



# How to choose the right scanner

The word 'scanner' describes a piece of equipment that is able to read bar codes, extract the encoded data and communicate/process the information between the relevant systems. Scanners are not the same as verifiers. Please see the section on 'the importance of symbol quality to scanning' for more details.

## Why you need a scanner

If you want to use the GS1 product identification and bar coding system to improve the speed and accuracy of recording the movement of products in any supply chain, you will need a bar code scanner to read the bar codes. Scanners can be used at any point in the supply chain, including manufacturing, wholesaling as well as at retail points of sale. Capturing data automatically can take place at any point of use, including hospital bedsides, pharmaceutical dispensaries, goods inwards, despatch points, and so on.

Scanning systems are used to increase the speed of data capture, reduce errors in data collection, and so provide accurate data to be used as the basis for many functions and management processes. These include retailing, ordering and invoicing, track and trace systems, asset tracking, stock control, item recognition, returns and rotation.

Additional benefits can be found in combining automatic data capture with other software systems to achieve effective pallet consolidation, purchasing, warehouse management, electronic communications, catalogues, and track and trace systems.

## How does a scanner work?

A scanner detects and measures the pattern of light and dark bars in a bar code, decodes this pattern, and sends the data to supporting systems.

Non-contact scanners can read bar codes at a distance but all scanner ranges will vary. Others, such as scanning pens or wands, must touch the bar code, and these are known as contact devices.

The scanner will always be connected to an operating system to enable speedy and efficient data transfer. Information relating to the data encoded in any bar code must be held on the computer (normally within a database).

## Which bar codes can be scanned?

Any of the scanners mentioned here is able to read the following bar codes: EAN-13, EAN-8, UPC-A, UPC-E, GS1 DataBar, ITF-14 and GS1-128. Scanners will be able to read other symbols that are outside the GS1 system. As the ITF-14 and GS1-128 bar codes were introduced for use on outer cases (traded units or trade item groupings), some retail point of sale scanning systems will not be programmed to read these symbols. Any other point of sale system should be able to scan all of these bar codes.

GS1 DataBar symbols are being introduced for use on all trade items on 1 January 2010. (GS1 DataBar Stacked Composite symbols have been usable on very small healthcare items since 2002 and many existing scanner installations will be unable to read them.)

New equipment should be able to read GS1 DataBar symbols, which are being introduced to co-exist with the present GS1 bar codes.

Many existing laser scanners can read the GS1 DataBar composite bar codes used on very small healthcare items after suitable upgrading. Whether any particular scanner can be upgraded to read the composite codes depends on the decoder's available processing power, memory, and ability to be reprogrammed.

## Which scanner should I use?

The choice of reader is not so much limited by the types of codes to be read, but more by the environment and purpose for which they will be used.

Application	Type			Technology					
	<i>Pen/wand Scanners<sup>1</sup></i>	<i>Hand Held/ Portable</i>	<i>Fixed position</i>	<i>Laser – Single line</i>	<i>Laser – Raster</i>	<i>Laser – Omni-Directional</i>	<i>CCD</i>	<i>Oscillating Mirror</i>	<i>Camera*</i>
Approximate cost **	£50-£160	£50 - £3,000	£90-£30,000						
Point of sale		Y	Y	Y	Y	Y	Y		
Warehouse management									
Stock picking		Y		Y	Y	Y	Y		
Inventory control/stock audit		Y		Y	Y	Y	Y		
Goods in		Y	Y	Y	Y	Y	Y	Y	Y
Goods out		Y	Y	Y	Y	Y	Y	Y	Y
On-line scanning (e.g. Scanning items on a conveyor belt within for example a production, distribution or warehouse environment).			Y	Y	Y	Y		Y	Y*
Mobile scanning (e.g. mobile unit on a lorry/van scanning items delivered; located on a trolley administering foods/drugs, shelf edge scanning etc)	Y	Y	Y	Y	Y	Y	Y		

\* Particularly suitable for high speed conveyor belt operations

\*\* In most installations more than one scanner will be required, for example single sided or multi-sided in fixed scanning locations.

## Mobile or fixed position scanning?

If the bar code scanning is required at a fixed point, such as at good inwards, or a point of sale, a fixed position scanner may be required. The scanner's power supply will be fixed, and the scanner will be able to send data in real time to the host computer.

Portable scanners will be necessary if mobile scanning is necessary, for example to scan products for stock taking purposes. All portable units (except those communicating to the host computer using wireless communications) will store the scanned data until it can be downloaded.

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Portable scanners may be installed on a mobile unit (for example, fork lift truck, lorry, trolley, hand held data terminal/handbook) and some applications will use wireless communications to update portable data terminals or the central system.

All scanners require a power source, provided by either batteries or the main power supply.

## Which types of scanner are available?

A wide range of scanning equipment is available with various prices and performances. The scanning technology industry is continuously developing and releasing new forms of scanners. There are contact and non-contact scanners.

There are basically four types of scanner.

### Pens/wands

Pens/wands require direct contact with the symbol throughout the scanning process. The pen is placed at one end of the symbol and is moved briskly across the code at a constant speed. As direct contact is required, pens and wands can damage the bar code and reduce its quality.

### Laser scanners

Laser scanners project a scanning beam of light onto the bar code. The maximum width of the bar code to be read is limited by the pattern of the laser beam being projected. There are four different ways of projecting the beam of light as explained below:

Single line – a single line is projected onto a specific area of the symbol either by hand or using an automated system in a fixed position.

Hand held laser scanners can read bar codes at a distance and can be directed at a certain area of the symbol that is visible or undamaged. The maximum width of the bar code to be read is limited by the width of the laser beam being projected.

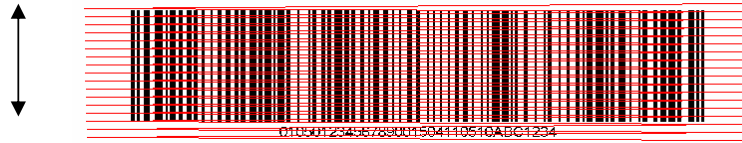


Raster – a pattern of parallel or grid lines is projected onto the bar code.



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Oscillating Mirror – a single laser beam using a moving/oscillating mirror to sweep up and down in order to locate a picket fence bar code.

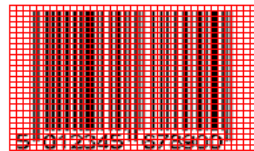


Omnidirectional – patterns of lines at different angles are projected across the bar code. EAN/UPC and the major GS1 DataBar symbols have been designed to be read in any position in front of this type of scanner. Omnidirectional scanners have generally been fixed position scanners, but omni-directional hand held scanners are now available.



### **CCD (Charge couple device) scanners**

CCD and imaging scanners illuminate the bar code and in effect take a one-dimensional and in some cases a two-dimensional picture of a complete cross section of the bar code, which is then decoded. There are contact and non-contact versions available.



### **Camera Scanners (fixed mount scanners)**

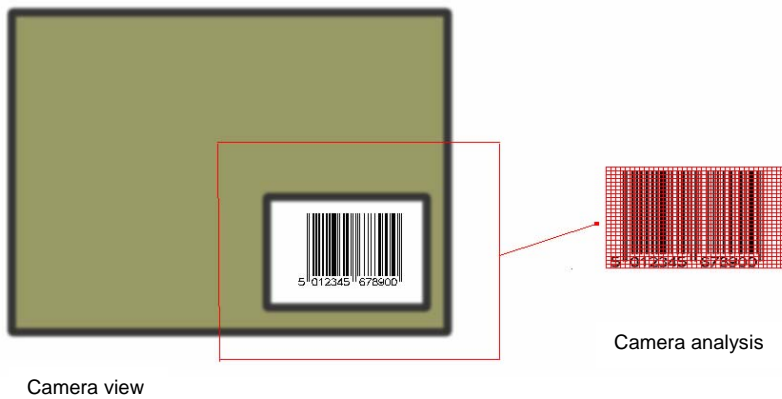
Camera scanners capture a two dimensional image of the product. The image is processed in real time; the camera searches for and decodes conventional bar codes, and may decode other identifying marks such as text.

Camera scanners can offer increased speed of data capture and a higher read rate due to their ability to decode poorer quality symbols than other scanning technologies.

Camera scanners typically require a higher system investment than other scanning technologies, however the running costs may be much lower due to increased performance and speed<sup>2</sup>.

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<sup>2</sup> High speed can be defined as a transport conveyor speed up to 2.0 metres/second.



## The importance of bar code quality to symbol scanning

A scanner will successfully scan a GS1 bar code if the symbol meets the requirements of the GS1 General Specifications. A verifier can determine if the bar code complies with the GS1 standards (please refer to GS1 UK for a copy of the verification document).

Bar code scanning and verification are not the same thing – scanning a symbol only indicates whether the symbol will or will not scan. It does not provide an indication of the quality of the symbol or identify potential faults. Verification provides a detailed analysis of the bar code and will determine whether the bar code meets the relevant standards. A symbol with a high grade is more likely to be read than a symbol with a lower grade.

The following can affect the quality of the bar code:

- Obscuring the bar code with labels, tape, folds or seams from shrink wrapping
- Poor print quality
- Insufficient quiet zones
- Wrong choice of colour for light and dark bars resulting in poor contrast
- Insufficient bar code height
- Incorrectly encoded data, etc

## Scanner requirements

The answers to the following questions should form the basis of your requirements list that can be used to help source an appropriate scanning solution.

1. Where will the scanners be used? For example:
  - on a production line
  - in a warehouse
  - at a retail or other point of sale
  - outdoors or indoors
  - for stock picking
  - at goods inward
  - at despatch
  - for dispensing pharmaceutical and medical products
2. Will the scanners be in a fixed location or do they need to be mobile?  
Will the scanner need to be hand held or kept in a fixed position?
3. What distance will the bar code need to be read at?

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4. What is the scanning environment? Is it dusty, is there vibration, and is it at ambient or freezing temperatures?
  5. Which bar codes will need to be scanned? Will any non-GS1 bar codes be scanned?
  6. How will the scanner be used? Will it be used by trained staff or used occasionally by inexperienced users?
  7. How many scanners will be required and in which position? Hand held scanners may suit some points of sale, but several fixed scanners may be required to scan goods passing on a conveyor belt within a warehouse.
  8. What type of products will be scanned? Consumer units, traded units, or logistics units?
  9. System considerations. Will the scanning software be compatible with your existing system and will the combination provide sufficient functionality to meet the expected benefits of installing the system?
  10. What is the budget for the scanning installation and any service and training costs?

### Further information

Visit the Solution Provider Finder available on GS1 UK's website, at [www.gs1uk.org](http://www.gs1uk.org)

See the Association for Automatic Identification and Mobility's website at [www.aimglobal.org](http://www.aimglobal.org) for further details on automatic identification and data capture technology and for global lists of equipment suppliers.



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