



SMART
SENSOR
BUSINESS

BAR CODE DETECTION

White Paper



Chapter 3

LASER BASED BAR CODE READERS

Welcome to **Leuze electronic** bar code detection 101. This is a collection of chapters to provide you more information about technologies and products to make your life easier and less complicated.

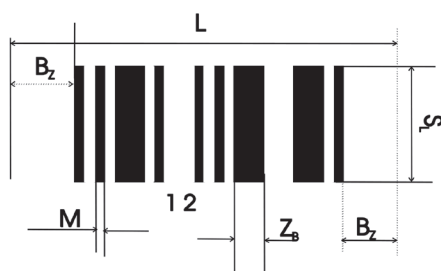
Laser based Bar Code Readers

For many years the use of a laser based bar code reader was the method of choice. There are many reasons why they are beneficial for applications which require one or more of the following:

- Higher depth of field
- Wider field of view requirements
- Low light applications where the laser provides the amount of light needed
- The use of different colors of laser for different depth of fields
- Raster based laser scanners can be used for especially difficult bar codes

Bar codes need to include at least the following:

- **Quiet zone (B_z)** = the light area before the start character and after the stop character of a bar code. The quiet zone (min. 10 x Module) is needed in order to indicate the start of the bar code to the scanner.
- **Module Size (M)** = the narrowest bar or gap in a bar code
- **Broad bar or gap (Z_B)** = Broad bars or gaps are always a multiple of the module.
Module x Ratio = Z_B (Normal Ratio 1:2.5)
- **Length of the bar code (L)** = the length of the bar code including start/stop character (in mm). Depending on definition, the quiet zone must be added or not.
- **Length of a bar (in mm) (S_i)** =

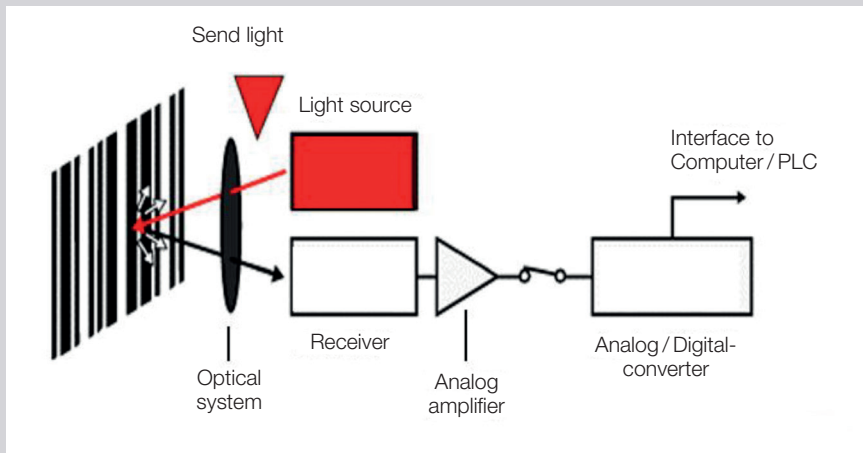


By using a laser diode and a combination of a spinning polygon wheel the bar code laser system provides a very effective reading solution. The following graphics will provide greater detail.

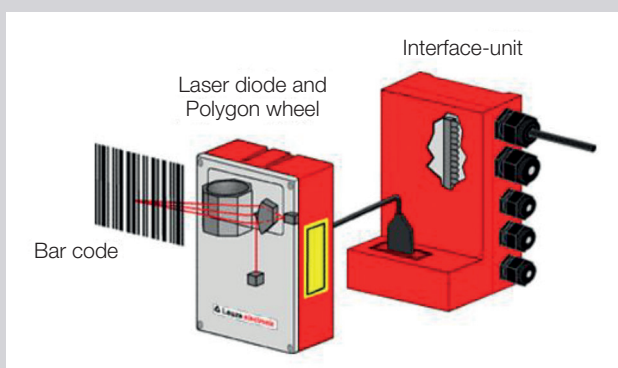


PRINCIPLES OF BAR CODE READING IN GENERAL

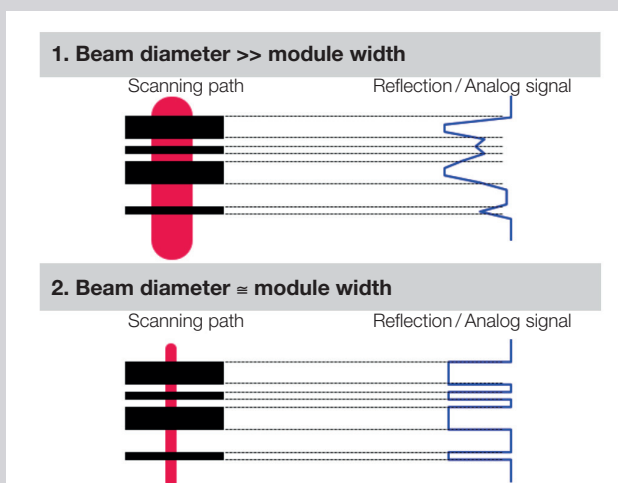
A **laser based Bar Code** reader uses a laser diode in combination with a spinning polygon wheel to properly align themselves for effective reading of a linear bar code.



Identification Resolution / Beam Diameter provide a further understanding of why the reading field and module size are so important. To effectively choose the best Laser Bar Code Reader requires a combination of module size and reading field requirement.

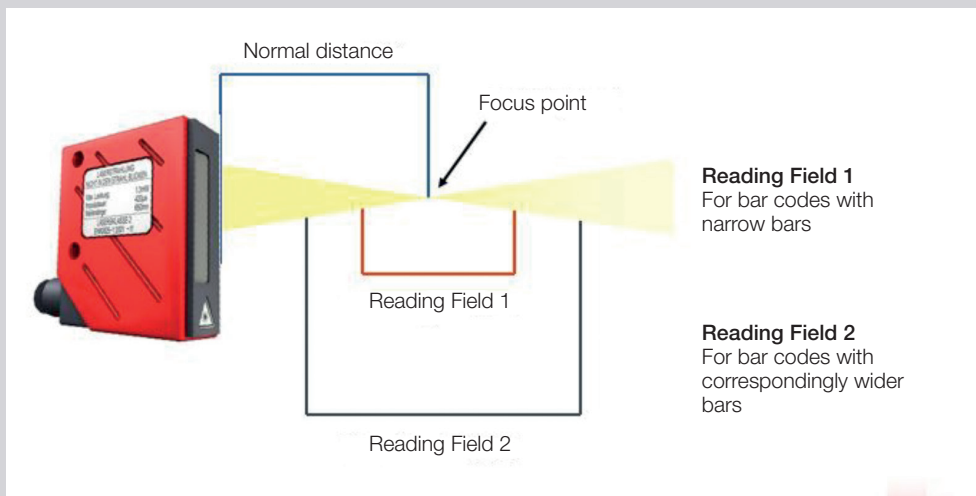


Another important characteristic to take into account is the focus point where the laser is optimally focused for the given module size.



Different optics can be configured for different reading field requirements.





Examples of Leuze electronic products:

The Leuze electronic **BCL 148** gives a reading distance up to 250 mm providing the ability of **reading between 1 – 15 rows of racks with focus adjustment**.

- Scanner with focus adjustment for sample codes and reagents
- Reading field depth of up to 250 mm
- Resolutions of 127 μ m codes in a broad area over multiple rows of racks are possible
- Maximum scanning rate of 750 scans/s also makes quick manual or automated rack insertions possible
- Optional frontal or lateral beam exit
- Because of the focus adjustment, even the first scan can be used for reading the code, thereby allowing the decoding to be verified multiple times



The Leuze electronic **BCL 8** is suited for **reading of 1 – 2 rows of racks or in sorters**. With the ability to consistently provide a high scanning rate (up to 600 scans/s) which facilitates reliable reading with Power Reserve built in.

- Consistently high scanning rate (up to 600 scans/s) facilitates reliable reading, even with manual insertion
- Robust IP 67 design with metal housing and glass front
- Integrated daisy chain network via RS 232 interface
- Various optics models for codes from 127 – 500 μ m
- Standard extensive firmware is provided for most application needs. The flexibility of the BCL allows for customization as needed and when requirements are beyond the standard firmware capabilities.



The Leuze electronic **BCL 21/22** is available for **reading of 1 – 6 rows of racks or in sorters**. This is achieved by a high-performance laser scanner with different optics models available for different reading field requirements.

- High-performance laser scanner with different optics models
- High scanning rate of up to 1,000 scans/s for the fastest movements, such as manual insertion and in conveyor systems for samples
- N-optics for high-resolution codes with module size from 150 µm
- Simple configuration of the desired configuration via online commands or with permanent settings in the firmware
- Raster scanner optionally available



The Leuze electronic **BCL 300i** is able to provide **reading of up to 6 rows of racks**. This series provides the most options available to allow us to customize a standard solution for you. These include different optics, interfaces, laser mirror options, integrated display and integrator heater.

- Reading distances 80 – 450 mm
- Modular connection technology by means of pluggable connection hoods with M12 connector, clamp connection or fixed connection cable
- High scanning rate of up to 1,000 scans/s for the fastest movements, such as manual insertion and in conveyor systems for samples
- Variants: Line scanner and deflecting mirror
- Raster scanner optionally available
- Code reconstruction technology (CRT) for reliable identification of damaged codes
- Optional display built into the reader
- Models can be configured with an optional heater for Lab Storage applications to provide for temperatures to –35 C°



Leuze electronic

WE ARE THE SENSOR PEOPLE

For more than 50 years, Leuze electronic has stood for innovative and efficient sensor solutions in the area of factory automation worldwide. Our range of products extends from switching and measuring sensors, identification and data transmission systems to intelligent image processing systems and solutions for safety at work. Our devices operate optically, inductively, with ultrasonic or via RFID, depending on which technology is appropriate for your application. With 18 of our own subsidiaries and 42 sales partners around the world, our customers can reach us quickly and easily everywhere. To accomplish this, we produce our sensors on four continents and can thereby always guarantee product availability. Regardless of when and where the competence of the sensor people happens to be needed at the moment. We are the right partner for both standard applications as well as for custom, high-end solutions. Through an expanded sales and service network, our competent consultation and our reliable customer service, you can count on us to be at your side around the world.



OUR PROMISE TO YOU

YOUR SENSOR BUSINESS – SIMPLER AND MORE EFFICIENT

Many companies say they are “customer orientated” – at Leuze electronic, we go a step further.

We offer specific and measurable added value in the areas of **USABILITY**, **APPLICATION KNOW-HOW** and **SERVICE** – to help make our customers more successful. These areas are our yardstick for new product developments, innovative service offerings and extensive market expertise.

SMARTER PRODUCT USABILITY With regard to our product developments, we systematically place emphasis on the especially good usability of all devices. To this end, simple mounting and alignment are taken into account – just as the uncomplicated integrability of the sensors in existing field bus systems and easy configuration, e.g. via a web browser, are.

SMARTER APPLICATION KNOW-HOW Whoever can do it all, can do nothing right. Which is why we concentrate on selected target sectors and applications. There, we are specialists and know all aspects inside out. For this purpose, we optimize our solutions and offer the absolute best solutions from a single source.

SMARTER CUSTOMER SERVICE The technical and personal proximity to our customers, and a skilled, straightforward handling of queries and problems, are among our strengths – and will remain so.



Switching Sensors

Optical Sensors
Ultrasonic Sensors
Fiber Optic Sensors
Inductive Switches
Forked Sensors
Light Curtains
Special Sensors

Measuring Sensors

Distance Sensors
Sensors for Positioning
3D Sensors
Light Curtains
Forked Sensors

Products for Safety at Work

Optoelectronic Safety Sensors
Safe Locking Devices, Switches and Proximity Sensors
Safe Control Components
Machine Safety Services

Identification

Bar Code Identification
2D-Code Identification
RF Identification

Data Transmission / Control Components

MA Modular Connection Units
Data Transmission
Safe Control Components

Industrial Image Processing

Light-Section Sensors
Smart Camera

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