



LS6100

Installation Manual

DATALOGIC DL
Bar Code & More

LS6100
INSTALLATION MANUAL

We

DATALOGIC S.p.A.
Via Candini, 2
40012 - Lippo di Calderara
Bologna - Italy

declare under our sole responsibility that the product

LS6100-XXXX, Laser Scanner and all its models

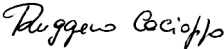
to which this declaration relates is in conformity with the following standards or other normative documents

- EN 55022, August 1994:** LIMITS AND METHODS OF MEASUREMENTS OF RADIO DISTURBANCE CHARACTERISTICS OF INFORMATION TECHNOLOGY EQUIPMENT (ITE)
- EN 50082-2, March 1995:** ELECTROMAGNETIC COMPATIBILITY. GENERIC IMMUNITY STANDARD. PART 2: INDUSTRIAL ENVIRONMENT
- EN 60950, October 1996:** SAFETY OF INFORMATION TECHNOLOGY EQUIPMENT, INCLUDING ELECTRICAL BUSINESS EQUIPMENT
- EN 60825, March 1993:** RADIATION SAFETY OF LASER PRODUCTS, EQUIPMENT CLASSIFICATION, REQUIREMENTS AND USER'S GUIDE

Following the provision of the Directive(s):

89/336 CEE AND SUCCESSIVE AMENDMENTS, 92/31 CEE; 93/68 CEE; 73/23 CEE

Lippo di Calderara, 23.09.1997

Ruggero Cacioppo

Quality Assurance Supervisor

Product names mentioned herein are for identification purposes only and may be trademarks and or registered trademarks of their respective companies.

Datalogic reserves the right to make modifications and improvements without prior notification.

© - 1997 Datalogic S.p.A.

CONTENTS

General View.....	iv
SAFETY PRECAUTIONS	v
Electrical Safety.....	v
Laser Safety.....	v
Standard Regulations.....	v
1 INTRODUCTION	1
1.1 General Features.....	1
1.1.1 LEDs.....	3
1.1.2 Laser Scanning Barcode Reader.....	3
1.1.3 Power Supply.....	3
1.1.4 Inputs.....	4
1.1.5 Outputs.....	5
1.2 Typical Applications.....	6
2 INSTALLATION	7
2.1 Package Contents.....	7
2.2 Guide to Installation.....	8
2.3 Mechanical Installation.....	8
2.4 Positioning.....	9
2.4.1 Focus Adjustment.....	11
2.4.2 Step Ladder Mode.....	13
2.4.3 Picket Fence Mode.....	14
2.4.4 Overflow.....	15
2.5 Electrical Installation.....	16
3 MAINTENANCE	17
4 TECHNICAL FEATURES	18
4.1 Performance.....	18
4.2 Reading Diagrams.....	19
4.3 Technical Data.....	23

LS6100

General View

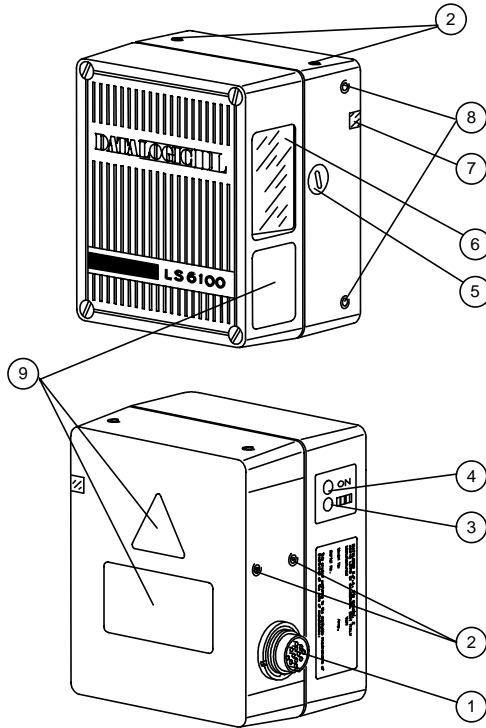


Figure A

- | | |
|--------------------------|----------------------------|
| ① Connector | ⑥ Laser beam output window |
| ② Mounting holes | ⑦ Laser ON LED |
| ③ Good read LED | ⑧ Mounting holes |
| ④ Power ON LED | ⑨ Warning labels |
| ⑤ Focus regulation cover | |

SAFETY PRECAUTIONS

ELECTRICAL SAFETY

This product conforms to the applicable requirements contained in the European Standard for electrical safety EN-60950 at the date of manufacture.

It is not necessary to open the device for normal operations or installation, however the following warnings still apply:



This device must be opened by qualified personnel only.



Before opening the device make sure the power cable is disconnected to avoid electric shock.

LASER SAFETY

The following information is provided to comply with the rules imposed by international authorities and refers to the correct use of the LS6100 barcode reader.

Standard Regulations

This barcode reader utilizes a low-power laser diode. Although staring directly at the laser beam momentarily causes no known biological damage, avoid staring at the beam as one would with any very strong light source, such as the sun.

Avoid that the laser beam hits the eye of an observer, even through reflective surfaces such as mirrors, etc.

This product conforms to the applicable requirements of both IEC 825-1 and CDRH 21 CFR 1040 at the date of manufacture. The scanner is classified as a Class 2 laser product according to IEC 825-1 regulations and as a Class II laser product according to CDRH regulations.

There is a safety device which allows the laser to be switched on only if the motor is rotating above the threshold for its correct scanning speed.

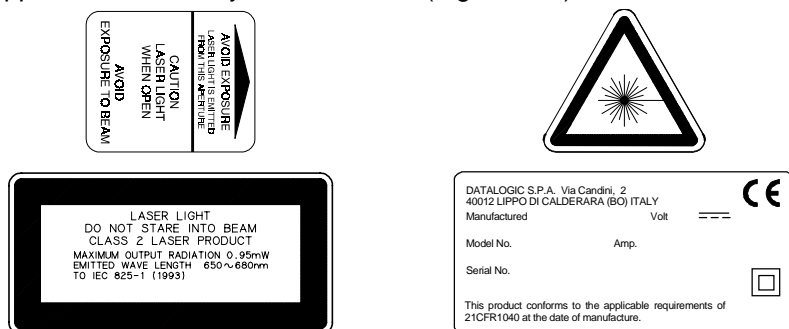
Any decoder used with this scanner must include a visible indication whenever it is on (i.e. LED power indicator) and must include easy access to the ON/OFF switch.

WARNING

Use of controls or adjustments or performance of procedures other than those specified herein may result in exposure to hazardous visible laser light.

The laser light is visible to the human eye and is emitted from the window on the side of the reader (Figure A, 6).

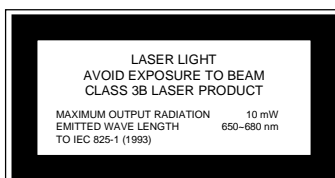
Warning labels indicating exposure to laser light and the device classification are applied onto the body of the scanner (Figure A, 9):



Warning and device class labels

Disconnect the power supply when opening the device during maintenance or installation to avoid exposure to hazardous laser light.

The laser diode used in this device is classified as a Class 3B laser product according to IEC 825-1 regulations and as a Class IIIb laser product according to CDRH regulations. As it is not possible to apply a classification label on the laser diode used in this device, the following label is reproduced here:



Laser diode class label

Any violation of the optic parts in particular can cause radiation up to the maximum level of the laser diode (10 mW at 650–680 nm).

1. INTRODUCTION

1.1 GENERAL FEATURES

The laser diode scanner LS6100 is a new industrial barcode reader which implements the most advanced technology and offers excellent performance.

The reader has been designed to meet the requirements of applications concerning automatic identification of objects on high speed conveyors, and to create very high reading performance systems for package sorting.

Thanks to the use of a sophisticated digitizer, the LS6100 tailors its characteristics to the application to be implemented and to the code to be read, thus offering high performance under any reading conditions.

The Datalogic reader has a standard scan rate of 800 scans/sec. and a max. reading distance of 1500 mm (59 in.) with a depth of field of 1250 mm (49.2 in.).

The LS6100 is enclosed in an industrial case with very compact dimensions. Due to its reduced size, the reader can be installed on any kind of conveyor without difficulty.

The LS6100 can be connected to any Datalogic decoder.

The LS6100 protection class is IP65.

For details and reading features, refer to chapter 4.

Some other relevant features are listed below:

- operation with single power supply
- operating voltage from 10 to 30 Vdc
- low power consumption
- possibility to read high density codes
- high scanning speed (800 scans/sec)
- raster versions available

MODELS AND ACCESSORIES

The LS6100 is supplied with different versions, depending on raster or linear reading.

These are the models:

LS6100-1000 Standard resolution

LS6100-1010 Raster version R1

LS6100-1020 Raster version R2

LS6100-1030 Raster version R3

R1, R2 and R3 LS6100 models have different distances (D) between the first and the last beam of the raster pattern as in the following table:

	Reading distance	
	500 mm (19.7 in)	800 mm (31.5 in)
R1	D = 24 mm (0.94 in)	D = 37 mm (1.45 in)
R2	D = 45 mm (1.77 in)	D = 71 mm (2.79 in)
R3	D = 88 mm (3.46 in)	D = 138 mm (5.43 in)

For the reading features of the above models, refer to paragraph 4.2.

The following accessories are available on request for the LS6100:

- 90° reading device GFC-50
- oscillating mirror attachment GFC-05

1.1.1 LEDs

The three LEDs on the side of the scanner indicate the following:

- Good Read LED (red) (figure A, part 3) is driven by an external decoder and indicates a successful barcode reading.
- Power ON LED (red) (figure A, part 4) indicates the reader is connected to the power supply.
- Laser ON LED (green) (figure A, part 7) indicates the laser diode is active.

1.1.2 Laser Scanning Barcode Reader

The LS6100 uses a red light laser diode having a wavelength between 650 and 680 nm. There is a safety device which allows the laser to be switched on only when the motor has reached the correct scanning speed therefore the laser beam is generated with a delay which depends on the motor inertia.

The laser beam output window is located on the front side of the reader (figure A, part 6).

1.1.3 Power Supply

The maximum D.C. voltage applicable between the VDC pin and GND is 35 V: higher values can damage the reader; for a correct operation it is advisable to limit the voltage to a maximum of 30 V D.C. .

The minimum D.C. operating voltage is 10 V; lower values do not allow the scanner to switch on.

The current consumption decreases as the power supply voltage increases.

1.1.4 Inputs

BEAM SHUTTER (BS)

The beam shutter input receives a signal coming from the decoder, if enabled, that turns off the laser as soon as the code(s) are read. The laser is turned on again when the next reading phase starts.

The command must be given by an open collector NPN transistor, taking care that the logic level "0" switches the laser off.

If this command is used, the laser must be normally off. It must be activated by the decoder on command of the code presence sensor.

If this input is not connected or the command is disabled, the laser is always on.

The maximum delay between the "laser on" command and the ready state of the scanner is 1 ms.

The use of the beam shutter command is always advised with laser diode readers. This keeps the medium power dissipation low in the device and thus prolongs the laser life.

GOOD READ LED

This signal activates the Good Read LED on the side of the reader (figure A, part 3).

The meaning of this signal is:

Logic level 0 = LED ON

Logic level 1 = LED OFF

The LED activation shows a successful acquisition of the code by the decoder.

1.1.5 Outputs

VIDEO, $\overline{\text{VIDEO}}$, SCAN, $\overline{\text{SCAN}}$

These signals represent the code and the scan start on two differential lines.

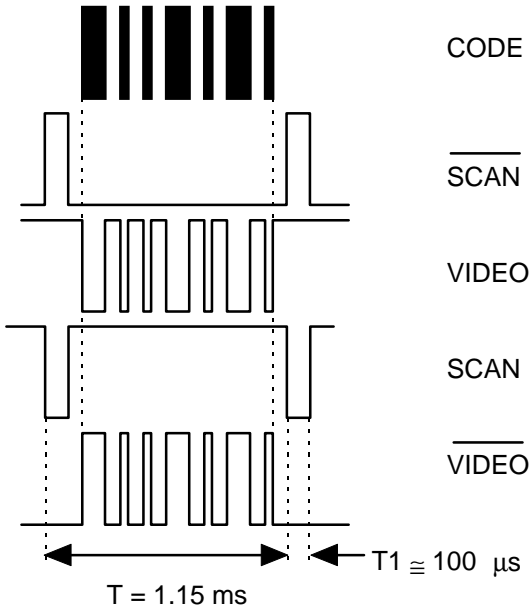


Figure 1.1 - VIDEO and SCAN signals

1.2 TYPICAL APPLICATIONS

The LS6100 was specifically designed for use in industrial applications. Typical applications are detecting moving objects in real time on conveyor belts for: storage, handling, distribution, manufacturing industry, service and public authority systems.

The decoder wired to the scanner is activated by a photoelectric sensor before the object enters the reading zone (see figure 1.2).

The LS6100 can be mounted horizontally or vertically to read labels in the two standard (step ladder and picket fence) positions (see par. 2.4.2 and 2.4.3).

In each application, the length of the scan line, the scan speed, the bar height and speed of the moving code with respect to the scanner must consent the reader to scan the code at least five times to assure a good read.

The use of raster models allows a greater code surface to be explored and therefore the possibility of correct reading is increased, even with poor print quality or when the code is positioned incorrectly.

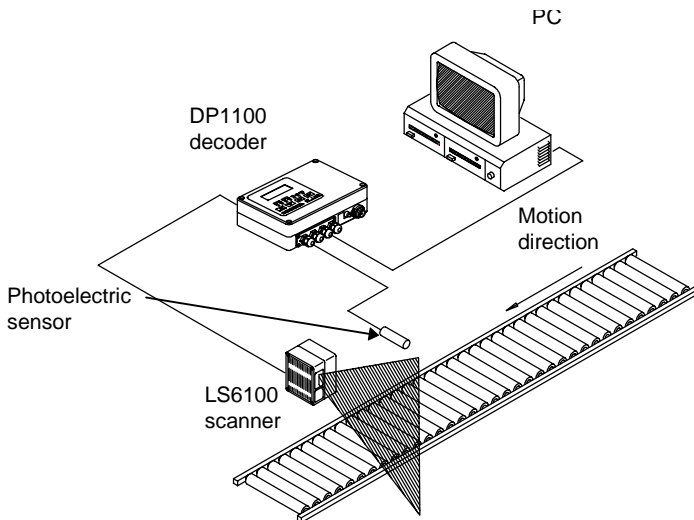


Figure 1.2 - LS6100 typical application

2. INSTALLATION

2.1 PACKAGE CONTENTS

When unpacking the LS6100 check that the equipment is complete.

The list of parts includes:

- 1) OPERATOR'S MANUAL and BARCODE TEST CHART
- 2) LS6100 READER
- 3) SET OF MOUNTING SCREWS AND WASHERS

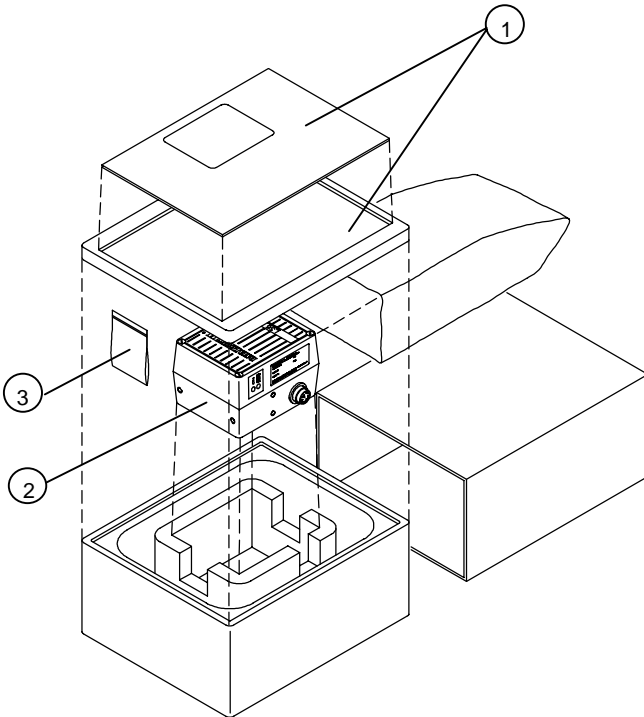


Figure 2.1 - LS6100 package contents

2.4 POSITIONING

When mounting the LS6100 take into consideration these three ideal label position angles: **Pitch 0°**, **Skew 10° to 30°** and **Tilt 0°**.

Follow the suggestions shown below for the best orientation.

The **Pitch** angle is represented by the value **P** in figure 2.3.

Position the reader to **minimize** the **Pitch** angle.

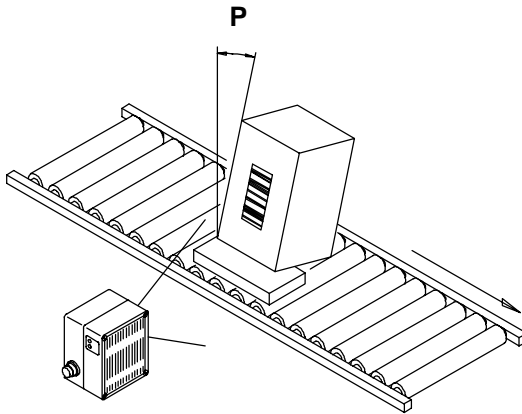


Figure 2.3 - Pitch angle

The **Skew** angle is represented by the value **S** in figure 2.4. Position the reader in order to **assure at least 10 degrees** for the **Skew** angle. This avoids the direct reflection of the laser light emitted by the LS6100.

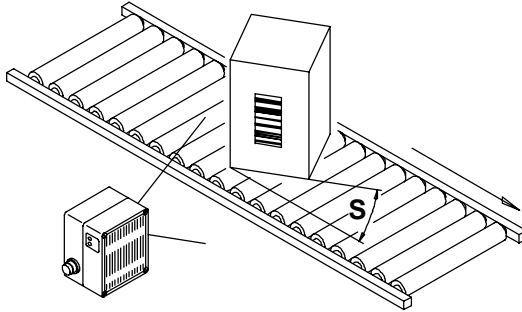


Figure 2.4 - Skew angle

The **Tilt** angle is represented by the value **T** in figure 2.5. Position the reader in order to **minimize** the **Tilt** angle.

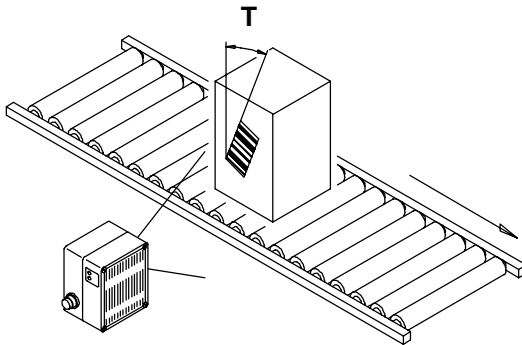


Figure 2.5 - Tilt angle

2.4.1 Focus Adjustment

Before installing the LS6100, the operator should select a specific reading area by means of the optical system for manual adjustment of the focal length.

The focus adjustment is obtained by means of a screw which moves the internal lenses during its rotation; the moving of the lenses causes the change of the laser beam focusing position.

Seven marks, numbered from 0 to 6, are printed on the regulation screw to indicate the different positions of the internal optics. Paragraph 4.2 contains a diagram which shows the reading performance that can be obtained from LS6100 scanners when operating with different focus positions and bar code label densities.

Even though the screw is marked with seven positions, the focus adjustment is continuous and not by step; this allows an optimum adjustment around the selected position.

WARNING

The scanner must be disconnected from the power supply during this operation to avoid dangerous laser radiation.

Refer to the following instructions when adjusting the focus:

- 1) Unscrew the focus regulation cover (Figure A, part 5) near the laser output window for access to the focus adjustment screw.
- 2) Carefully turn the screw which moves the internal optical system counterclockwise until the number 0 is aligned with the notch as shown in the following figure.
- 3) Now turn the focus adjustment screw clockwise to reach the desired position (refer to paragraph 4.2).

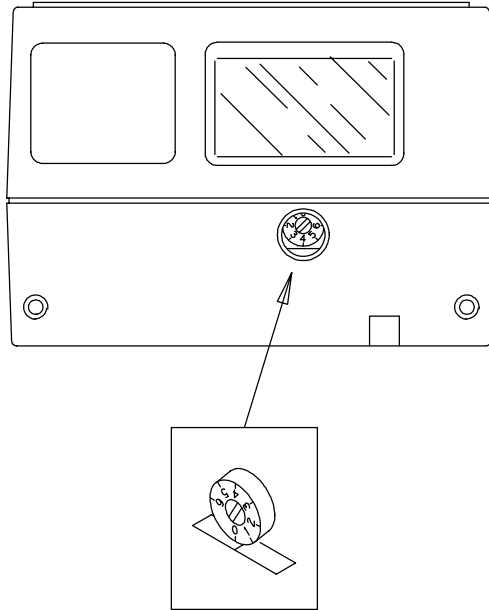


Figure 2.6 - Focus regulation

NOTE

The focus adjustment screw is positioned by default at the value 2.

2.4.2 Step Ladder Mode

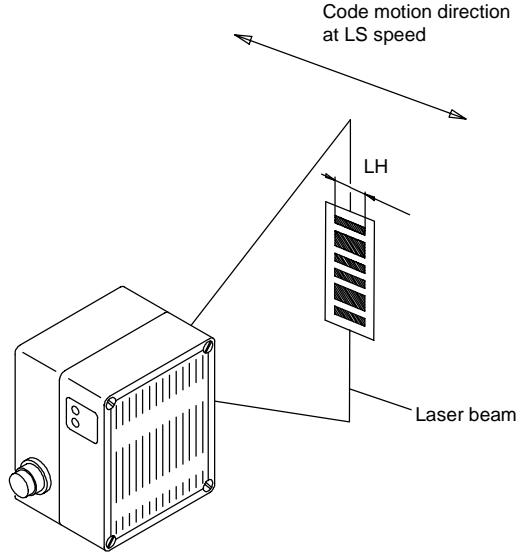


Figure 2.7 - "Step Ladder" scanning mode

If scanning is perpendicular to the code motion direction (Figure 2.7 - "Step Ladder" mode), the number of effective scans performed by the reader is given by the following formula:

$$SN = [(LH / LS) * SS] - 2$$

These symbols signify:

- SN = number of effective scans
- LH = label height (in mm)
- LS = label movement speed (in mm/s)
- SS = number of scans per second

2.4.3 Picket Fence Mode

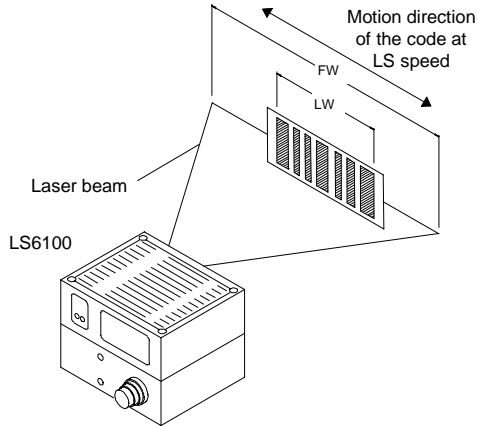


Figure 2.8 - "Picket Fence" scanning mode

If scanning is parallel to the code motion, (Figure 2.8 - "Picket Fence" mode), the number of effective scans is given by:

$$SN = [((FW - LW) / LS) * SS] - 2$$

These symbols signify:

- SN = number of effective scans
- FW = reading field width (in mm)
- LW = label width (in mm)
- LS = label movement speed (in mm/s)
- SS = scans per second

2.4.4 Overflow

To calculate the overflow value use the following formulas:

$$TD = XB * (1 / LS)$$

where

$$LS = 12.5 * (NS / NM) * (CD + 30)$$

The symbols have the following significance:

TD = time duration of the bar

XB = bar width

LS = laser speed (in mm/s)

NS = number of scans per second

NM = number of mirrors

CD = code distance from the reader (in mm)

This value is used when configuring the decoder attached to the scanner.

2.5 ELECTRICAL INSTALLATION

The LS6100 is supplied with a circular connector, through which connection between scanner and decoder takes place and the operating voltage is supplied. The following terminals are available:

Pin	Name	Function
A	VDC	operating voltage
B	GND	ground
C	BEAM SHUTTER	laser off signal
D	+ VIDEO	video signal representing code
E	I. U.	internal use - do not connect
F	- VIDEO	complementary of video signal
G	- SCAN	complementary of scan start
H	+ SCAN	scan start
J	GOOD READ	code acquisition signal
L	SHIELD	
K	RESOL	resolution signal
M	I. U.	internal use - do not connect

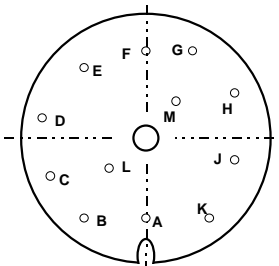


Figure 2.9 - Connector LS6100 side

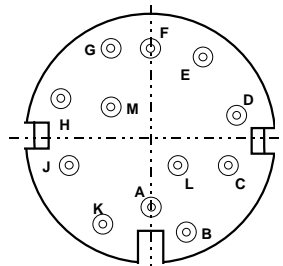


Figure 2.10 - Connector cable side

3. MAINTENANCE

The LS6100 has no user replaceable components and does not require any particular maintenance.

WARNING

Clean the window of the LS6100 when the scanner is turned off or, at least when the laser beam is deactivated.

The reader's window, from which the laser beam is emitted, must be kept clean; a dirty window can alter the performance.

Clean the window periodically using soft material, soaked in alcohol, and avoid abrasive substances.

4. TECHNICAL FEATURES

4.1 PERFORMANCE

The LS6100 reader performance depends on the code density and focus adjustment.

The LS6100's optical resolution allows code reading from 0.2 mm to 1 mm narrow bars in the zone between 250 and 1500 mm from the emission window.

Refer to the diagrams given in paragraph 4.2 for further details on the reading features. These diagrams refer to the standard models and are taken on various resolution sample codes at a 25 °C ambient temperature, depending on the conditions in the notes under each diagram.

If standard models do not satisfy specific requirements, contact your nearest Datalogic distributor, supplying code samples, to obtain complete information on the reading possibilities.

4.2 READING DIAGRAMS

The following diagram indicates several combinations of bar code densities and operating distances that can be encountered in most common applications and the corresponding reading fields.

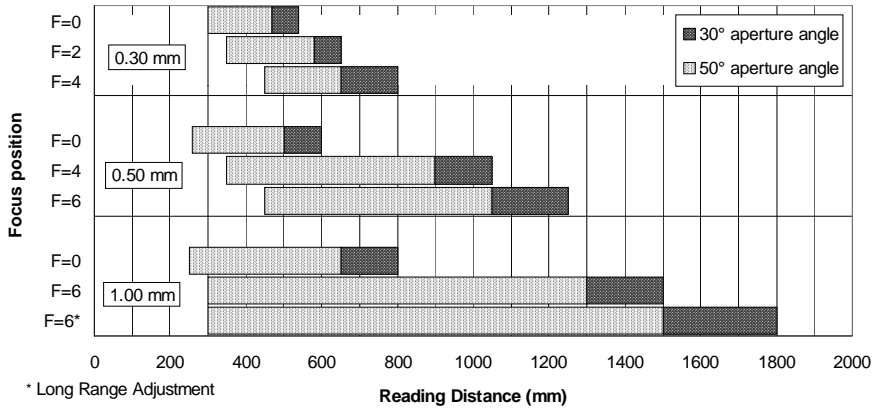


Figure 4.1 - Reading distances for LS6100

NOTE

For long range adjustment contact your Datalogic distributor.

Example:

The following figure shows the reading diagram obtained for the LS6100 operating with focus screw set at position 6 and barcode density of 0.50 mm.

From figure 4.1 you will get the following reading distances:

- Minimum = 450 mm
- Maximum at 50° of laser beam aperture = 1050 mm
- Maximum at 30° of laser beam aperture = 1250 mm

NOTE: (0,0) IS THE CENTER OF THE LASER BEAM OUTPUT WINDOW

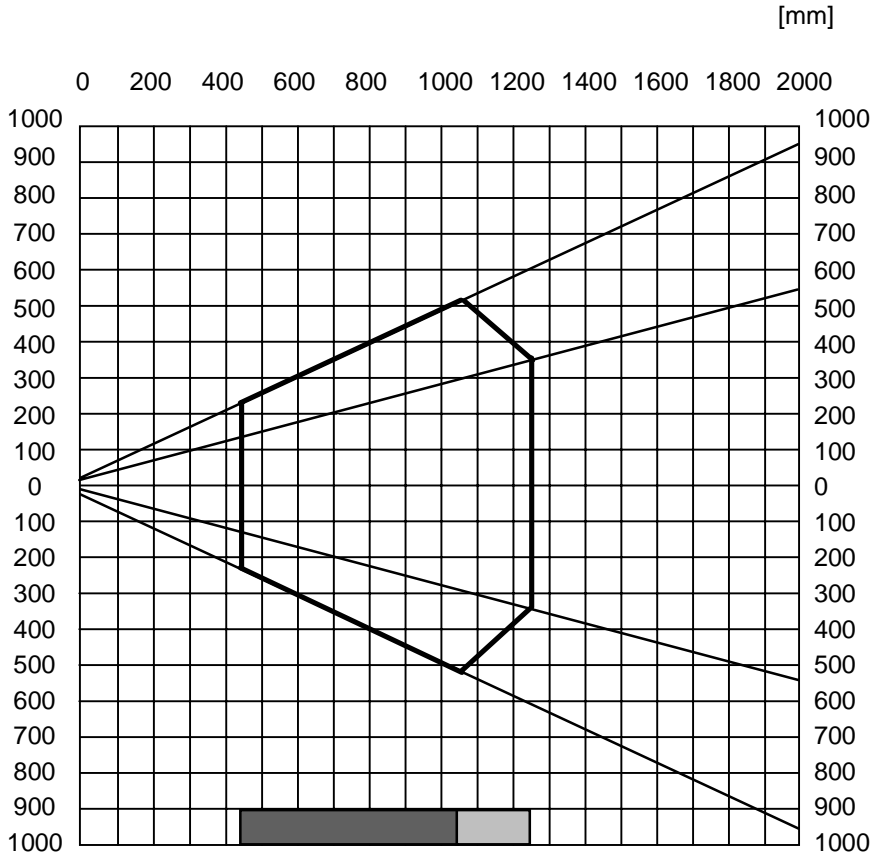


Figure 4.2 - Example of reading diagram for LS6100

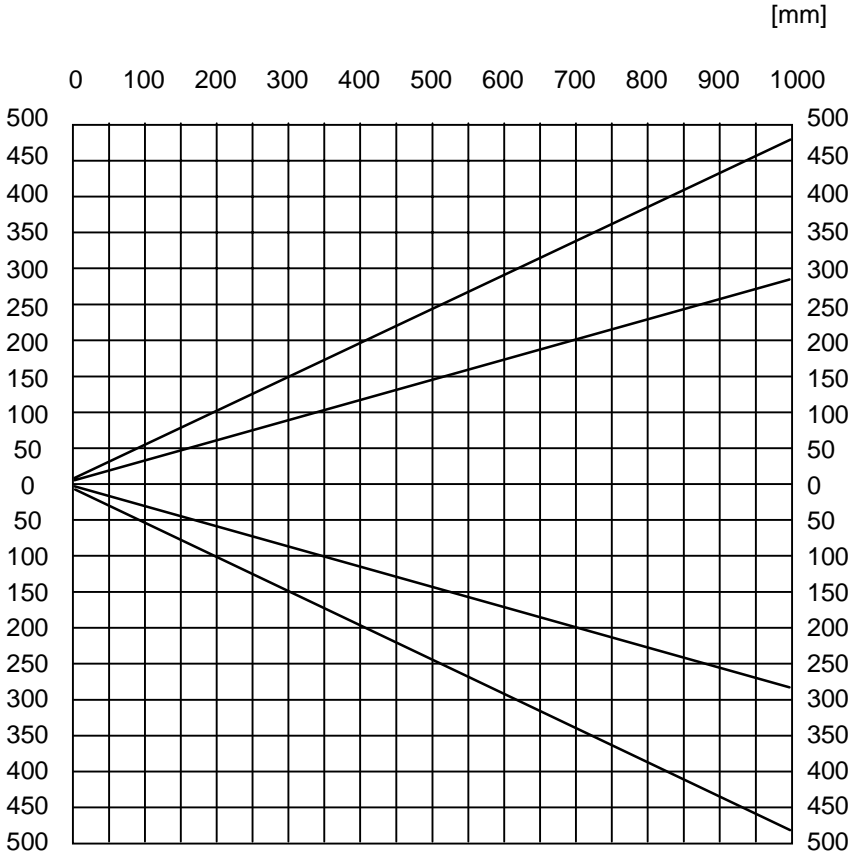


Figure 4.3 - Empty grid: reading distance from 0 to 1000 mm

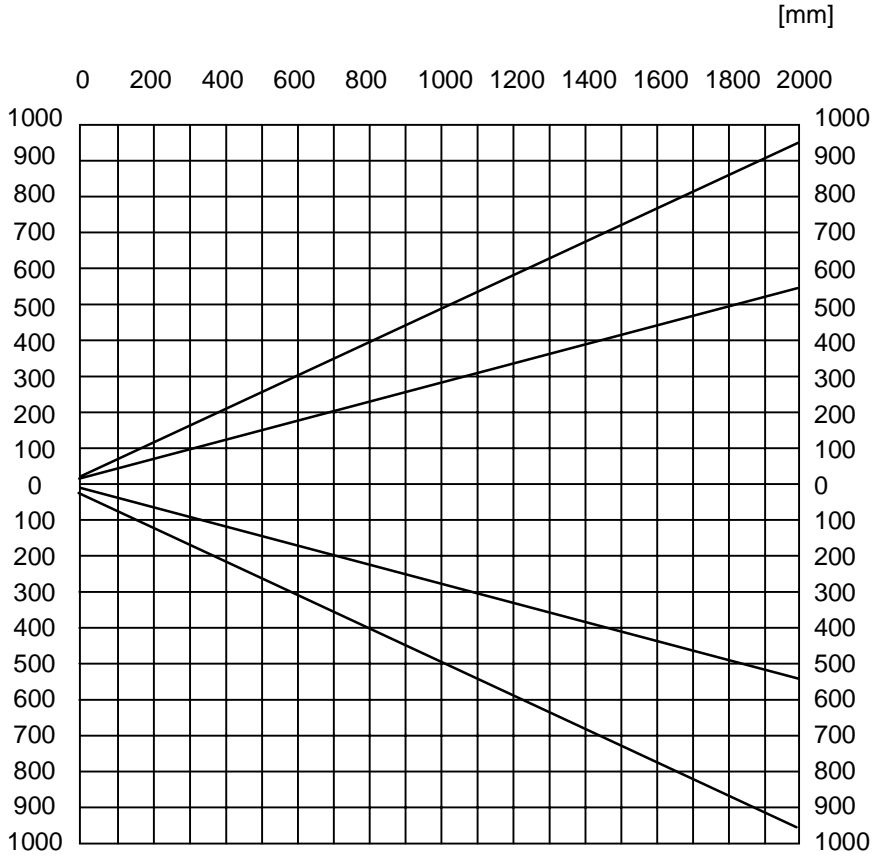


Figure 4.4 - Empty grid: reading distance from 0 to 2000 mm

4.3 TECHNICAL DATA

ELECTRICAL CHARACTERISTICS (see NOTE)	
Max. Input voltage	35 V
Operating voltage	10 to 30 V
Operating current	0.55 - 0.18 A
Power consumption max.	5.5 W
OPTICAL CHARACTERISTICS	
Light source	semiconductor laser diode
Wave length (see NOTE)	650 - 680 nm
Safety class	Class 2 - IEC 825 Class II - CDRH
READING FEATURES	
Scanning speed	800 scans/s
Aperture angle	55 degrees
Maximum resolution	0.2 mm
Maximum reading distance	see diagram
Maximum reading field	see diagram
OPERATING ENVIRONMENT	
Working temperature	0 °C/+40 °C (32 °F to 104 °F)
Storage temperature	-20 °C/+70 °C (-4 °F to 158 °F)
Max. relative humidity	90% non condensing
Max. ambient light rejection	20000 Lux (sun light)
Vibration Resistance	IEC 68-2-6 Test FC 1.5 mm; 10: 55 Hz; 2 hours x, y, z axis
Shock resistance	IEC 68-2-27 Test EA 30 G; 11 ms; 3 shocks x, y, z axis
Protection class	IP65
PHYSICAL CHARACTERISTICS	
Mechanical dimensions	95.5 x 101 x 66.5 mm (3.76 x 3.98 x 2.62 in)
Weight	680 g (24 oz)

NOTE

The features indicated are to be considered typical at an ambient temperature of 25 °C (77 °F), if not specified differently.