL

## mini.s – slot sensors

### Slot sensors

Slot sensors are unbeatable when it comes to accuracy, small part detection and operating reliability. They can be installed quickly and calibrated efficiently with little effort.

- Fast installation, no complex adjustment, ease of handling
- High operating reliability
- High resolution
- Red emitter light
- High switching frequency



Optoelectronic Sensors

Slot Sensors

### Applications

- Material flow and part detection in conveying systems for automatic assembly machines
- Positioning circuit boards for the electronic industry
- Checking the smallest pin diameters for proper trimming

BES

BMF

**BOS**

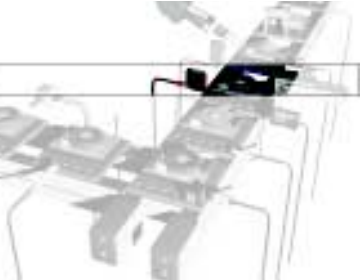
**BGL**

BOD

BAW

BIL

BIS



### BOD 6K

The BOS 6K series stands for high-tech in the smallest possible space. New in this series: the BOD 6K measuring sensor. This mini-sensor with its 32×20×12 dimensions covers a measuring range of 20 to 80 mm and is equipped with an additional switching output. Adjustable with a reliable and easy-to-use teach-in procedure made even easier with a highly visible red light.

- Analog output signal (0...10 V)
- Additional switching output with background suppression
- Teach-in calibration of the switching output
- Small, compact housing
- Rounds out the complete product family

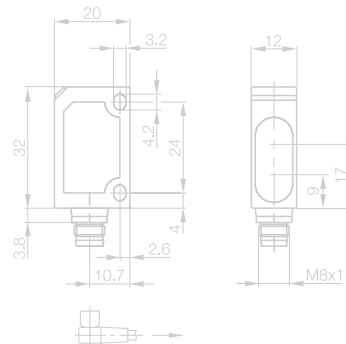
## mini.s – optical distance sensors

### Applications

- Ideal for level sensing when combining the analog and switching output.
- Position regulating



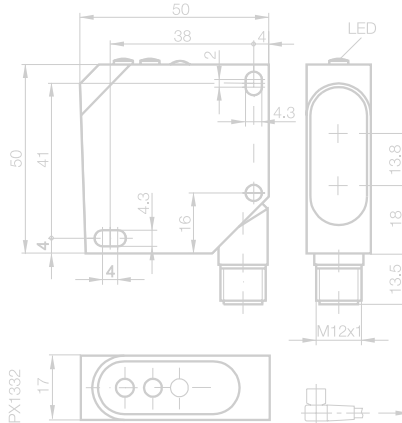
# 6K



## BOD 26K

The compact BOD 26K sensors combine precision and simplicity. Easy, reliable collimation with focused laser light. Small light spot size and high measuring frequency, ideal for detecting the smallest parts. The same series offers various sensing principles such as laser background suppression, retro-reflective sensors with auto-collimation optics, and color sensors.

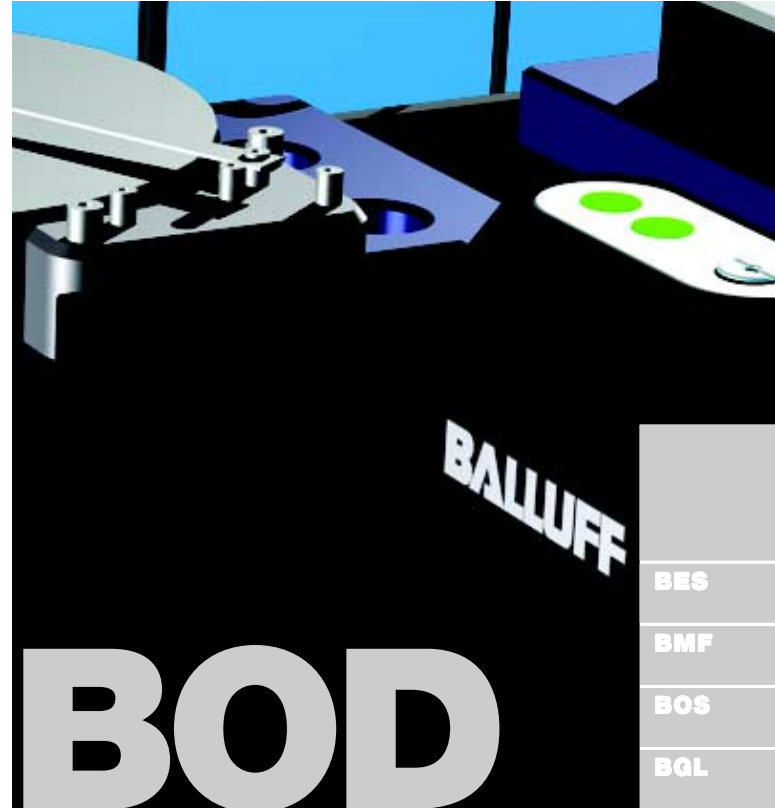
- Analog output signal
- High resolution, 40 or 80  $\mu\text{m}$
- Measuring range from 45...85 mm
- Connector or cable versions



### Applications

- Position sensing
- Detail sensing
- Level detection
- Object detection

# 26K



# BOD

Optical Distance Sensors with Analog Output  
**mini.s**

BES

BMF

BOS

BGL

**BOD**

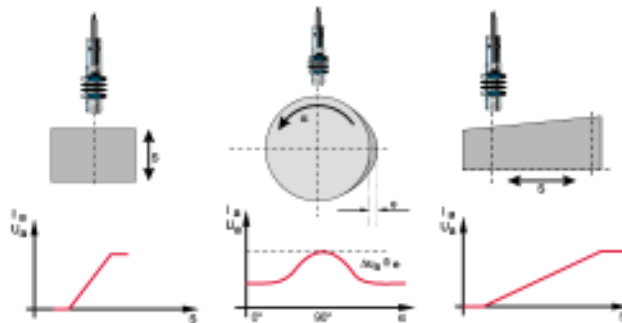
BAW

BIL

BIS

# BAW

## mini.s – analog sensors



### BAW Ø 6,5 mm – the smallest! With integrated temperature output

The smallest form factor for an analog distance sensor with integrated electronics and temperature output. Highest precision. Temperature signal allows for additional compensation for thermally induced expansion of the machine.

- Linear range 0.5...2 mm
- High repeatability and resolution
- Non-contacting, wear-free and absolute

### The BAW family – versatile problem solvers

These analog sensors with working ranges from 1.5 mm to 8 mm sense distance changes in a variety of installation situations with high repeatability.

Tightly sealed, rugged and reliable. In combination with a processor in the M18 housing, up to 3 switching points can be taught in the installation.

- Non-contacting measuring principle
- Working ranges from 1.5 mm to 8 mm
- Analog output signal 0...10 V, 0...20 mA or 4...20 mA

### Applications

- Non-contact sensing of travel and distances
- Positioning and position monitoring
- Wide variety of monitoring tasks





# BIL

## mini.s

# mini.s – magneto-inductive travel sensor

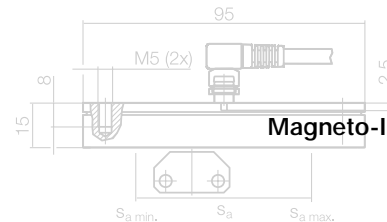
### BIL – innovative sensors for travel sensing

These sensors are designed for travel or stroke distances of up to 60 mm, detecting positions without contact and wear-free. Analog output signal proportional to the location of the passive (no cable) position marker. Sensor head and processing element are already incorporated into the housing. The overall length of the housing is just 95 mm.

- New sensor principle
- Measuring range 60 mm
- Compact, excellent ratio of measuring range and housing length
- Insensitive to shock, vibration and moisture, since the sensor element and the electronics are potted.
- Output signal 0...10 V or 4...20 mA
- High repeatability and temperature stability

### Applications

- Robotics
- Automated assembly
- Clamping distance of tools and grippers
- Process technology: Flow measurement with floats



Analog Sensors

BES

BMF

BOS

BGL

BOD

BAW

BIL

BIS

### BIS C-121 – the smallest data carrier with 511 bytes

With dimensions of just 9×4.5 mm, the BIS C-121 is the smallest of the data carriers yet with a memory capacity of 511 bytes. Can be installed in metal with no loss of function. Special vacuum-compatible BIS C-121 version is glass encapsulated for use in aggressive media. Offset read/write heads. Compact processors with IP 65 rating.

- Ø 9×4.5 mm
- 511 byte capacity
- Can be installed in metal
- Glass encapsulated version available
- Non-contacting and wear-free
- Inductive energy coupling
- Reliable and rugged

### Applications

Tool identification and autoclaves  
(BIS C-121 glass encapsulated)

### BIS C-190 and BIS C-191 – Around-corner data carriers for pallets

Expensive and time-consuming rotating of workpiece carriers is becoming a thing of the past. Around-corner data carriers with two 90° offset sides with the same quality, for reading and writing.

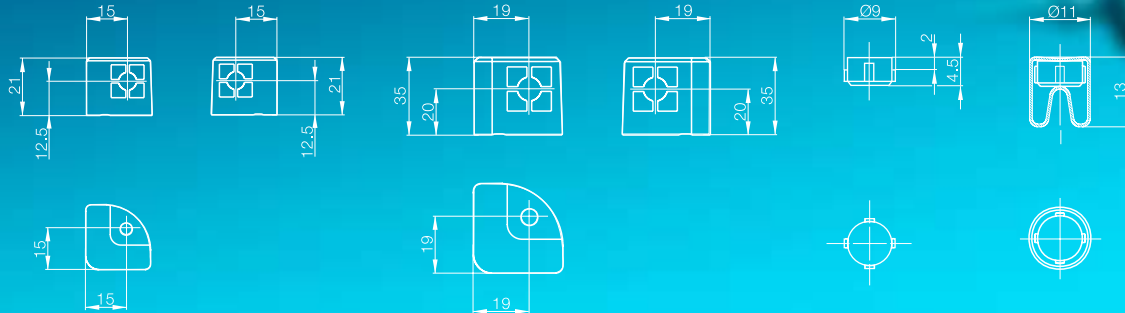
BIS C-190: Housing size 34×34×35 mm. 3 memory versions in EEPROM and FRAM technology available.

BIS C-191: Housing size 24×24×21 mm. 2 memory versions in EEPROM technology available.

- Compact housing
- Non-contacting data exchange
- Range up to 25 mm with BIS C-190 and up to 10 mm with BIS C-191
- Reading on-the-fly up to 48 m/min with BIS C-190 and up to 24 m/min with BIS C-191
- Insensitive to contamination

### Applications

Assembly lines, pallet identification, conveying systems





# BIS

## mini.s – identification systems

**mini.s**



Identification Systems

**BES**

**BMF**

**BOS**

**BGL**

**BOD**

**BAW**

**BIL**

**BIS**

mini.s – the new sensor dimension

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