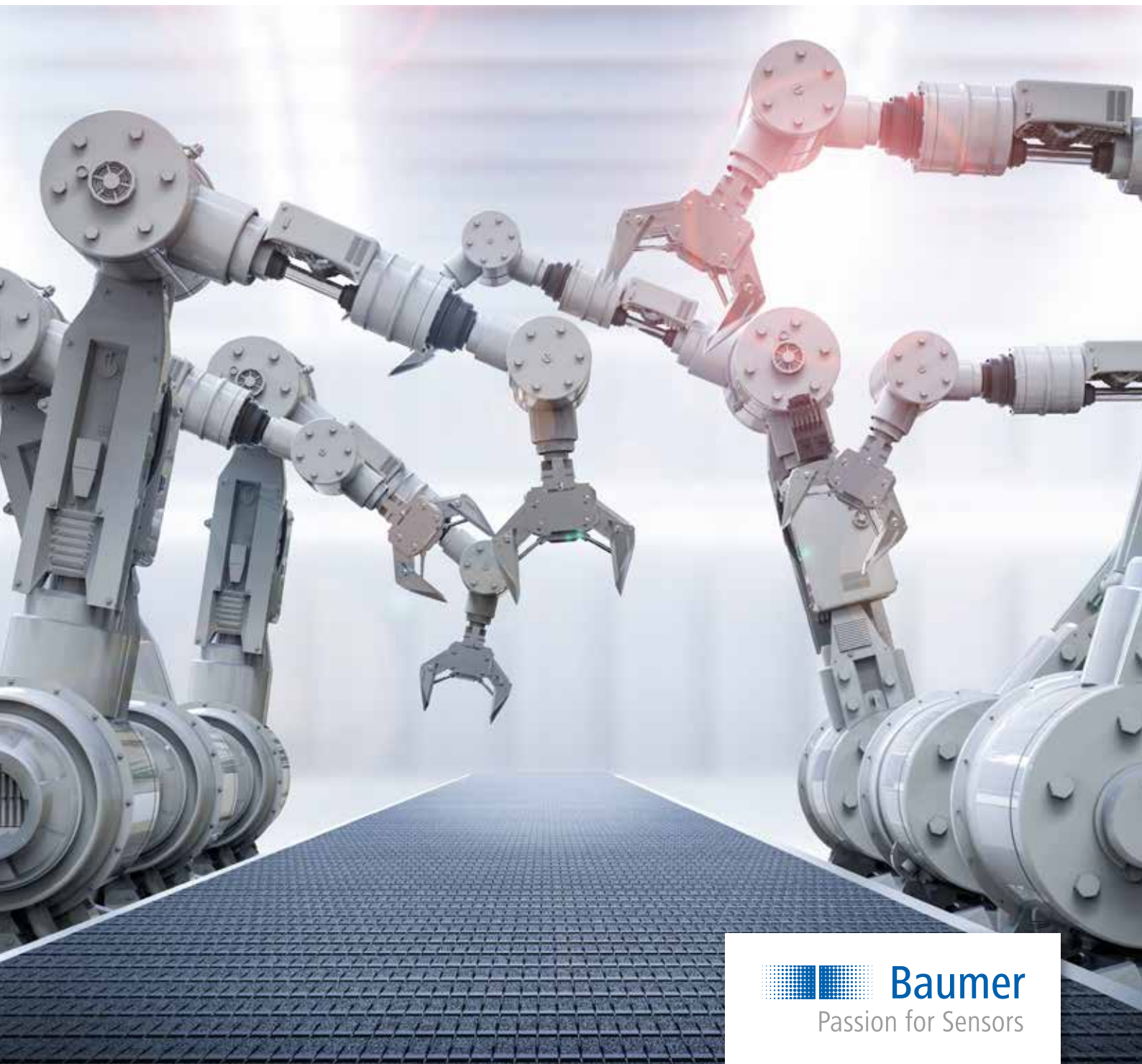


# Robotics: End-of-Arm Tooling

## Grippers & automatic tool changers



**Baumer**

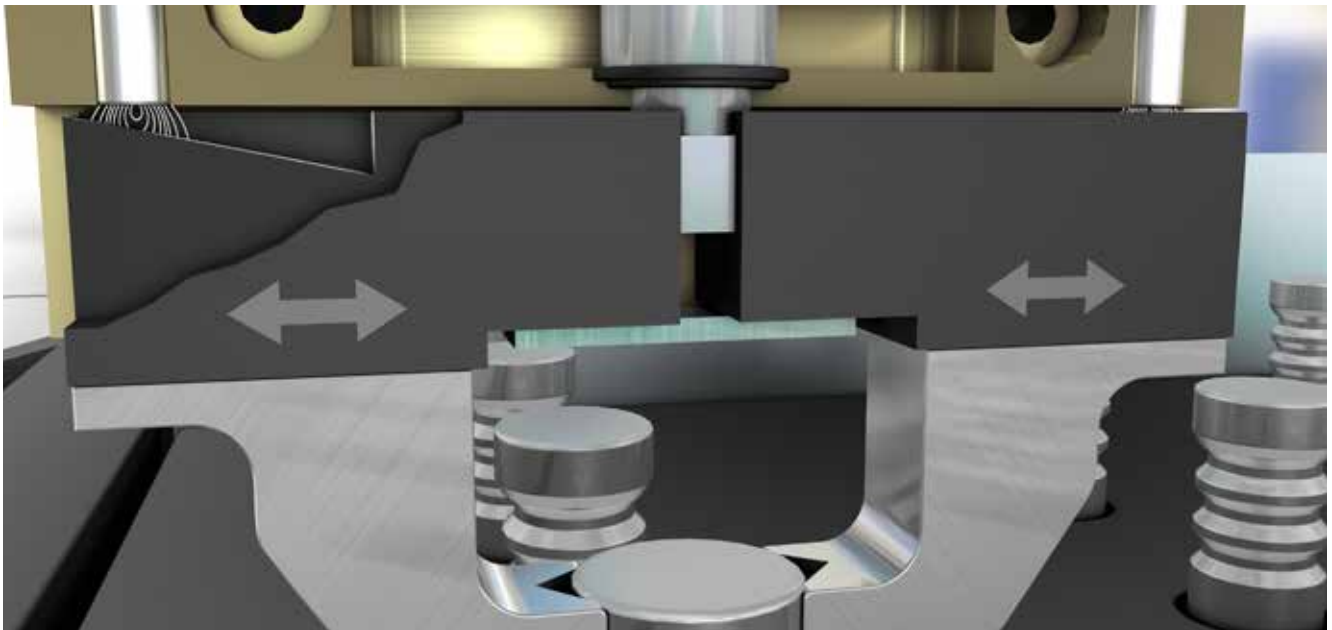
Passion for Sensors

# Parallel grippers – sensor applications.

## Smart gripping with Baumer sensor solutions

Baumer miniature sensors with an analog output or IO-Link provide precise position feedback of the gripper jaws. In this way, the gripper itself becomes a measuring instrument to check and validate the gripped part. High resolution and repeat accuracy combined with low temperature drift ensure both process stability and precision. In addition teachable and linearized sensor versions save time before and during setup and calibration, sparing the need to get involved on the controls level. Furthermore, up to 2 switching points can be defined

with the output being fully configurable comprising hysteresis, curve steepness and measuring range. With a response time of 0.5 ms, the sensors are suitable for high speed applications while also providing a high dynamic resolution. The superior sensor functionality provides access to data such as cycle counters and operating hours. This data can be used for preventive maintenance, warranty claim management and statistics, perfectly enabling the smart gripper to contribute to IoT machine concepts.



## Jaws: Position

Task: Indirect measurement of the opening degree of the gripper fingers in order to provide feedback from the gripped part. A wedge or a cam have to be designed into, or added to, the gripper mechanism to act as a target for a miniature inductive distance sensor.

### Inductive distance sensors – IR 06 / IR 08 family

- 0 mm to 3 mm measuring range
- Linearized
- Available in 6.5 mm and 8 mm housing
- Teachable versions available
- IO-Link versions available
- High resolution and repeatability

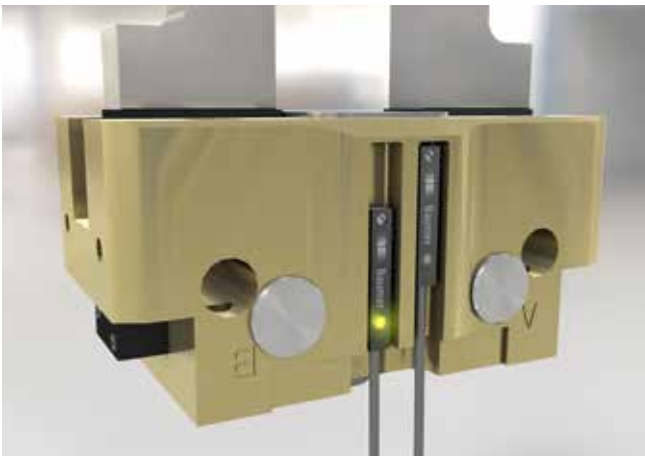
### Inductive distance sensors – IF 08

- Miniature size 8 × 4.7 × 16 mm
- High resolution and repeatability
- 0 mm to 2 mm measuring range
- 0 to 10 V output
- Cable connection

### Inductive distance sensors – IWFM 05

- Miniature size 5 × 5 × 32 mm
- 0 mm to 1 mm measuring range
- High resolution and repeatability
- 0 to 10 V output
- M5 connector





## Piston position

**Task:** Detecting upper and lower end position of the piston in pneumatic grippers in order to ensure that the piston rod is not broken. The controls will collate the signal with the jaws / fingers open / close signal.

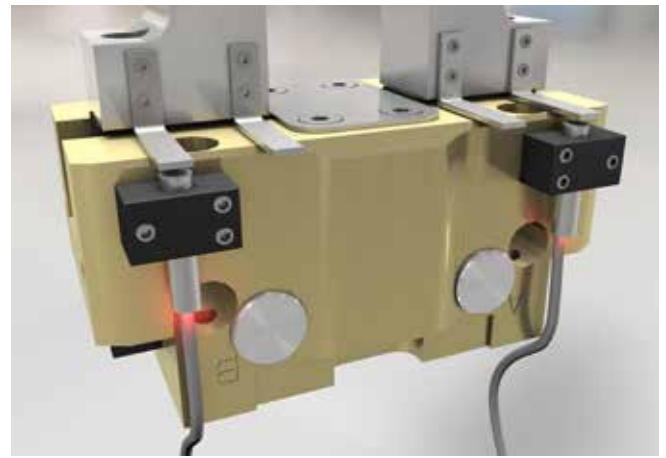
### Magnetic cylinder sensors for T- and C-slots

- Robust magneto-resistive technology
- Reproducible and precise switching behavior
- Ultra fast 200 kHz switching frequency
- IP 67 with reverse polarity protection
- Cable or cable-connector

For T-slots – MZTK 06N1011

For T-slots with 90° cable outlet – MZTK 06N1012

Insert from above – MZTK 06N1013



## Jaws: End position

**Task:** Detecting open / close condition of the jaws.

### Miniature inductive proximity switch – IFRM 03P3713/L

- Super small self-contained cylindrical inductive prox, (ø3 × 16 mm with cable or 3 × 12 mm 3-wire stranded)
- 1 mm sensing distance at 4 kHz

### Miniature inductive proximity switch – IFRM 04 family

- Ultra compact M5 connector version ø4 × 24 mm, sensing distance = 1 mm
- Compact cable version, ø4 × 25 mm with extended sensing distance of 1.6 mm

### Inductive proximity switch – IFRM 05 family

- 5 mm housing with sensing distances from 1 mm to 1.6 mm
- Housing lengths from 15 mm to 45 mm
- M8 connector version available

### Inductive proximity switch – IFRM 06 / IR 06 family

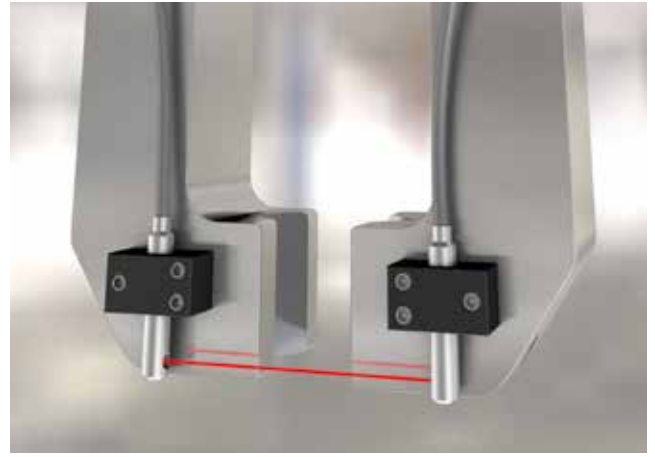
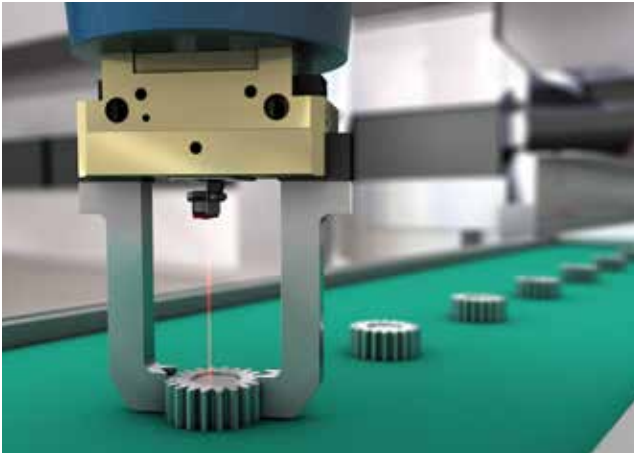
- 2 mm and 3 mm sensing distance available
- ø6.5 mm housing with lengths from 22 mm to 56 mm
- ATEX version available
- Factor 1 versions: Equal sensing distance on all metals
- Non flush version with 6 mm sensing distance available

### Inductive proximity switch – IFRD 08 / IR 08 family

- *DuroProx* line: Full metal housing available
- High temperature versions available up to 100 °C / 212 °F self-contained and up to 180 °C / 356 °F with external electronics
- Factor 1 versions: Equal sensing distance on all metals
- ATEX version available

### Inductive proximity switch – IFFM 08N37A6/L

- 5 × 8 × 16 mm square metal housing with 2 mm sensing distance
- Integrated mounting hole



## Part presence detection

Task: Detect part presence or distance to part between gripper fingers in open and close condition.

### Diffuse subminiature sensors with background suppression – FHCK 07 family

- Smallest teachable miniature photoelectric sensor with background suppression sensing distance = 10 mm to 60 mm

### Diffuse miniature sensors with background suppression – FHDK 10 family

- Available with presets of 30 mm, 50 mm, 80 mm
- Teachable from 20 mm to 120 mm
- LED and laser light source available
- Lightspot or line available

### Small ultrasonic proximity sensors – UNDK 10

- Sensing distance from 10 mm to 200 mm
- Lightweight ultrasonic proximity switch with small sonic beam pattern
- Quick 5 ms response time
- Reflex-type also available

### Miniature fiber optic through beam sensor – FVDK 10N5101

- Size: 27 × 19.5 × 12 mm, 36 g lightweight, adjustable photoelectric through beam sensor with up to 160 mm sensing distance

### Fiber optics

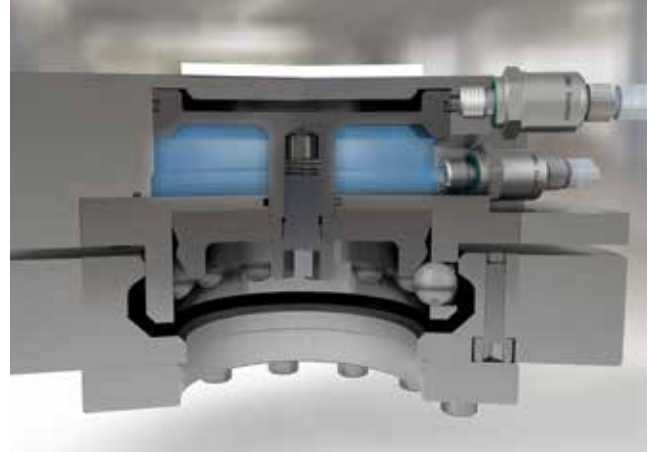
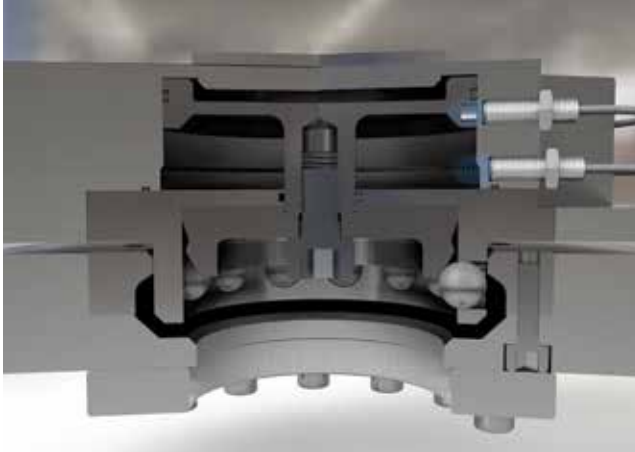
- Large sensing head selection
- Lightweight
- Highly flexible plastic fibers





# Automatic tool changers – sensor applications.

Reliably detecting the proper connecting of the tool changer to its counterpart is crucial for safety. The integrated fail-safe mechanism in most tool changers will not prevent failure due to incomplete coupling. Baumer offers different sensor technologies to reliably detect the piston position.



## Locked / unlocked detection

**Task:** Monitoring locked and unlocked condition by detecting piston position.

### Magnetic

The service-friendly way: Easy mounting in blind hole – no sealant needed.

**8 mm magnetic proximity switches – MFRM 08P15/183948**

- Compact length of 30 mm
- Stainless steel housing
- Up to 60 mm sensing distance



**Task:** Monitoring locked and unlocked condition by measuring air pressure above and below the piston crown.

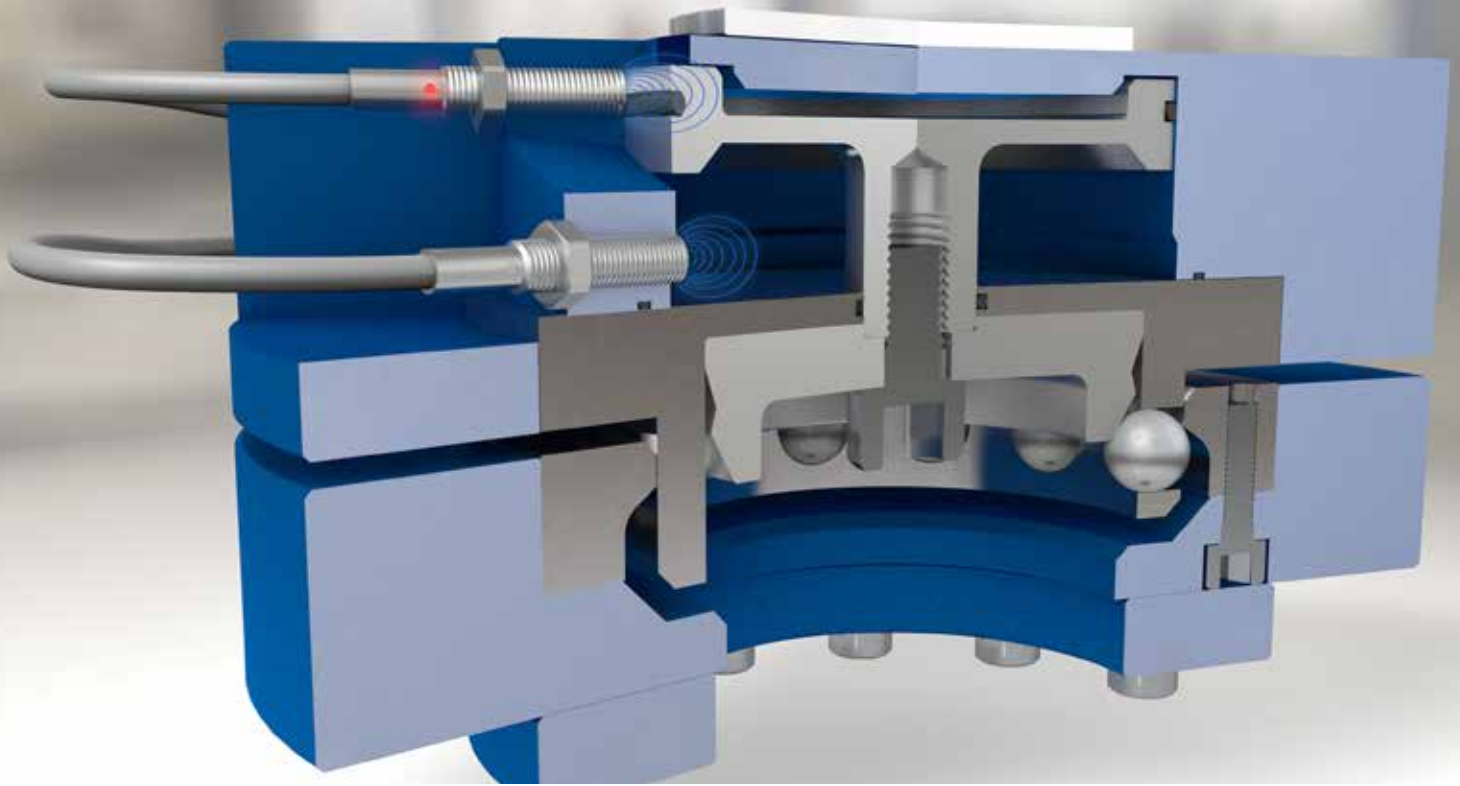
### Pressure

Gain additional safety by actively monitoring the pressure on both sides of the piston.

**Pressure sensor PBM 4**

- Compact design
- Stainless steel housing
- Configurable interfaces and output





**Task:** Monitoring locked- and unlocked condition by detecting piston position.

## Inductive

Robust and airtight due to fully potted electronics with excellent repeatability over a wide temperature range.

### Miniature inductive proximity switch – IFRM 04 family

- Ultra compact M5 connector version  $\varnothing 4 \times 24$  mm, sensing distance = 1 mm
- Compact cable version,  $\varnothing 4 \times 25$  mm with extended sensing distance of 1.6 mm

### 6 mm inductive proximity switch – IFRM 06 / IR 06 family

- 2 mm and 3 mm sensing distance
- $\varnothing 6.5$  mm housing with lengths from 22 mm to 56 mm
- ATEX-version available
- Factor 1 versions: Equal sensing distance on all metals
- *GammaProx* line with extra large sensing distance of 3 mm
- Non-flush versions with 6 mm sensing distance

### 8 mm inductive proximity switch – IFRM 08P1713/L and IR 08 family

- Sensing distances 2 mm and 3 mm
- Airtight design / fully potted electronics
- Available housing lengths: 22 mm, 30 mm, 40 mm, 50 mm
- IR 08 available in 28 mm, 36 mm, 46 mm and 56 mm
- Factor 1 versions: Equal sensing distance on all metals



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