Products and solutions for identification
Optical code readers or RFID systems are used for the detection and tracking of objects in material flow or production processes. The fields of application range from code reading on a wide range of transport containers, motor parts or medical samples to identification without visual contact through the use of RFID technology.
Our mobile and stationary identification systems read all common 1D- and 2D-codes or the data stored on transponders with extremely high reliability. Identification often occurs independent of the alignment and positioning of the object, even at high movement speeds.

Equipped for all requirements:
— Even soiled or damaged codes can be reliably read using code reconstruction technology
— Devices are available with especially compact design for installation in constrained spaces
— Our hand-held scanners – with various optics – enable code reading from distances of up to 16 meters
— Various device models as well as modular connection systems enable data transmission by using all standard fieldbus/industrial bus interfaces
With curiosity and determination, we – the Sensor People – have been partners for technological milestones in industrial automation for more than 50 years. The success of our customers is what drives us. Yesterday. Today. Tomorrow.
The right technology

To offer the optimum solution for all requirements, we use various technologies. These range from optically reading 1D- and 2D-codes to contact-free data transmission through radio frequency identification.

1D-code

With 1D-codes, the information is represented using lines and gaps of various widths. The black bars and white gaps reflect the light emitted by the 1D-code reader to different degrees. Less light is reflected by the black bars. This is detected by the receiver module of the reader, which converts the information into binary data that can subsequently be processed further and output via an interface.

Advantages
— Simple and inexpensive to create
— Through an integrated check digit, the code is directly checked for validity, thereby making possible high first-pass read rates

Areas of application
— Electronics, automotive and consumer goods industries
— Transport logistics
— Postal shipping

2D-code

There are two types of 2D-codes: the matrix code and the stacked code. With the matrix code, the information is represented by arranging small geometric cells. The stacked code is a special case. Here, the information is represented by lines and gaps in multiple rows. The camera of the sensor takes a picture of the code. The camera chip detects the contrast between the white gaps and the black cells and converts the information into binary data. This is then processed further and output via an interface. Unlike the 1D-code, the information is contained in the arrangement of the cells.

Advantages
— Minimal space requirement
— Highest-possible information content
— Through the integrated error correction algorithm, even damaged codes can be read error-free

Areas of application
— Transport logistics
— Electronics and automotive industries
— Consumer goods and travel sectors
— Pharmaceutical industry

www.leuze.com
Radio Frequency Identification – RFID

An RFID system consists of a read/write system with integrated and/or external antenna as well as at least one transponder and uses electromagnetic waves for data transmission. Each transponder consists of an antenna and a microchip on which a unique, unchangeable serial number (Unique ID) as well as – depending on the type of transponder – other object-related data is stored.

While active transponders use an integrated power source for data transmission, passive transponders draw the energy required for data transmission from the electromagnetic field of the reader. RFID systems use low frequencies/LF (125 kHz to 134 kHz), high frequencies/HF (13.56 MHz) or ultra-high frequencies/UHF (865 MHz to 928 MHz). The used frequencies vary depending on operating range, transmission rate and susceptibility to interference. In general: the reading ranges achieved by the system increase with frequency, but so too does the susceptibility to interference.

Advantages
- “Visual contact” is not required between write/read unit and transponder: the radio waves penetrate materials such as wood, cardboard or plastic depending on the frequency range
- Transponders can be integrated in the product or in the transport medium
- RFID systems are robust and also function reliably in harsh environments independent of contamination
- When using writable transponders, production and quality data can be stored directly on the transponders during the production process

Areas of application
- Production control
- Access control
- Identification of persons and objects
- Skid, container and pallet identification
- Material flow control in conveyor and storage systems or the automotive industry
Selection guide

Stationary use
Optical

1D-bar code
Without housing
Industrial housing
Relatively small
Compact
Relatively large

Stacked code
Without housing
Industrial housing
Relatively small
Compact

2D-code
Without housing
Industrial housing
Relatively small
Compact

Directly marked codes (DPM)
# Selection guide

## Min. – max. reading distances
(depending on modulus width and optics model)

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<tr>
<th>Min. – max. reading distances</th>
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<td>50–230 mm</td>
<td>CR 50</td>
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<td>30–425 mm</td>
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</tr>
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<td>20–71 mm</td>
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<td>25–260 mm</td>
<td>BCL 92, BCL 95</td>
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<tr>
<td>40–160 mm</td>
<td>BCL 8</td>
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<td>50–230 mm</td>
<td>CR 55</td>
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<td>50–330 mm</td>
<td>LSIS 220</td>
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<tr>
<td>30–425 mm</td>
<td>DCR 55</td>
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<td>40–800 mm</td>
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<td>BCL 300i</td>
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<td>300–1,450 mm</td>
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<td>450–1,700 mm</td>
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<td>200–2,400 mm</td>
<td>BCL 500i</td>
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<td>75–10,000 mm</td>
<td>LSIS 422i</td>
<td>31</td>
</tr>
<tr>
<td></td>
<td>– Depending on the version, see data for the BCL 500i, BCL 600i and BCL 900i series</td>
<td></td>
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<td></td>
<td>MSPI systems</td>
<td>23</td>
</tr>
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<tr>
<td>75–10,000 mm</td>
<td>DCR 200i, LSIS 462i</td>
<td>31</td>
</tr>
</tbody>
</table>

Devices for use in laboratory automation
Selection guide

Stationary use
  RFID
    LF (125 kHz)
    HF (13.56 MHz)

Mobile use
  hand-held scanners
    1D-bar code
      Industrial housing
      Multi-purpose
    Stacked code
      Industrial housing
      Multi-purpose
    2D-code
      Industrial housing
      Multi-purpose
    Directly marked codes (DPM)
## Min. – max. reading distances
(depending on modulus width and optics model)

<table>
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<th>Reading Distances</th>
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<td>RFI 32</td>
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<tr>
<td>0 – 110 mm</td>
<td>RFM 32</td>
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<tr>
<td>0 – 400 mm</td>
<td>RFM 62</td>
</tr>
<tr>
<td>0 – 170 mm</td>
<td>IT 1920i</td>
</tr>
<tr>
<td>0 – 147 mm</td>
<td>HS 66x8</td>
</tr>
<tr>
<td>100 – 4,460 mm</td>
<td>IT 128xi</td>
</tr>
<tr>
<td>10 – 16,000 mm</td>
<td>IT 19xxi</td>
</tr>
<tr>
<td>37 – 370 mm</td>
<td>IT 147xg</td>
</tr>
<tr>
<td>10 – 460 mm</td>
<td>IT 1300g</td>
</tr>
<tr>
<td>0 – 596 mm</td>
<td>IT 195xg</td>
</tr>
<tr>
<td>0 – 170 mm</td>
<td>IT 1920i</td>
</tr>
<tr>
<td>0 – 147 mm</td>
<td>HS 66x8</td>
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<td>0 – 147 mm</td>
<td>HS 66x8</td>
</tr>
</tbody>
</table>
1D-code readers

Code reading on objects of various height

Requirement: If objects of various height are transported on a conveyor line, it must be guaranteed that the 1D-codes are read independent of their position.

Solution: The BCL 300i and BCL 500i 1D-code readers are available in models with oscillating mirror that can read moving objects at different heights.

Code reading in constrained spaces

Requirement: If 1D-code readers are used in applications with small installation depth, a device with lateral beam exit may be necessary.

Solution: The BCL 200i 1D bar code readers are optimized by means of a lateral cable outlet and deflecting mirror for constrained spaces between the conveyor line. Thanks to the integrated code reconstruction technology, you can even read damaged codes reliably.

Code reading on pallets

Requirement: If codes with low modulus size need to be read on objects from a relatively far distance, a 1D-code reader with the largest possible reading field depth is necessary.

Solution: The BCL 600i 1D-code readers achieve a 50% greater depth of field with their blue laser diode than devices with red laser light. The high reading field depth reduces the sensitivity in the event of fluctuations in distance and eliminates the need for manual focus adjustment.
Code reading from long distances

Requirement: If objects of various height are transported on a conveyor line at high speed, it must be guaranteed that the 1D-codes are read independent of their distance to the reader.

Solution: The BCL 900i 1D-code readers have an especially large reading field due to their opening angle of 60°. The high scanning rate of up to 1,000 scans/s guarantees code reading even at high conveyor speeds.

Omnidirectional code reading

Requirement: Codes must be read independent of their alignment and position.

Solution: The BCL 500i, 600i and 900i 1D-code readers are each available as modular scanner systems. Through their arrangement, omnidirectional reading is possible.

Code reading for objects of various height

Requirement: Codes must be read on objects with high movement speed independent of their alignment, position and height.

Solution: The BCL 900i 1D-code readers are available as modular scanner systems for omnidirectional reading. Through their high scanning rate and operating range, codes can be read on quickly moving objects of various height.
1D-code readers

**Code reading of multiple rows of racks**

**Requirement:** A large number of codes must be read at various distances within a short time.

**Solution:** With their focus adjustment, the BCL 148 1D-code readers enable a reading field depth of up to 310 mm. As a result, codes with a small modulus size can be read even from a relatively long distance. The fast decoding and reading by the device enable a high process speed.

**Code reading on samples in constrained spaces**

**Requirement:** Codes must be read in constrained spaces while at a standstill or while moving slowly.

**Solution:** Thanks to their extremely small design, the CR 50/55 1D-code readers are suitable for use in constrained spaces.
BCL 8

Compact 1D-code readers with especially high degree of protection of the housing

Areas of application
— Code reading in harsh industrial environments
— Code reading on objects with medium to high movement speed

Operating principle
— Laser single line, deflecting mirror

Advantages for you

<table>
<thead>
<tr>
<th>VERY ROBUST</th>
<th>FLEXIBLE INSTALLATION</th>
<th>EASY HANDLING</th>
</tr>
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<tbody>
<tr>
<td>Compact housing with high degree of protection for the highest requirements in constrained spaces</td>
<td>Turning connector enables adaptation of the cable outlet to the application requirements</td>
<td>Integrated control functions such as reference code comparison eliminate the need for additional hardware for this purpose</td>
</tr>
</tbody>
</table>

Features
— Reliable reading of all common 1D-codes including Pharmacodes
— Flexible installation options through front or perpendicular beam exit as well as turning connector
— Reading range: 40 – 160 mm
— Modulus size: 0.15 – 0.5 mm
— Constant high scanning rate of up to 600 scans/s
— Ambient temperature (operation): 0 – 40°C
— Interface: RS 232
— Degree of protection: IP 67
— Dimensions (W × H × L): 40.3 × 48 × 15 mm
BCL 92, BCL 95
1D-code reader with high depth of field

Areas of application
— Code reading across up to 7 rows of racks
— Code reading on objects with medium to high movement speeds

Operating principle
— Laser single line, deflecting mirror

Advantages for you

<table>
<thead>
<tr>
<th>SPACE-SAVING</th>
<th>Large reading field height even at short reading distance reduces installation depth</th>
</tr>
</thead>
<tbody>
<tr>
<td>FAST COMMISSIONING</td>
<td>Configuration via Sensor Studio software enables fast commissioning</td>
</tr>
<tr>
<td>FLEXIBLE INSTALLATION</td>
<td>Adaptation to the application requirements thanks to flexible cable outlet</td>
</tr>
</tbody>
</table>

Features
— Reliable reading of all common 1D-codes including Pharmacodes
— Flexible installation options through front or perpendicular beam exit
— Reading range:
  — BCL 92: 25 – 260 mm
  — BCL 95: 50 – 180 mm
— Modulus size: 0.15 – 0.5 mm
— Scanning rate of maximum 600 scans/s also enables fast manual or automated rack insertion
— Ambient temperature (operation): 0 – 50°C
— Interface: RS 232
— Degree of protection: IP 54
— Dimensions (W × H × L):
  — Standard model (front beam exit):
    — 62 × 43.5 × 23.8 mm
  — Model with deflecting mirror:
    — 62 × 56.9 × 23.8 mm
— High reading field height at short distances
BCL 148
1D-code reader with adjustable focus

Areas of application
— Code reading across up to 16 rows of racks

Operating principle
— Laser single line with focus adjustment

Advantages for you

<table>
<thead>
<tr>
<th>SPACE-SAVING</th>
<th>FLEXIBLE OPERATING RANGE</th>
</tr>
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<tbody>
<tr>
<td>Large reading field height even at short reading distance reduces installation depth</td>
<td>Adjustable focus enables the reading of codes from various distances</td>
</tr>
</tbody>
</table>

Features
— Reliable reading of all common 1D-codes including Pharmacodes
— Front beam exit
— Reading range: 30 – 310 mm
— Modulus size: 0.127 – 0.5 mm
— Scanning rate of up to 750 scans/s also enables fast manual or automated rack insertion
— Ambient temperature (operation): 5 – 40°C
— Interfaces: RS 232, RS 485
— Degree of protection: IP 65
— Dimensions (W x H x L): 71 x 38 x 118.5 mm
— High reading field height at short distances
— Focus adjustment for sample codes and reagents
— Robust metal housing with cable connection
BCL 200i
1D-code reader for container/tray identification

Areas of application
— Code reading in constrained spaces
— Code reading on objects with high movement speed

Operating principle
— Laser single line, raster scanner, deflecting mirror

Advantages for you

<table>
<thead>
<tr>
<th>HIGH SYSTEM AVAILABILITY</th>
<th>SIMPLE INTEGRATION</th>
<th>FAST COMMISSIONING</th>
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</table>
| Integrated code reconstruc-
| technology enables relia-
| ble reading of damaged 
| codes and, thus, a smooth 
| process sequence          |
| Module selection in the 
| GSDML files enables simple 
| integration in PROFINET 
| networks                        |
| Configuration via browser-
| based webConfig enables fast 
| commissioning                  |

Features
— Reliable reading of all common 1D-codes
— Flexible installation options by means of lateral cable outlet and perpendicular beam exit
— Reading range: 40 – 255 mm
— Modulus size: 0.2 – 0.5 mm
— High scanning rate of up to 1,000 scans/s for objects with high movement speed
— Ambient temperature (operation): 0 – 40°C
— Interfaces: PROFINET IO/RT, Ethernet TCP/IP, UDP, as 1-port model
— Degree of protection: IP 65
— Dimensions (W × H × L): 92 × 38 × 84 mm
— Connection via permanent connection cables with M12 connector

* depending on model
**BCL 300i**

1D-code reader for medium to large operating ranges

**Areas of application**
- Code reading on objects of various height
- Code reading in constrained spaces
- Code reading on objects with high movement speed

**Operating principle**
- Laser single line, raster scanner, deflecting mirror, oscillating mirror

**Features**
- Reliable reading of all common 1D-codes
- Flexible installation options through front or perpendicular beam exit
- Reading range: 50 – 680 mm*
- Modulus size: 0.127 – 0.8 mm*
- High scanning rate of up to 1,000 scans/s for objects with high movement speed
- Ambient temperature (operation): 0 – 40°C (without heating), -35 – 40°C (with heating)
- Interfaces: PROFiBUS, PROFINET IO/RT, Ethernet TCP/IP, UDR, Ethernet IP, EtherCAT, multiNet, RS 232, RS 422, RS 485
- Degree of protection: IP 65
- Dimensions (W × H × L):
  95 × 44 × 68 mm (single line scanner),
  125 × 58 × 110 mm (oscillating mirror),
  103 × 44 × 96 mm (deflecting mirror)
- Connection by means of modular connection hoods with M12 connector, clamp connection or fixed connection cables
- Models available with display and heating

* depending on model
BCL 500i, BCL 600i

1D-code readers for large operating ranges and codes with small modulus width

Areas of application
- Code reading on objects of various height
- Code reading on objects from a far distance
- Code reading on objects with high movement speed

Operating principle
- Laser single line, oscillating mirror

Features
- Reliable reading of all common 1D-codes
- Flexible installation options through front or perpendicular beam exit
- Reading range: 200–2,400 mm*
- Modulus size: 0.25 – 1 mm (depending on device model)
- High scanning rate of up to 1,000 scans/s for objects with high movement speed
- Ambient temperature (operation):
  - 0–40°C (without heating), −35–40°C (with heating)
- Interfaces: PROFIBUS, PROFINET IO/RT, Ethernet TCP/IP, UDP, Ethernet IP, multiNet, RS 232, RS 422, RS 485
- Degree of protection: IP 65
- Dimensions (W × H × L):
  - 123.5 × 63 × 106.5 mm (single line scanner),
  - 173 × 84 × 147 mm (oscillating mirror)
- Diagnostics and configuration via browser-based webConfig or directly via the PLC by means of GSD/GSDML file
- Models available with display and heating
- BCL 600i: Blue laser diode enables an extended reading field without changing the focus adjustment

Advantages for you

<table>
<thead>
<tr>
<th>HIGH SYSTEM AVAILABILITY</th>
<th>FAST COMMISSIONING</th>
<th>SIMPLE INTEGRATION</th>
</tr>
</thead>
</table>
| Integrated code reconstruc-
| tion technology enables |
| reliable reading of dam-
| aged codes and, thus, a |
| smooth process sequence |
| Configuration via browser-
| based webConfig enables |
| fast commissioning |
| Module selection in the |
| GSD/GSDML files enables |
| simple integration in |
| PROFIBUS or PROFINET |
| networks |

* depending on model
Product overview – 1D-code readers

BCL 900i
1D-code reader for very large operating ranges

Areas of application
— Code reading on objects of various height
— Code reading on objects from a very far distance

Operating principle
— Laser single line

Advantages for you

<table>
<thead>
<tr>
<th>VERY FAST</th>
<th>SIMPLE DETECTION</th>
<th>MAXIMUM EFFICIENCY</th>
</tr>
</thead>
<tbody>
<tr>
<td>Very high reading rate ensures a very high object throughput</td>
<td>The available object tracking enables shorter distances to the code</td>
<td>Integrated dual optics enable a large reading field and reduce the number of devices that are required</td>
</tr>
</tbody>
</table>

Features
— Reliable reading of all common 1D-codes
— Front beam exit
— Reading range: 450 – 1,700 mm
— Modulus size: 0.25 – 0.5 mm
— High scanning rate of up to 1,000 scans/s for objects with high movement speed
— Ambient temperature (operation): 0 – 50°C
— Interfaces: Ethernet IP, Ethernet TCP/IP UDP, RS 232, RS 422
— Degree of protection: IP 65
— Dimensions (W × H × L): 216 × 96 × 127 mm
— Simple teaching-in of codes using a control buttons
— Diagnostics and configuration via browser-based webConfig
— Simple focus changeover through integrated dual optics
— Integrated Ethernet switch
MSPi systems
Modular scanner systems

Areas of application
— Code reading independent of position and alignment

Operating principle
— Laser single line

Advantages for you

<table>
<thead>
<tr>
<th>FAST INSTALLATION</th>
<th>FAST COMMISSIONING</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pre-assembled Plug&amp;Play system enables simple mounting and commissioning</td>
<td>Configuration via browser-based webConfig enables fast commissioning</td>
</tr>
</tbody>
</table>

Features
— Reliable reading of all common 1D-codes
— Omnidirectional arrangement enables code reading independent of the code alignment
— Models available with the BCL 500i, BCL 600i or BCL 900i 1D-code readers
— Expanded modular system for up to 32 devices
— Interfaces: PROFIBUS, PROFINET IO/RT, Ethernet TCP/IP, UDP, Ethernet IP, multiNet, RS 232, RS 422, RS 485
CR 50, CR 55
Compact 1D-code readers with large reading field

Areas of application
- Code reading in constrained spaces
- Code reading on objects at a standstill or with slow movement speed

Operating principle
- Single line scanner with CCD image sensor

Advantages for you

<table>
<thead>
<tr>
<th>SMALL SIZE</th>
<th>FAST COMMISSIONING</th>
</tr>
</thead>
<tbody>
<tr>
<td>Large reading range in compact housing</td>
<td>Configuration via Sensor Studio software enables fast commissioning</td>
</tr>
</tbody>
</table>

Features
- Reliable reading of all common 1D-codes
- Front beam exit
- Reading range: 40 – 250 mm
- Modulus size: 0.1 – 0.5 mm
- Scanning rate of up to 330 scans/s for applications at a standstill or moving slowly
- Ambient temperature (operation): 0 – 50°C
- Interfaces: USB, RS 232
- Degree of protection: IP 54

- Miniature code reader in 2 mounting variants:
  - CR 50: Open module for integration in instrument parts, e.g., via the 12-pin connector directly on the circuit board
  - CR 55: Metal housing with optics cover and cable connection for installation at any location

- Dimensions (W × H × L):
  - CR 50: 22.5 × 14 × 33 mm
  - CR 55: 31 × 18.3 × 45.5 mm
CR 100
Compact 1D-code readers with extra large reading field at close range

Areas of application
— Code reading in constrained spaces
— Reading of codes in ladder orientation

Operating principle
— Single line scanner with CCD image sensor, deflecting mirror

Advantages for you

<table>
<thead>
<tr>
<th>SPACE-SAVING</th>
<th>FAST COMMISSIONING</th>
</tr>
</thead>
<tbody>
<tr>
<td>Large reading field height even at short reading distance reduces installation depth</td>
<td>Configuration via browser-based webConfig enables fast commissioning</td>
</tr>
</tbody>
</table>

Features
— Reliable reading of all common 1D-codes including Pharmacodes
— Flexible installation options through front or perpendicular beam exit
— Reading range: 15 – 72 mm
— Modulus size: 0.15 – 0.5 mm
— Scanning rate of up to 700 scans/s for reliable reading, even while in motion
— Ambient temperature (operation): 0 – 45°C
— Interface: RS 232
— Degree of protection: IP 40
— Dimensions (W × H × L): 55 × 20 × 47 mm
— Especially well suited for use in automatic analyzers through a large reading field at short distances
— Firmware with a wide range of customization options enables fast realization of customer-specific requirements
1D-/2D-code readers

Code reading in the production area

**Requirement:** In final assembly, codes are used for the traceability of individual components. These must be read on a conveyor line that – at times – moves at high speeds.

**Solution:** Thanks to their high scanning rate, the DCR 200i 1D-/2D-code readers enable the reading of codes on quickly moving objects. In addition, optics models are available for various reading ranges.

Manual code reading and reading in presentation mode

**Requirement:** In assembly processes in which large, various components are moved by hand, both automatic as well as manual code reading must be possible.

**Solution:** The LSIS 220 1D-/2D-code readers are equipped with various trigger options for automatic and manual operation.

Label inspection

**Requirement:** In addition to the reading of codes, it is often necessary during label inspection to check the position and print quality of the codes.

**Solution:** The LSIS 462i 1D-/2D-code readers compare the print position of the code with a position defined in advance. In addition, the built-in image processing can be used to check the print quality and presence of plain text on labels.
Code reading in presentation mode

**Requirement:** 1D-/2D-codes must be read on samples by an automatic analyzer. Devices with modular construction are necessary for use in small automatic analyzers.

**Solution:** With their very small size and open design, the DCR 50 1D-/2D-code readers can be optimally integrated in constrained spaces.

Code reading on reagents

**Requirement:** 1D-/2D-codes must be read on samples or reagents by an automatic analyzer. Devices with modular construction are necessary for use in small automatic analyzers.

**Solution:** The DCR 55 1D-/2D-code readers can read codes in a large reading field on slowly moving objects. For very restricted installation situations, the DCR 50 is available as a model without housing.

Code reading in tube sorters

**Requirement:** Prior to further processing, 1D-/2D-codes must be read for sorting.

**Solution:** The DCR 55 1D-/2D-code readers can read codes in a large reading field. For very restricted installation situations, the DCR 50 is available without housing.
DCR 50, DCR 55
Compact 1D- and 2D-code readers

Areas of application
- Code reading on objects at a standstill or with slow movement speed
- Code reading in constrained spaces

Operating principle
- CMOS image sensor and Rolling Shutter technology

Advantages for you

<table>
<thead>
<tr>
<th>QUICK INTEGRATION</th>
<th>VERY ROBUST</th>
<th>FAST COMMISSIONING</th>
</tr>
</thead>
<tbody>
<tr>
<td>Contacting possible directly on the circuit board by means of connectors</td>
<td>Compact metal housing with lens cover for the highest requirements in constrained spaces</td>
<td>Configuration via Sensor Studio software enables fast commissioning</td>
</tr>
</tbody>
</table>

Features
- Reliable reading of all common 1D- and 2D-codes independent of position and alignment
- Reading range: 30 – 425 mm
- Modulus size: 0.127 – 0.528 mm
- Ambient temperature (operation): 0 – 50°C
- Dimensions (W × H × L):
  - DCR 50: 31.6 × 12.7 × 27.5 mm
  - DCR 55: 31.5 × 20 × 40.3 mm
- Miniature code reader in 2 mounting variants:
  - DCR 50: The open design enables the integration in instruments and the direct fastening to the pipettor. Connection to the circuit board can be established via a 12-pin connector
  - DCR 55: Compact size enables integration in devices and instruments with limited available space

VERY ROBUST
Compact metal housing with lens cover for the highest requirements in constrained spaces
DCR 200i
Fast 1D- and 2D-code readers with modular design

Areas of application
— Code reading on objects with high movement speed

Operating principle
— Camera-based CMOS image sensor and Global Shutter technology

Advantages for you

- FAST COMMISSIONING
  Configuration via installation wizard saves time and prevents errors

- VERY FLEXIBLE
  Easy-to-change housing hoods enable fast adaptation to changing requirements

- FAST READING
  A high depth of field even with fast object movement enables a high throughput

Features
— Reliable reading of all common 1D- and 2D-codes including Pharmacodes independent of their position and alignment
— Possible to read directly marked codes
— Reading range: 40 – 800 mm (depending on optics model)
— High resolution of 1.3 megapixels enables the reading of small codes
— Modulus size: 0.1 – 1 mm
— Ambient temperatures (operation): 0 – 50°C (without heating), -30 – 50°C (with heating)
— Interfaces: PROFINET IO/RT, Ethernet TCP/IP, UDP, RS 232, RS 422
— Degree of protection: IP 65
— Dimensions (W × H × L): 43 × 61 × 44 mm
— Powerful LED illumination enables use under poor contrast conditions
— Intelligent decoder algorithms allow code reading even with poor print quality
— Diagnostics and configuration via browser-based webConfig or directly via the PLC by means of GSDML file
— Model with stainless steel housing and degree of protection IP 67/69K available
LSIS 220
Compact 1D- and 2D-code readers

Areas of application
— Manual code reading and reading in presentation mode

Operating principle
— Camera-based 1D-/2D-code reader with CMOS image sensor and Global Shutter technology

Features
— Reliable reading of all common 1D- and 2D-codes independent of their position and alignment
— Flexible installation options through M12 turning connector
— Reading range: 50 – 330 mm
— Modulus size: 0.127 – 1 mm
— Ambient temperature (operation): 0 – 40°C
— Interfaces: USB, RS 232
— Degree of protection: IP 65
— Dimensions (W × H × L): 40 × 32 × 47 mm
— Optimized camera resolution enables code reading in situations with slight movement
— Integrated optics for larger read field and in-focus detection all the way to the edge areas
— LED indicator signals that reading has been performed
— Trigger button for manual activation and configuration
LSIS 422i, LSIS 462i
High-performance 1D- and 2D-code readers with motor-driven focus adjustment

Areas of application
— Code reading of 1D- and 2D-codes
— Label inspection

Operating principle
— Camera-based 1D-/2D-code reader with CMOS image sensor and Global Shutter technology

Advantages for you

<table>
<thead>
<tr>
<th>HIGH READING QUALITY</th>
<th>INTEGRATED TEST FUNCTION</th>
<th>FLEXIBLE OPERATING RANGE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Homogeneous illumination ensures high read quality even in unfavorable lighting conditions</td>
<td>Models for printout inspection of labels available</td>
<td>Motor-driven focus adjustment enables a large reading field and reduces the number of required devices</td>
</tr>
</tbody>
</table>

Features
— Reliable reading of all common 1D- and 2D-codes (including directly marked) independent of their position and alignment
— Reading range: 50 – 10,000 mm
— Modulus size: 0.2 – 1 mm
— Ambient temperature (operation): 0 – 45°C
— Interfaces: Ethernet TCP/IP, UDP, RS 232
— Degree of protection: IP 67
— Dimensions (W × H × L): 75 × 55 × 113 mm
— Commissioning and operation via browser-based webConfig
— Reference code comparison possible
1D-hand-held scanners

Code reading during storage

Requirement: During storage, codes on a wide range of objects and components must be read independent of their position and alignment.

Solution: The IT 145xg, IT 190xg and IT 1300g hand-held scanners read codes independent of their position and orientation thanks to their camera-based reading technology. The devices are suitable for use in dry and clean environments.

Code reading in order processing

Requirement: During the processing of customer and production orders, 1D- or 2D-codes must be read on the corresponding order papers for each order to record and assign individual orders.

Solution: The IT 145xg and IT 190xg hand-held scanners read all common printed 1D- and 2D-codes. The especially lightweight and ergonomic housing design is gentle on the user during continuous use. The devices are suitable for use in dry and clean environments.

Code reading during order picking

Requirement: During the detection of larger goods or groups of goods, codes must generally also be read from a far distance and in harsh environments.

Solution: The IT 128xi and IT 19xxi hand-held scanners are characterized by large reading ranges. Furthermore, their housing and functionality are not affected by typical contamination (e.g., oil) or aggressive cleaning agents.
IT 147xg, IT 1300g
Hand-held scanners for all common 1D-codes

Areas of application
— Code reading in dry and clean environments

Operating principle
— Area Imager, Linear Imager

Advantages for you

<table>
<thead>
<tr>
<th>COMFORTABLE USE</th>
<th>EASY TO CONNECT</th>
<th>FAST COMMISSIONING</th>
</tr>
</thead>
<tbody>
<tr>
<td>Easy handling through especially light-weight and ergonomic housing design</td>
<td>Simple connection options to common fieldbuses and Industrial Ethernet</td>
<td>Configuration via configuration codes or software enables fast commissioning</td>
</tr>
</tbody>
</table>

Features
— Reliable reading of all common 1D-codes independent of their position
— Reading range: 10 – 460 mm
— Ambient temperature (operation): 0 – 50°C
— Interfaces: RS 232, USB. Via MA 200i also Ethernet, CANopen, PROFINET, DeviceNet, Ethernet IP and EtherCAT
— Cable-connected and Bluetooth models available
— Dimensions (W × H × L):
  — IT 1300g: 79 × 150 × 112 mm
  — IT 147xg: 82 × 173 × 62 mm
— Drop height of up to 1.5 m onto concrete floor
— Degree of protection: IT 1300g: IP 41
  IT 1472g: IP 42
IT 128xi
Industry-compatible hand-held scanners for all common 1D-codes

Areas of application
— Use in rough or contamination-susceptible environments

Operating principle
— Single line scanner

Advantages for you

VERY ROBUST
Housing with high degree of protection for the highest application requirements

EASY TO CONNECT
Simple connection options to common fieldbuses and Industrial Ethernet

FAST COMMISSIONING
Configuration via configuration codes or software enables fast commissioning

Features
— Reliable reading of all common 1D-Codes independent of their position and alignment
— Reading range: 25 – 4,460 mm
— Ambient temperatures (operation):
  — Cable connection: -30 – 50 °C
— Interfaces: RS 232, USB, Via MA 200i also Ethernet, CANopen, PROFINET, DeviceNet, Ethernet IP and EtherCAT
— Cable-connected and Bluetooth models available
— Dimensions (W x H x L): 75 x 195 x 133 mm
— Drop height of up to 2 m onto concrete floor
— Degree of protection: IP 65
Applications – 1D-/2D-hand-held scanners

1D-/2D-hand-held scanners

**Code reading during order picking**

**Requirement:** During the order picking of delivery orders, 1D- and 2D-codes must be read on various moving objects.

**Solution:** The IT 145xg and IT 1300g hand-held scanners read all common 1D-codes. The IT 190xg hand-held scanners also read all 2D-codes, independent of their position and alignment. The devices are suitable for use in dry and clean environments.

**Code reading during storage**

**Requirement:** During the storage of larger objects, 1D- and 2D-codes must often be read in harsh industrial environments in which there is a risk of contamination by oil or lubricants.

**Solution:** The IT 128xi and 19xxi hand-held scanners read all common 1D- and 2D-codes independent of their position and alignment. Due to their high degree of protection, the devices are suitable for the increased requirements of industrial application environments.

**Code reading for the traceability of components**

**Requirement:** During the processing of electronic components, directly marked 1D- and 2D-codes on the individual components must often be read before they are processed further. Traceability can thereby be ensured, e.g., in the event of product recalls.

**Solution:** The IT 1920i DPM hand-held scanner reads all common 1D- and 2D-codes. The devices are DPM-capable and can, thus, reliably read directly marked codes. The high degree of protection of the housing also protects against damage to the sensitive components.
Code reading for the traceability of components

**Requirement:** During the mounting of individual components, small 1D- and 2D-codes must be read for traceability purposes. Because the environment is often harsh and prone to contamination, directly marked codes are used in particular.

**Solution:** The IT 1920i and HS 66x8 hand-held scanners can withstand the high demands just as the applied codes. The devices are DPM-capable and can, thus, reliably read the directly marked codes.

Code reading in engine assembly

**Requirement:** During engine assembly, directly marked 2D-codes must be read on the individual components. In addition, the stress on the housing is especially high due to oily surfaces and hard floors.

**Solution:** The IT 1920i and HS 66x8 hand-held scanners can withstand especially demanding application environments thanks to their high degree of protection of the housing. The devices are DPM-capable and can, thus, reliably read the directly marked codes.

Code reading on medical instruments after cleaning

**Requirement:** To guarantee that only sterile medical instruments are used in surgical operations, directly marked 1D- and 2D-codes must be read on the instruments for the traceability of the cleaning.

**Solution:** The IT 1920i and HS 66x8 hand-held scanners are resistant to common cleaning agents used in this area due to the degree of protection of the housing. The devices are DPM-capable and can, thus, reliably read the directly marked codes.
1D-/2D-hand-held scanners

Code reading for verifying samples

**Requirement:** To verify medical samples or reagents prior to analysis, small and – in many cases – directly marked 1D- and 2D-codes must be read on these items.

**Solution:** The IT 1920i and HS 66x8 hand-held scanners are DPM-capable and are therefore used to read directly marked codes.
IT 195xg
Performance hand-held scanner for all common 1D- and 2D-codes

Areas of application
— Code reading in dry and clean environments

Operating principle
— Area Imager

Advantages for you

<table>
<thead>
<tr>
<th>COMFORTABLE USE</th>
<th>EASY TO CONNECT</th>
<th>FAST COMMISSIONING</th>
</tr>
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<tbody>
<tr>
<td>Easy handling through especially lightweight and ergonomic housing design</td>
<td>Connection options to common fieldbuses and Industrial Ethernet</td>
<td>Configuration via configuration codes or software enables fast commissioning</td>
</tr>
</tbody>
</table>

Features
— Reliable reading of all common 1D- and 2D-codes independent of their position and alignment
— Reading range: 0 – 822 mm
— Ambient temperature (operation): 0 – 50°C
— Interfaces: RS 232, USB. Via MA 200i also Ethernet, CANopen, PROFINET, DeviceNet, Ethernet IP and EtherCAT
— Cable-connected and Bluetooth models available
— Dimensions (W x H x L): 70 x 160 x 80 mm
— Drop height of up to 1.8 m onto concrete floor
— Degree of protection: IP 41
— Optics models for various reading ranges
IT 147xg-2D
Hand-held scanners for all common 1D- and 2D-codes

Areas of application
— Code reading in dry and clean environments

Operating principle
— Area Imager

Advantages for you

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</table>

Features
— Reliable reading of all common 1D- and 2D-codes independent of their position and alignment
— Reading range: 5 – 400 mm
— Ambient temperature (operation): 0 – 50°C
— Interfaces: RS 232, USB. Via MA 200i also Ethernet, CANopen, PROFINET, DeviceNet, Ethernet IP and EtherCAT
— Cable-connected and Bluetooth models available
— Dimensions (W × H × L): 62 × 169 × 82 mm
— Drop height of up to 1.8 m onto concrete floor
— Degree of protection: IT 1470g: IP 40
  IT 1472g: IP 42
— Optics models for various reading ranges
IT 19xxi
Industry-compatible hand-held scanners for all common 1D- and 2D-codes

Areas of application
— Code reading in rough or contamination-susceptible industrial environments

Operating principle
— Area Imager

Advantages for you

LARGE OPERATING RANGE
Reading range of up to 16 meters allows codes to be read on objects located at even relatively far distances

EASY TO CONNECT
Connection options to common fieldbuses and Industrial Ethernet

FAST COMMISSIONING
Configuration via configuration codes or software enables fast commissioning

Features
— Reliable reading of all common 1D- and 2D-codes independent of their position and alignment
— Reading range: 10 – 16,000 mm
— Ambient temperatures (operation):
  – Wireless: –20 – 50°C
  – Cable connection: –30 – 50°C
— Interfaces: RS 232, USB. Via MA 200i also Ethernet, CANopen, PROFINET, DeviceNet, Ethernet IP and EtherCAT
— Cable-connected and Bluetooth models available
— Dimensions (W x H x L): 75 x 195 x 133 mm
— Drop height of up to 2 m onto concrete floor
— Degree of protection: IT 1980i/1981i: IP 65
  IT 1990i/1991i: IP 65/IP 67
**IT 1920i**

Industry-compatible hand-held scanners for common directly marked 1D- and 2D-codes

**Areas of application**

- Reading of directly marked 1D- and 2D-codes in harsh or contamination-prone industrial environments

**Operating principle**

- Area Imager

**Advantages for you**

- **HIGHEST PRECISION**
  The built-in laser alignment aid prevents the reading of an incorrect code on objects with multiple markings

- **EASY TO CONNECT**
  Connection options to fieldbuses and Industrial Ethernet

- **FAST COMMISSIONING**
  Configuration via configuration codes or software enables fast commissioning

**Features**

- Reliable reading of all common directly marked 1D- and 2D-codes independent of their position and alignment
- Reading range: 0 – 170 mm
- Ambient temperature (operation): –30 – 50°C
- Interfaces: RS 232, USB. Via MA 200i also Ethernet, CANopen, PROFINET, DeviceNet, Ethernet IP and EtherCAT
- Dimensions (W × H × L): 74.5 × 193 × 134 mm
- Drop height of up to 2 m onto concrete floor
- Degree of protection: IP 65
- Various illumination options enable the reading of low-contrast codes
HS 66x8
Industry-compatible hand-held scanners for common directly marked 1D- and 2D-codes

Areas of application
— Reading of directly marked 1D- and 2D-codes in harsh or contamination-prone industrial environments

Operating principle
— Area Imager

Advantages for you

<table>
<thead>
<tr>
<th>LARGE VARIETY</th>
<th>EASY TO CONNECT</th>
<th>FAST COMMISSIONING</th>
</tr>
</thead>
<tbody>
<tr>
<td>Various optics and illumination models enable reliable detection, even of codes with very low contrast on different surfaces</td>
<td>Connection options to common fieldbuses and Industrial Ethernet</td>
<td>Configuration via configuration codes or software enables fast commissioning</td>
</tr>
</tbody>
</table>

Features
— Reliable reading of all common directly marked 1D- and 2D-codes independent of position and alignment
— Reading range: 0 – 147 mm
— Ambient temperatures (operation):
  — Wireless: -20 – 50°C
  — Cable connection: -30 – 50°C
— Interfaces: RS 232, USB. Via MA 200i also Ethernet, CANopen, PROFINET, DeviceNet, Ethernet IP and EtherCAT
— Cable-connected and Bluetooth models available
— Dimensions (W x H x L): 77 x 185 x 132 mm
— Drop height of up to 2.4 m onto concrete floor
— Degree of protection: IP 67
— Various illumination options enable optimum reading performance with engraved, dot-peened and laser-etched codes
RFID

**RFID container identification**

**Requirement:** In the food industry, the containers and, thus, the data carriers are exposed to various cleaning processes and chemicals. To be able to read and, if necessary, store product-related data at every processing point, the data carriers must be especially robust.

**Solution:** Thanks to their high degree of protection of up to IP 68/69K, the TFM and TFI transponders are – in combination with the RFM and RFI read/write devices – very well suited for use in the food industry. On the TFM transponders, quality data and process data can be stored during the production process.

**RFID skid identification**

**Requirement:** In the automotive industry, data carriers must, to some extent, withstand high temperatures during processes for the surface treatment of body parts. Furthermore, paint particles can prevent visual contact with the data carrier.

**Solution:** The RFID waves of the RFM read/write devices can penetrate even layers of paint. The corresponding transponders can withstand temperatures of up to 250°C.

**RFID pallet identification**

**Requirement:** During pallet identification, the data carriers are either on the pallet or on the material that is to be transported. Here, the pallet feet may be soiled or the data carrier may be located under the packaging film. Thus, visual contact between the identification device and data carrier is possible only to a limited extent if at all.

**Solution:** With the RFM read/write devices, the data carriers can be read from and written to even without visual contact.Insensitive to dirt, the transponders of the TFM series are available as hard tags or smart labels.
RFI 32
RFID readers with a frequency range of 125 kHz (LF)

Areas of application
— Part tracking in container, pallet and skid transport systems – even under harsh ambient conditions

Advantages for you

**VERY ROBUST**
Cast, robust housing enables use under harsh ambient conditions

**FAST COMMISSIONING**
Easy and fast configuration via the intuitive RF configuration tool

Features
— Evaluation unit with integrated antenna reduces installation effort and is suitable for constrained installation situations
— Reading range: 0 – 80 mm (depending on the used transponder)
— Reading speed: up to 0.6 m/s
— Ambient temperature (operation): –25 – 70°C
— Interfaces: RS 232. Via MA 200i also PROFINET, DeviceNet, Ethernet IP and EtherCAT
— Dimensions (W × H × L): 76 × 30 × 102 mm
— Degree of protection: IP 65
— Through the internal parameter memory, the parameters are retained in the device even after a power failure
— Transponders can be read in passing
— Status display directly on the device
— Insensitive to environmental materials such as water, textiles, plastic or wood
RFM 32, RFM 62
RFID read/write systems with a frequency range of 13.56 MHz (HF)

Areas of application
— Part tracking in container, pallet and skid transport systems – even under harsh ambient conditions
— Use in production control

Advantages for you

**VERY ROBUST**
(Partially) cast, robust housings enables use under harsh ambient conditions

**FAST COMMISSIONING**
Easy and fast configuration via the intuitive RF configuration tool

Features
— Evaluation unit with integrated antenna reduces installation effort and is suitable for constrained installation situations
— Global use through ISO 15693 conformity
— Staggered reading ranges:
  – RFM 32: 0 – 110 mm
  – RFM 62: 0 – 400 mm
— High reading speed of up to 6 m/s
— Ambient temperature (operation): –25 ... 65°C
— Interfaces: RS 232, Via MA 200i also PROFINET, DeviceNet, Ethernet IP and EtherCAT
— Dimensions (W × H × L):
  – RFM 32: 76 × 30 × 102 mm
  – RFM 62: 298 × 34 × 298 mm
— Degrees of protection: – RFM 32: IP 67
  – RFM 62: IP 65
— Storage of quality and production data during the production process enables use for production control
— Through internal parameter memory, the parameters are retained in the device even after a power failure
— Transponders can be read to and written from in passing
— Status display directly on the device
— RFM 32 Ex: Model available for use in potentially explosive areas
TFI
Passive RFID fixcode transponders with a frequency range of 125 kHz (LF)

Areas of application
— Part tracking in container, pallet and skid transport systems

Advantages for you

HEAT-RESISTANT
Special high-temperature transponders can also be used at high process temperatures

EVERYTHING FROM A SINGLE SOURCE
Suitable transponders for the RFI 32 reader

SAFETY
Unchangeable Unique ID offers a high level of protection against tampering

Features
— Unchangeable 8-byte Unique ID, read-only
— Degree of protection: up to IP 67
— Ambient temperature (operation): –20 – 85°C*
— Ambient temperature (storage): –40 – 200°C*
— Disc transponders with diameters of 30 and 50 mm
— Insensitive to environmental materials such as water, textiles, plastic or wood

* depending on model
TFM
Passive RFID transponders with a frequency range of 13.56 MHz (HF)

Areas of application
- Part tracking in container, pallet and skid transport systems
- Applications in production control (e.g., control of assembly or painting processes)

Advantages for you
- HEAT-RESISTANT
  Special high-temperature transponders can also be used at high process temperatures
- EVERYTHING FROM A SINGLE SOURCE
  Suitable transponders for the RFM 32/62 readers
- LARGE VARIETY
  Numerous models enable installation in various applications

Features
- Global use through ISO 15693 conformity
- All transponders are provided with an unchangeable Unique ID
- Storage of quality and production data during the production process enables use for production control
- Degree of protection: up to IP 68/69K
- Memory size up to 1024 bytes*
- Ambient temperature (operation): –25 – 150°C*
- Ambient temperature (storage): –40 – 250°C*
- Various designs and sizes available for different applications: disc transponders, key fobs, self-adhesive smart labels or plug-in cards
- Model available for use in potentially explosive areas

* depending on model
## Technical data

### 1D-code readers

<table>
<thead>
<tr>
<th>Model</th>
<th>Code technology</th>
<th>Operating principle</th>
<th>Beam exit</th>
<th>Light source</th>
<th>Reading distances (depending on modulus width and optics model)</th>
<th>Modulus size min. – max. (depending on modulus width and optics model)</th>
<th>Scanning rate, typical</th>
<th>Ambient temperature (operation without heating)</th>
<th>Ambient temperature (operation with heating)</th>
<th>Interfaces</th>
<th>Connection type</th>
<th>Degree of protection</th>
<th>Dimensions housing (W x H x L)</th>
</tr>
</thead>
<tbody>
<tr>
<td>BCL 8</td>
<td>1D</td>
<td>Laser single line</td>
<td>Front or perpendicular with deflecting mirror</td>
<td>Laser, red</td>
<td>40 – 160 mm</td>
<td>0.15 – 0.5 mm</td>
<td>600 scans/s</td>
<td>0 – 40 °C</td>
<td>0 – 40 °C</td>
<td>RS 232</td>
<td>M12 connector, 5-pin, A-coded</td>
<td>IP 67</td>
<td>40.3 x 48 x 15 mm</td>
</tr>
<tr>
<td>BCL 92</td>
<td>1D</td>
<td>Laser single line</td>
<td>Front or perpendicular with deflecting mirror</td>
<td>Laser, red</td>
<td>25 – 260 mm / 50 – 180 mm</td>
<td>6.5 – 20 mil / 0.165 – 0.5 mm</td>
<td>600 scans/s</td>
<td>5 – 40 °C</td>
<td>5 – 40 °C</td>
<td>RS 232</td>
<td>M12 connector with 150 mm pigtail, 8-pin</td>
<td>IP 54</td>
<td>71 x 38 x 118.5 mm</td>
</tr>
<tr>
<td>BCL 95</td>
<td>1D</td>
<td>Laser single line</td>
<td>Perpendicular with deflecting mirror</td>
<td>Laser, red</td>
<td></td>
<td>0.127 – 0.5 mm</td>
<td>750 scans/s</td>
<td>0 – 40 °C</td>
<td>5 – 40 °C</td>
<td>RS 232 / RS 485</td>
<td>900 mm cable with 15-pin Sub-D connector</td>
<td>IP 65</td>
<td></td>
</tr>
<tr>
<td>BCL 148</td>
<td>1D</td>
<td>Laser single line</td>
<td></td>
<td></td>
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</tr>
</tbody>
</table>

* Optics models: N = High Density (near), M = Medium Density (medium distance), F = Low Density (far), L = Long Range (very long distance), J = Ink-jet
### Technical data

<table>
<thead>
<tr>
<th>BCL 200i</th>
<th>BCL 300i</th>
<th>BCL 500i</th>
<th>BCL 600i</th>
<th>BCL 900i</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>1D</strong></td>
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</tr>
<tr>
<td>Laser single line</td>
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<td>Laser single line</td>
<td>Laser single line</td>
</tr>
<tr>
<td>Raster scanner</td>
<td>Raster scanner</td>
<td>Scanner with oscillating mirror</td>
<td>Scanner with oscillating mirror</td>
<td></td>
</tr>
<tr>
<td>Perpendicular with deflecting mirror</td>
<td>Front or perpendicular with deflecting mirror</td>
<td>Front</td>
<td>Front</td>
<td>Front</td>
</tr>
<tr>
<td>Laser, red</td>
<td>Laser, red</td>
<td>Laser, red</td>
<td>Laser, blue</td>
<td>Laser, red</td>
</tr>
<tr>
<td>M: 40–255 mm</td>
<td>N*: 40–255 mm</td>
<td>N*: 40–255 mm</td>
<td>M: 300–1,150 mm</td>
<td>N*: 525–1,500 mm</td>
</tr>
<tr>
<td>M: 0.2–0.5 mm</td>
<td>M: 0.25–0.5 mm</td>
<td>M: 0.25–0.5 mm</td>
<td>N*: 0.25–0.38 mm</td>
<td></td>
</tr>
<tr>
<td><strong>1,000 scans/s</strong></td>
<td><strong>1,000 scans/s</strong></td>
<td><strong>1,000 scans/s</strong></td>
<td><strong>1,000 scans/s</strong></td>
<td><strong>1,000 scans/s</strong></td>
</tr>
<tr>
<td>0–40 °C</td>
<td>0–40 °C</td>
<td>5–40 °C</td>
<td>5–50 °C</td>
<td></td>
</tr>
<tr>
<td>–35–40 °C</td>
<td>–35–40 °C</td>
<td>–35–40 °C</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>PROFINET IO/RT Ethernet TCP/IP, UDP</strong></td>
<td><strong>PROFINET IO/RT Ethernet TCP/IP, UDP</strong></td>
<td><strong>PROFINET IO/RT Ethernet TCP/IP, UDP</strong></td>
<td><strong>PROFINET IO/RT Ethernet TCP/IP, UDP</strong></td>
<td><strong>PROFINET IO/RT Ethernet TCP/IP, UDP</strong></td>
</tr>
<tr>
<td>M12 connector with 0.9 m (PWR) or 0.7 m (HOST) pigtail</td>
<td>M12 connector Cable Plug connector</td>
<td>4x M12 connector USB</td>
<td>4x M12 connector USB</td>
<td>1x M12 connector, 4-pin, A-coded, male 1x M12 connector, 17-pin, A-coded, male 1x M12 connector, 4-pin, D-coded, female 1x M12 connector, 4-pin, D-coded, female</td>
</tr>
<tr>
<td><strong>IP 65</strong></td>
<td><strong>IP 65</strong></td>
<td><strong>IP 65</strong></td>
<td><strong>IP 65</strong></td>
<td><strong>IP 65</strong></td>
</tr>
<tr>
<td>92 × 38 × 84 mm</td>
<td>Single line scanner: 95 × 44 × 68 mm Oscillating mirror: 125 × 58 × 110 mm Deflecting mirror: 103 × 44 × 98 mm</td>
<td>Single line scanner: 123.5 × 63 × 106.5 mm Oscillating mirror: 173 × 84 × 147 mm</td>
<td>Single line scanner: 123.5 × 63 × 106.5 mm Oscillating mirror: 173 × 84 × 147 mm</td>
<td>216 × 96 × 127 mm</td>
</tr>
</tbody>
</table>
## Technical data

<table>
<thead>
<tr>
<th>Code technology</th>
<th>CR 50</th>
<th>CR 55</th>
<th>CR 100</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operating principle</td>
<td>Single line with CCD image sensor</td>
<td>Single line with CCD image sensor</td>
<td>Single line with CCD image sensor</td>
</tr>
<tr>
<td>Beam exit</td>
<td>Front</td>
<td>Front</td>
<td>Front or perpendicular with deflecting mirror</td>
</tr>
<tr>
<td>Light source</td>
<td>LED, red</td>
<td>LED, red</td>
<td>LED, red</td>
</tr>
<tr>
<td>Reading distances (depending on modulus width and optics model)</td>
<td>50–230 mm</td>
<td>50–230 mm</td>
<td>20–72 mm</td>
</tr>
<tr>
<td>Modulus size min. – max. (depending on modulus width and optics model)</td>
<td>5–20 mil / 0.127–0.5 mm</td>
<td>5–20 mil / 0.127–0.5 mm</td>
<td>0.15–0.5 mm</td>
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<tr>
<td>Scanning rate, typical</td>
<td>330 scans/s</td>
<td>330 scans/s</td>
<td>700 scans/s</td>
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<tr>
<td>Ambient temperature (operation without heating)</td>
<td>0–50 °C</td>
<td>0–50 °C</td>
<td>0–45 °C</td>
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<tr>
<td>Interfaces</td>
<td>USB 2.0, RS 232</td>
<td>USB 2.0, RS 232</td>
<td>RS 232</td>
</tr>
<tr>
<td>Connection type</td>
<td>Molex connector, 6-pin, male</td>
<td>Cable 2,000 mm, 6-wire</td>
<td>Cable 2,000 mm, 6-wire</td>
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<tr>
<td>Degree of protection</td>
<td>–</td>
<td>IP 54</td>
<td>IP 40</td>
</tr>
<tr>
<td>Housing dimensions (W × H × L)</td>
<td>22.5 × 14 × 33 mm</td>
<td>31 × 18.3 × 45.5 mm</td>
<td>31 × 18.3 × 45.5 mm</td>
</tr>
</tbody>
</table>

*Optics models: U = Ultra High Density, N = High Density (near), M = Medium Density (medium distance), F = Low Density (far), L = Long Range (very long distance), J = Ink-jet*
### Technical data

#### 1D-/2D-code readers

<table>
<thead>
<tr>
<th></th>
<th>DCR 50</th>
<th>DCR 55</th>
<th>DCR 200i</th>
<th>LSIS 220</th>
<th>LSIS 422i</th>
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<tbody>
<tr>
<td><strong>1D / 2D</strong></td>
<td>1D / 2D</td>
<td>1D / 2D</td>
<td>1D / 2D</td>
<td>1D / 2D</td>
<td>1D / 2D</td>
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<tr>
<td><strong>Camera-based CMOS image sensor and Rolling Shutter technology</strong></td>
<td>Camera-based CMOS image sensor and Rolling Shutter technology</td>
<td>Camera-based CMOS image sensor and Global Shutter technology</td>
<td>Camera-based CMOS image sensor and Global Shutter technology</td>
<td>Camera-based CMOS image sensor and Global Shutter technology</td>
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</tr>
<tr>
<td><strong>Illumination: Red LED Aimer: Blue LED</strong></td>
<td>Illumination: Red LED Aimer: Blue LED</td>
<td>LED, red, IRT</td>
<td>Illumination: Red LED Aimer: Green LED</td>
<td>LED, RGB, white, IR</td>
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</tr>
<tr>
<td><strong>Beam exit</strong></td>
<td>Front</td>
<td>Front</td>
<td>Front</td>
<td>Front</td>
<td>Front</td>
</tr>
<tr>
<td><strong>Light source</strong></td>
<td>LED, red</td>
<td>LED, red, blue</td>
<td>LED, RGB, white, blue</td>
<td>LED, RGB, white, IR</td>
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</tr>
<tr>
<td><strong>Reading distances</strong></td>
<td>50 – 230 mm</td>
<td>50 – 230 mm</td>
<td>20 – 72 mm</td>
<td>30 – 425 mm</td>
<td>U: 40 – 75 mm</td>
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<tr>
<td></td>
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<td></td>
<td></td>
<td></td>
<td>N: 40 – 140 mm</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>M: 50 – 220 mm</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>F: 70 – 360 mm</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>L: 50 – 800 mm</td>
</tr>
<tr>
<td><strong>0.127 – 0.528 mm</strong></td>
<td>0.127 – 0.528 mm</td>
<td>U: 0.100 – 0.25 mm</td>
<td>0.127 – 1 mm</td>
<td>0.2 – 1.0 mm</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>N: 0.127 – 0.25 mm</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>M: 0.190 – 0.33 mm</td>
</tr>
<tr>
<td></td>
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<td></td>
<td></td>
<td></td>
<td>F: 0.250 – 0.50 mm</td>
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<tr>
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<td></td>
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<td>L: 0.350 – 1.00 mm</td>
</tr>
<tr>
<td><strong>0.50 mm</strong></td>
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<td>0.50 mm</td>
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<td>0.50 mm</td>
</tr>
<tr>
<td><strong>0 – 50 °C</strong></td>
<td>0 – 50 °C</td>
<td>0 – 50 °C</td>
<td>5 – 40 °C</td>
<td>0 – 45 °C</td>
<td></td>
</tr>
<tr>
<td><strong>–</strong></td>
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<td>–</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td></td>
<td>USB 2.0</td>
<td>Ethernet TCP/IP, UDP PROFINET RT</td>
<td>USB 2.0</td>
<td>Ethernet TCP/IP, UDP</td>
<td></td>
</tr>
<tr>
<td><strong>Molex connector, 6-pin, male</strong></td>
<td>Cable 2,000 mm, 6-wire USB</td>
<td>1x M12 connector, 12-pin, A-coded, male</td>
<td>1x M12 connector, 8-pin, A-coded</td>
<td>1x M12 connector, 4-pin, D-coded, female</td>
<td></td>
</tr>
<tr>
<td><strong>–</strong></td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>–</td>
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<tr>
<td><strong>–</strong></td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td><strong>31.6 x 12.7 x 27.5 mm</strong></td>
<td>31.5 x 61 x 40.3 mm</td>
<td>43 x 61 x 44 mm</td>
<td>40 x 32 x 47 mm</td>
<td>75 x 55 x 113 mm</td>
<td></td>
</tr>
</tbody>
</table>
# Technical data

## 1D-hand-held scanners

<table>
<thead>
<tr>
<th></th>
<th>IT 147xg-1D</th>
<th>IT 1300g</th>
<th>IT 128xi</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Code technology</strong></td>
<td>1D</td>
<td>1D</td>
<td>1D</td>
</tr>
<tr>
<td><strong>Operating principle</strong></td>
<td>Area Imager</td>
<td>Linear Imager</td>
<td>Single scan line</td>
</tr>
<tr>
<td><strong>Min./max. reading distances</strong> (depending on modulus width)</td>
<td>0–40 mm</td>
<td>10–460 mm</td>
<td>100–4,460 mm</td>
</tr>
<tr>
<td><strong>Min. modulus size</strong></td>
<td>0.127–0.508 mm</td>
<td>0.127–0.40 mm</td>
<td>0.191–2.54 mm</td>
</tr>
<tr>
<td><strong>Ambient temperature</strong></td>
<td>0–40 °C, 0–50 °C</td>
<td>0–50 °C</td>
<td>–30–50 °C</td>
</tr>
<tr>
<td><strong>Interfaces</strong></td>
<td>RS 232, USB, Fieldbuses and Industrial Ethernet via MA 200i</td>
<td>RS 232, USB, Fieldbuses and Industrial Ethernet via MA 200i</td>
<td>PS/2, RS 232, USB, Fieldbuses and Industrial Ethernet via MA 200i</td>
</tr>
<tr>
<td><strong>Connection type</strong></td>
<td>RJ41, Bluetooth</td>
<td>RJ41</td>
<td>RJ41</td>
</tr>
<tr>
<td><strong>Degree of protection</strong></td>
<td>IP 40, IP 42</td>
<td>IP 41</td>
<td>IP 65</td>
</tr>
<tr>
<td><strong>Dimensions</strong> (W × H × L)</td>
<td>62 × 169 × 82 mm</td>
<td>79 × 150 × 112 mm</td>
<td>75 × 133 × 195 mm</td>
</tr>
</tbody>
</table>
### 1D-/2D-hand-held scanners

<table>
<thead>
<tr>
<th></th>
<th>IT 147xg-2D</th>
<th>IT 195xg</th>
<th>IT 19xxi</th>
<th>IT 1920i</th>
<th>HS 66x8</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>1D- and 2D-codes</strong></td>
<td>1D- and 2D-codes</td>
<td>1D- and 2D-codes</td>
<td>1D- and 2D-codes (DPM)</td>
<td>1D- and 2D-codes (DPM)</td>
<td></td>
</tr>
<tr>
<td><strong>Area Imager</strong></td>
<td>Area Imager</td>
<td>Area Imager</td>
<td>Area Imager</td>
<td>Area Imager</td>
<td></td>
</tr>
<tr>
<td><strong>5 – 400 mm</strong></td>
<td>0 – 822 mm</td>
<td>10 – 16,000 mm</td>
<td>0 – 170 mm</td>
<td>0 – 147 mm</td>
<td></td>
</tr>
<tr>
<td><strong>6 – 604 mm</strong></td>
<td>6 – 2,236 mm</td>
<td>0 – 837 mm</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>0.127 – 0.508 mm</strong></td>
<td>0.127 – 0.508 mm</td>
<td>0.191 – 2.540 mm</td>
<td>0.076 – 0.508 mm</td>
<td>0.076 – 0.508 mm</td>
<td></td>
</tr>
<tr>
<td><strong>RS 232</strong></td>
<td>PS/2, RS 232</td>
<td>PS/2, RS 232</td>
<td>PS/2, RS 232</td>
<td>PS/2, RS 232</td>
<td></td>
</tr>
<tr>
<td><strong>USB</strong></td>
<td>USB</td>
<td>USB</td>
<td>USB</td>
<td>USB</td>
<td></td>
</tr>
<tr>
<td><strong>Fieldbuses and Industrial Ethernet via MA 200i</strong></td>
<td>Fieldbuses and Industrial Ethernet via MA 200i</td>
<td>Fieldbuses and Industrial Ethernet via MA 200i</td>
<td>Fieldbuses and Industrial Ethernet via MA 200i</td>
<td>Fieldbuses and Industrial Ethernet via MA 200i</td>
<td></td>
</tr>
<tr>
<td><strong>RJ41, Bluetooth</strong></td>
<td>RJ41, Bluetooth</td>
<td>RJ41, Bluetooth</td>
<td>RJ41</td>
<td>RJ41, Bluetooth</td>
<td></td>
</tr>
<tr>
<td><strong>IP 40, IP 42</strong></td>
<td>IP 41</td>
<td>IP 65 (IP 67)</td>
<td>IP 65</td>
<td>IP 65, IP 67</td>
<td></td>
</tr>
<tr>
<td><strong>62 × 169 × 82 mm</strong></td>
<td>70 × 160 × 80 mm</td>
<td>75 × 133 × 195 mm</td>
<td>74.5 × 193 × 134 mm</td>
<td>77 × 185 × 132 mm, 77 × 185 × 143 mm</td>
<td></td>
</tr>
</tbody>
</table>

**Code technology**
- IT 147xg-1D
- IT 1300g
- IT 128xi
- IT 147xg-2D
- IT 195xg
- IT 19xxi
- IT 1920i
- HS 66x8

**Operating principle**
- Area Imager
- Linear Imager
- Single scan line
- Area Imager
- Area Imager
- Area Imager
- Area Imager
- Area Imager

**Min./max. reading distances**
- (depending on modulus width)
  - 0 – 400 mm
  - 10 – 460 mm
  - 100 – 4,460 mm
  - 5 – 400 mm
  - 0 – 822 mm
  - 6 – 604 mm
  - 10 – 16,000 mm
  - 0 – 2,236 mm
  - 0 – 837 mm
  - 0 – 170 mm
  - 0 – 147 mm

**Min. modulus size**
- 0.127 – 0.508 mm
- 0.127 – 0.508 mm
- 0.127 – 0.508 mm
- 0.127 – 0.508 mm
- 0.127 – 0.508 mm
- 0.127 – 0.508 mm
- 0.191 – 2.540 mm
- 0.191 – 2.540 mm
- 0.191 – 2.540 mm
- 0.191 – 2.540 mm
- 0.191 – 2.540 mm
- 0.191 – 2.540 mm

**Ambient temperature**
- 0 – 40 °C, 0 – 50 °C
- 0 – 50 °C
- –30 – 50 °C
- 0 – 40 °C, 0 – 50 °C
- 0 – 50 °C
- –30 – 50 °C, –20 – 50 °C
- –30 – 50 °C
- –30 – 50 °C, –20 – 50 °C

**Interfaces**
- RS 232
- USB
- Fieldbuses and Industrial Ethernet via MA 200i
- RS 232
- USB
- Fieldbuses and Industrial Ethernet via MA 200i
- PS/2
- RS 232
- USB
- Fieldbuses and Industrial Ethernet via MA 200i
- PS/2
- RS 232
- USB
- Fieldbuses and Industrial Ethernet via MA 200i
- PS/2
- RS 232
- USB
- Fieldbuses and Industrial Ethernet via MA 200i

**Connection type**
- RJ41, Bluetooth
- RJ41, Bluetooth
- RJ41, Bluetooth
- RJ41
- RJ41
- RJ41
- RJ41
- RJ41
- RJ41

**Degree of protection**
- IP 40, IP 42
- IP 41
- IP 65 (IP 67)
- IP 65
- IP 65, IP 67
- IP 65
- IP 65
- IP 65
- IP 65

**Dimensions**
- (W × H × L)
  - 62 × 169 × 82 mm
  - 79 × 150 × 112 mm
  - 75 × 133 × 195 mm
  - 62 × 169 × 82 mm
  - 70 × 160 × 80 mm
  - 75 × 133 × 195 mm
  - 74.5 × 193 × 134 mm
  - 77 × 185 × 132 mm
  - 77 × 185 × 143 mm
# Technical data

## RFID read/write devices

<table>
<thead>
<tr>
<th>Function</th>
<th>RFI 32</th>
<th>RFM 32/RFM 32 Ex</th>
<th>RFM 62</th>
</tr>
</thead>
<tbody>
<tr>
<td>Frequency range</td>
<td>125 kHz (LF)</td>
<td>13.56 MHz (HF)</td>
<td>13.56 MHz (HF)</td>
</tr>
<tr>
<td>Max. reading/writing range (depending on the transponder)</td>
<td>TFI 03: up to 60 mm, TFI 05: up to 80 mm</td>
<td>TFM 02: up to 50 mm, TFM 03/05/08: up to 110 mm</td>
<td>TFM 02: up to 130 mm, TFM 03: up to 350 mm, TFM 05: up to 220 mm, TFM 08: up to 400 mm</td>
</tr>
<tr>
<td>Ambient temperature (operation)</td>
<td>–25 – 70 °C</td>
<td>–25 – 65 °C</td>
<td>–25 – 65 °C</td>
</tr>
<tr>
<td>Interface*</td>
<td>RS 232</td>
<td>RS 232</td>
<td>RS 232</td>
</tr>
<tr>
<td>Connection type</td>
<td>1,000 mm cable with socket connectors (10+6)</td>
<td>1,000 mm cable with socket connectors (10+6)</td>
<td>1,000 mm cable with socket connectors (10+6)</td>
</tr>
<tr>
<td>Degree of protection</td>
<td>IP 65</td>
<td>IP 67</td>
<td>IP 65</td>
</tr>
<tr>
<td>Dimensions (W × H × L)</td>
<td>76 × 30 × 102 mm</td>
<td>76 × 30 × 102 mm</td>
<td>298 × 34 × 298 mm</td>
</tr>
</tbody>
</table>

* via MA 200i: Ethernet, PROFINET, DeviceNet, Ethernet IP and EtherCAT

## RFID transponders

<table>
<thead>
<tr>
<th>TFI 03 11</th>
<th>TFI 05 11</th>
<th>TFI 03 16</th>
<th>TFI 05 16</th>
<th>TFI 03 11</th>
<th>TFI 05 11</th>
<th>TFI 08 11</th>
<th>TFI 03 15</th>
<th>TFI 05 15</th>
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<tbody>
<tr>
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<td>125 kHz (LF)</td>
<td>125 kHz (LF)</td>
<td>13.56 MHz (HF)</td>
<td>13.56 MHz (HF)</td>
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<tr>
<td>Design</td>
<td>Disc transponder</td>
<td>Disc transponder</td>
<td>Disc transponder</td>
<td>Disc transponder</td>
<td></td>
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<tr>
<td>Chip type</td>
<td>EM4102</td>
<td>EM4102</td>
<td>I-CodeSLI</td>
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<tr>
<td>Memory</td>
<td>8-byte fixcode</td>
<td>8-byte fixcode</td>
<td>112 byte</td>
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<tr>
<td>Ambient temperature (operation)</td>
<td>–20 – 70 °C</td>
<td>–20 – 85 °C</td>
<td>–20 – 70 °C</td>
<td>–25 – 85 °C</td>
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## Technical data

<table>
<thead>
<tr>
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<th>TFM 06 11</th>
<th>TFM 02 11</th>
<th>TFM 05 16</th>
<th>TFM 03 16</th>
<th>TFM 02 11</th>
<th>TFM 05 22</th>
<th>TFM 08 11</th>
</tr>
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<tbody>
<tr>
<td>Frequency</td>
<td>13.56 MHz (HF)</td>
<td>13.56 MHz (HF)</td>
<td>13.56 MHz (HF)</td>
<td>13.56 MHz (HF)</td>
<td>13.56 MHz (HF)</td>
<td>13.56 MHz (HF)</td>
<td>13.56 MHz (HF)</td>
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<tr>
<td>Design</td>
<td>Disc transponder</td>
<td>Disc transponder</td>
<td>Disc transponder</td>
<td>Key fobs</td>
<td>Smart label Self-adhesive</td>
<td>Plug-in card</td>
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</tr>
<tr>
<td>Chip type</td>
<td>EM4102</td>
<td>EM4102</td>
<td>I-CodeSLI</td>
<td>I-CodeSLI</td>
<td>I-CodeSLI</td>
<td>I-CodeSLI</td>
<td>TagIT HFI</td>
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<td>Memory</td>
<td>8-byte fixcode</td>
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<td>112 byte</td>
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<td>256 byte</td>
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</tbody>
</table>
Suitable products

1D-/2D-code readers

**Mounting system for rod**
Suitable for BCL 300i, BCL 500i, LSIS 400i

**Mounting system for rod**
Adjustable, turnable 360°, galvanized.
Suitable for DCR 200i

**Mounting bracket**
Stainless steel / galvanized.
Suitable for BCL 300i, DCR 200i

**Connection units**
Suitable for BCL 300i, BPS 300i

**Cover hoods**
For replacing if operating conditions change.
Suitable for DCR 200i

**Starter kit**
Scan engine, mounted on additional circuit board with Micro-USB socket, USB cable, USB flash memory stick with drivers and documentation.
Suitable for CR 50 and CR 55
Suitable products

**Interchangeable lenses**
With various focal lengths (6–75 mm) and diaphragms (1.4–2.8).
Suitable for LSIS 4xx M49-x9

**MA-CR adapter circuit board**
For laboratory and test purposes.
Suitable for CR 100, BCL 95, DCR 50, DCR 55

**Additional lighting**
Ring light or flood light.
Suitable for DCR 200i

**Fieldbus gateways**
MA.200i for field use for connecting bar code readers and identification systems

**RFID**

**Spacer transponders**
Suitable for TFI, TFM

**Mounting device**
For use in painting lines.
Suitable for TFM 05 16
In a constantly changing industrial world, we work together with our customers to find the best solution for their sensor applications: innovatively, precisely and efficiently.

Key figures

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
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<tbody>
<tr>
<td>Foundation</td>
<td>1963</td>
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<tr>
<td>Company structure</td>
<td>GmbH + Co. KG, wholly family-owned</td>
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<tr>
<td>Executive management</td>
<td>Ulrich Balbach</td>
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<tr>
<td>Headquarters</td>
<td>Owen, Germany</td>
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<tr>
<td>Distribution companies</td>
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<td>Production locations</td>
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<td>Technological competence centers</td>
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<td>Distributors</td>
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<td>Employees</td>
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</table>

Product range

- Switching sensors
- Measuring sensors
- Safety
- Identification
- Data transmission
- Network and connection technology
- Industrial image processing
- Accessories and supplementary products

Focus industries

- Intralogistics
- Packaging industry
- Machine tools
- Automotive industry
- Laboratory automation

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Your success is our motivation. We therefore place great value on always being personally, quickly, and easily accessible to you. We produce on four continents, allowing us to offer you reliable product availability.
Our product range at a glance

### Switching Sensors
- Optical Sensors
- Inductive Switches
- Capacitive Sensors
- Ultrasonic Sensors
- Fiber Optic Sensors
- Fork Sensors
- Light Curtains
- Special Sensors

### Measuring Sensors
- Distance Sensors
- Sensors for Positioning
- 3D Sensors
- Light Curtains
- Bar Code Positioning Systems
- Fork Sensors

### Identification
- Bar Code Identification
- 2D-Code Identification
- RF Identification

### Data Transmission
- Optical Data Transmission Systems

### Network and Connection Technology
- Connection Technology
- Modular Connection Units

### Industrial Image Processing
- Light Section Sensors
- Smart Camera

### Safety
- Safety Solutions
- Safety Laser Scanners
- Safety Light Curtains
- Single and Multiple Light Beam Safety Devices
- Safety Radar Sensors
- Safe Locking Devices, Switches and Proximity Sensors
- Safety PLCs and Relays
- Machine Safety Services

### Accessories and Supplementary Products
- Signaling Devices
- Mounting Systems
- Reflectors

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