



**DS2200**

Installation Manual

**DATALOGIC DL**  
*Bar Code & More*  
.....

**DS2200**

**INSTALLATION MANUAL**

We

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

declare under our sole responsibility that the product

**DS2200-XXXX, Laser Scanner and all its models**

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

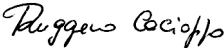
**EN 55022, August 1994:** LIMITS AND METHODS OF MEASUREMENTS OF RADIO DISTURBANCE CHARACTERISTICS OF INFORMATION TECHNOLOGY EQUIPMENT (ITE)

**EN 50082-2, March 1995:** ELECTROMAGNETIC COMPATIBILITY. GENERIC IMMUNITY STANDARD. PART 2: INDUSTRIAL ENVIRONMENT

Following the provision of the Directive(s):

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

Lippo di Calderara, 22.05.1998

Ruggero Cacioppo  
  
Quality Assurance Supervisor

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# GUIDE TO INSTALLATION

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The following can be used as a checklist to verify all the necessary steps for complete installation of the DS2200 scanner.

1. Read all information in the section "Safety Precautions" at the beginning of this manual.
2. Correctly position and mount the scanner for barcode reading according to the information in par. 2.2, 2.4 and 3.4.
3. Provide correct system cabling according to the signals necessary (see all applicable sub-paragraphs under 2.3). See also sub-paragraphs under 2.5 for reference.
4. Install the Configuration Disk.  
*Upon successful completion of the installation, the readme.hlp file is opened, giving details about how to get started configuring your scanner. See also the Guide to Rapid Configuration link. Specific parameter details are available in the Help On Line.*

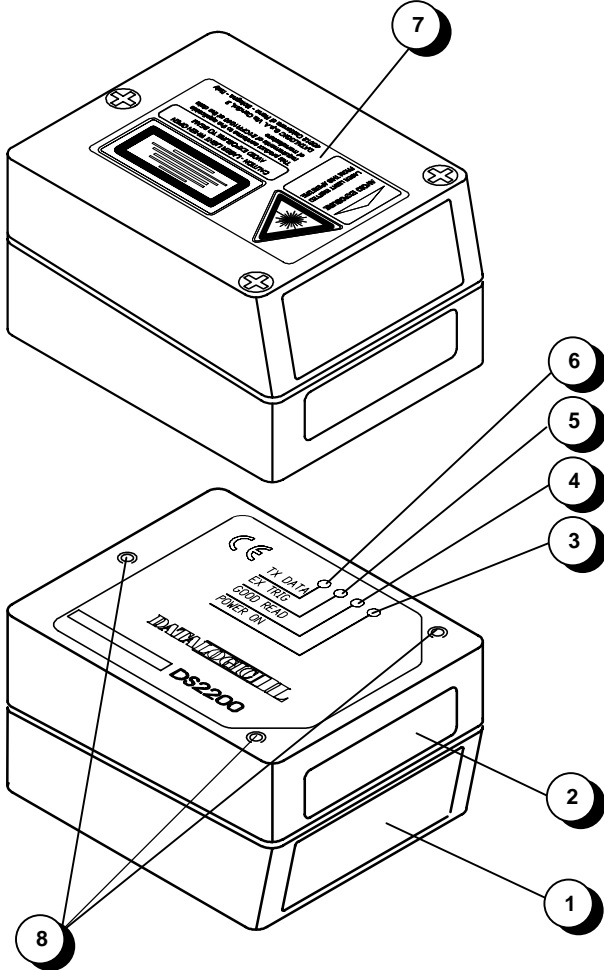
## NOTE

*Fine tuning of the scanner position for barcode reading can be accomplished using the Test Mode as described in WinHost.*

The installation is now complete.

# DS2200

## General View



- 1 Barcode Image Input Window
- 2 Laser Beam Output Window
- 3 Power ON LED
- 4 Good Read LED
- 5 Ext Trig LED
- 6 TX Data LED
- 7 Laser Warning and Device Class Label
- 8 Mounting Holes

Figure A

# SAFETY PRECAUTIONS

---

## LASER SAFETY

The following information is provided to comply with the rules imposed by international authorities and refers to the correct use of the DS2200 scanner.

### Standard Regulations

This scanner 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.

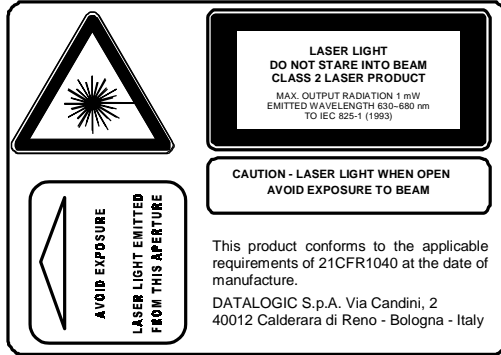
*The laser beam can be switched off through a software command (see "Beam Shutter" in the WinHost Help On Line or in the "Command Strings for DS2200" file in the DS2200 directory).*

### 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 scanner (Figure A, )

The warning label indicating exposure to laser light and the device classification is applied onto the body of the scanner (figure A, 7):



**Warning and device class label**

For installation, use and maintenance it is not necessary to open the scanner.

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 (7mW at 630~680 nm).

## POWER SUPPLY

### - DS2200 All Models:

This accessory device is intended to be supplied by a UL Listed Power Unit with a "Class 2" or LPS power source which supplies power directly to the scanner via the 25-pin connector.

# 1 GENERAL FEATURES

---

## 1.1 INTRODUCTION

The DS2200 scanner is a cost effective barcode reader complete with decoder designed to satisfy demanding requirements associated with high performance scanning.

The DS2200 ultra compact dimensions, based on Datalogic's experience in miniaturised laser components, make the scanner's integration into automated equipment extremely easy.

The DS2200 is easily configurable by means of the Windows-based user-friendly WinHost utility program provided on diskette, or through ESC sequences via the serial interface.

## 1.2 DESCRIPTION

Some of the main features of DS2200 are listed below:

- miniaturised dimensions
- scanning speed: 500 scans/sec.
- linear, raster and high optical resolution versions
- 2 serial communication interfaces: RS232 + RS485 Half-Duplex
- reads all popular codes
- supply voltage: 5 Vdc
- test mode to verify the reading features and exact positioning of the scanner without the need for external tools
- programmable in 4 different operating modes to suit the most various barcode reading system requirements
- code verifier
- programmable input and output signals
- light source: solid state laser diode; the light emitted has a wave length of 630 ~ 680 nm. For laser safety precautions refer to the "Safety Precautions" section at the beginning of this manual
- low power consumption

- IP65 protection class of the enclosure; the reader is therefore suitable for industrial environments where high protection against harsh external conditions is required.

The laser beam output window is on the side of the scanner (Figure A, ②).

A security system allows the laser to activate only once the motor has reached the correct rotational speed; consequently, the laser beam is generated after a slight delay from the power on of the scanner.

### 1.2.1 Indicators

The four LEDs on the scanner indicate the following:

**POWER ON** (red), indicates the reader is connected to the power supply. (Figure A, ③).

**GOOD READ** (red), is used to signal the possibility of a successful barcode reading. (Figure A, ④).

**EXT TRIG** (yellow), indicates external trigger activity. Refer to par. 2.3.4. (Figure A, ⑤).

**TX DATA** (green), when blinking, indicates data transmission. (Figure A, ⑥).

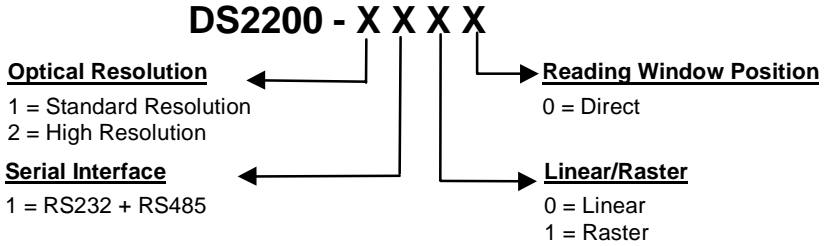
The screw holes on the body of the reader are for mechanical fixture (Figure A, ⑧).

## 1.3 AVAILABLE MODELS

The DS2200 scanner is available in versions that differ in regard to the following parameters:

- Resolution.
- Linear or raster models.

The following models are therefore available:



The following tables display each version's reading performance.

Version	Max Code Resolution	Speed
	mm (mils)	scans/s
1XXX	0.15 (6)	500
2XXX	0.07 (3)	500

Version	Reading Distance
1XXX	50 mm (2.0 in) - 220 mm (8.7 in) on 0.60 mm (24 mils) codes
2XXX	40 mm (1.6 in) - 125 mm (4.9 in) on 0.20 mm (8 mils) codes

See reading diagrams in par. 3.4 for further details.

## 1.4 ACCESSORY

The following accessory is available on request:

DC5-2200: DC converter 4-30 Vdc to 5 Vdc.

## 2 INSTALLATION

---

### 2.1 PACKAGE CONTENTS

Verify that the DS2200 reader and all the parts supplied with the equipment are present and intact when opening the packaging; the list of parts includes:

1. DS2200 reader with cable
2. Installation Manual
3. Bar code test chart (PCS = 0.9)
4. DS2200 configuration program disk
5. Mounting kit: - bracket  
- screws

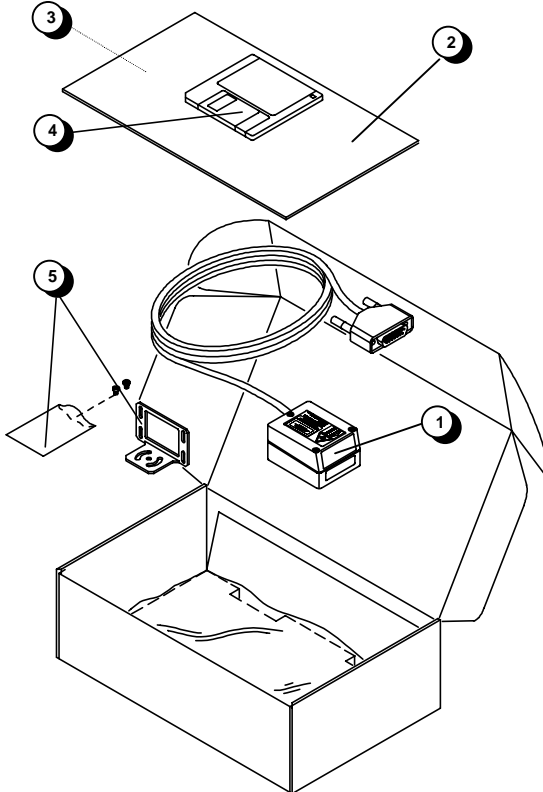


Figure 2.1 - DS2200 package contents

## 2.2 MECHANICAL INSTALLATION

DS2200 can be installed to operate in any position.

There are three screw holes (M2.5 x 5) on the body of the reader for mounting. The diagram below gives all the information required for installation; refer to par. 2.4 for correct positioning of the scanner with respect to the code passage zone.

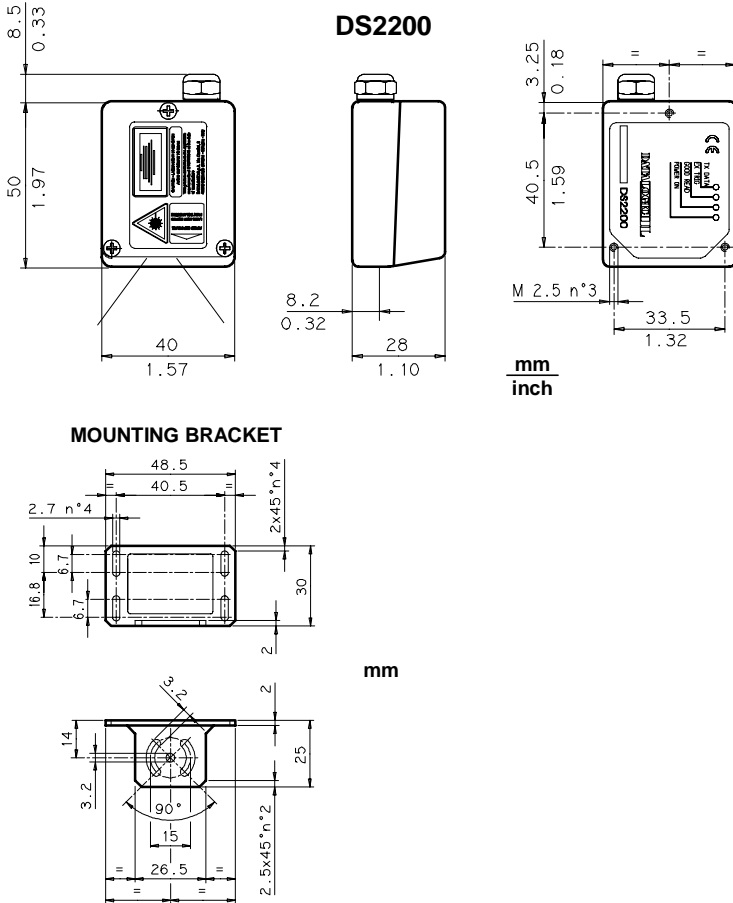


Figure 2.2 - DS2200 overall dimensions

## 2.3 ELECTRICAL CONNECTIONS

The DS2200 cable is equipped with a 25-pin female D-sub connector for connection with the power supply and input/output signals:

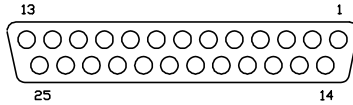


Figure 2.3 – 25-pin female D-sub connector

25-pin D-sub connector pinout		
Pin	Name	Function
9,13	VS	Power supply input voltage +
25	GND	Power supply input voltage -
1	CHASSIS	Chassis Ground
19	EXT TRIG-	External Trigger -
22, 10,12	I/O REF	I/O reference
8	OUT1 +	Output 1 +
11	OUT2 +	Output 2 +
2	TXAUX	TX RS232 Aux. Interface
3	RXAUX	RX RS232 Aux. Interface
4	RTX485-	RTX- RS485 Main Interface
5	RTX485+	RTX+ RS485 Main Interface
7	SGND	Signal Ground
16	NGND	Internal Use - for Service only
17	FPE	Internal Use - for Service only
6, 14, 15, 18, 20, 21, 23, 24	NC	No Connect

### 2.3.1 Power Supply

The following pins of the DS2200 connector are used:

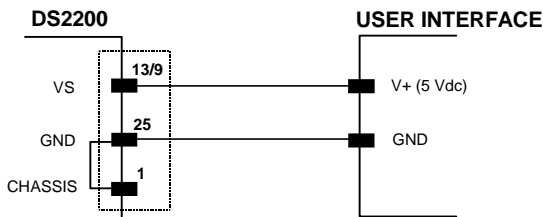


Figure 2.4 - Power supply connections

The power must be 5 Vdc only.

### 2.3.2 Main Serial Interface - RS485 Half-Duplex

The RS485 half-duplex interface (3 wires + shield) is used for polled communication protocols.

It can be used for Multidrop connections in a master/slave layout, or with a Datalogic Multiplexer (see par. 2.5.2 and 2.5.3).

The connector pinout follows:

Pin	Name	Function
5	RTX485+	RS485 transmitted/received data +
4	RTX485-	RS485 transmitted/received data -
7	SGND	signal ground

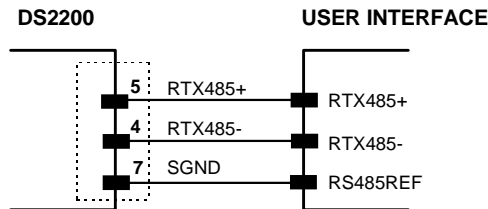


Figure 2.5 - RS485 half-duplex connections

*For this interface type, the Multidrop Address must also be set via serial channel by the WinHost utility or by ESC sequences.*

The figure on the next page shows an example of a multidrop configuration between a Multiplexer and DS2200 scanners.

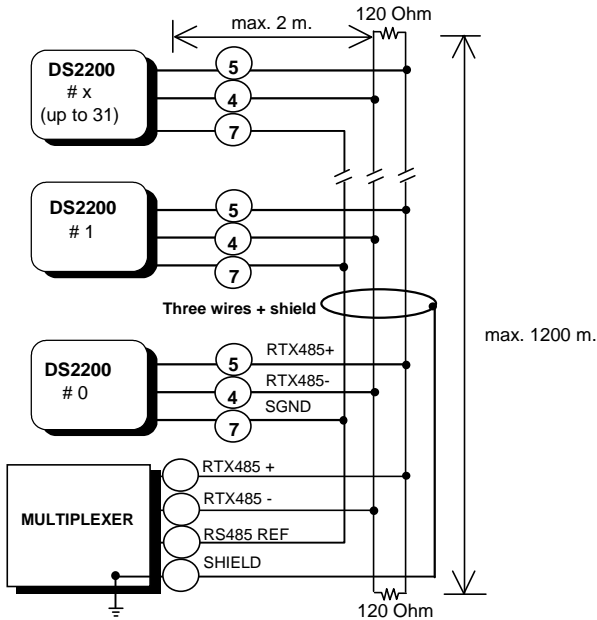


Figure 2.6 - DS2200 Multidrop connection to a Multiplexer

### 2.3.3 Auxiliary Interface - RS232

The auxiliary serial interface is used exclusively for RS232 point-to-point connections. It is also used for configuring the DS2200.

*The parameters relative to the auxiliary interface (baud rate, data bits, etc.) can be defined using the Winhost utility program or "Host Mode Programming" installed from the diskette.*

The following pins of the 25-pin connector are used to connect the RS232 auxiliary interface:

Pin	Name	Function
3	RXAUX	RS232 received data
2	TXAUX	RS232 transmitted data
7	SGND	signal ground

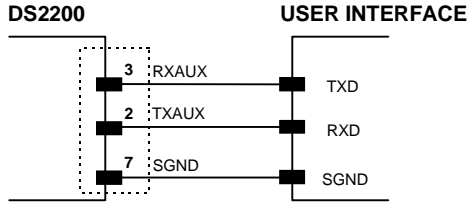


Figure 2.7 - RS232 auxiliary interface connections

### 2.3.4 Inputs

The inputs available on the connector supplied with the scanner are indicated below:

Pin	Name	Function
19	EXT TRIG-	external trigger (input -)
22	I/O REF	I/O reference

The EXT TRIG input is used to connect the external trigger which tells the scanner to scan for a code. *The active state of this input is selected in software. Refer to the Winhost Help On Line.*

The yellow LED (Figure A, 5) is on when EXT TRIG- is shorted to I/O REF.

This input was designed to be driven by an NPN type command. The connections are indicated in the following diagram:

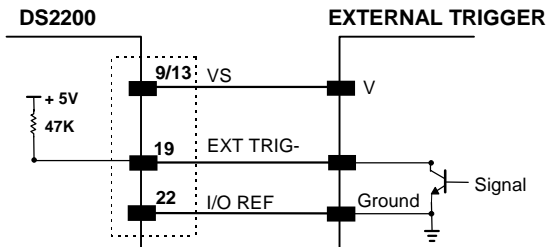


Figure 2.8 - External Trigger Input command

This input can be driven by an independently powered source, but the signal on EXT TRIG- must not exceed 9 Vdc.

An anti-disturbance hardware filter is implemented on the External Trigger input (< 5 milliseconds delay).

*An additional 15 ms (typical) delay can be implemented through a dedicated software parameter (refer to WinHost Help On Line).*

### 2.3.5 Outputs

The following pins are present on the connector of the scanner:

Pin	Name	Function
8	OUT1+	output 1 +
10	I/O REF	I/O reference
11	OUT2+	output 2 +
12	I/O REF	I/O reference

*The meaning of the two outputs OUT1 and OUT2 can be defined by the user (No Read, Right or Wrong). Refer to the Winhost Help On Line.*

By default, OUT1 is associated with the No Read event, which activates when the code signalled by the External Trigger is not decoded, and OUT2 is associated with the Right event, which activates when the code is correctly decoded.

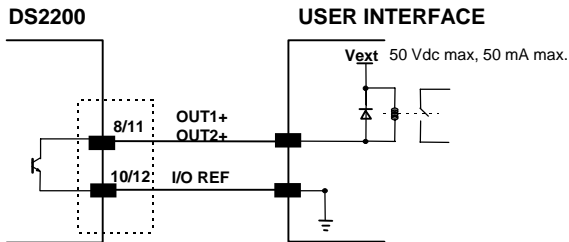


Figure 2.9 - DS2200 output connections

*These outputs are both level or pulse configurable.*

## 2.4 POSITIONING

The DS2200 scanner is able to decode barcode labels at a variety of angles, however significant angular distortion may degrade reading performance.

When mounting the DS2200 take into consideration these three ideal label position angles: **Pitch 0°**, **Skew 15° to 30°** and **Tilt 0°**.

Follow the suggestions for the best orientation:

The **Pitch** angle is represented by the value **P** in Figure 2.10. Position the reader in order to **minimize** the **Pitch** angle.

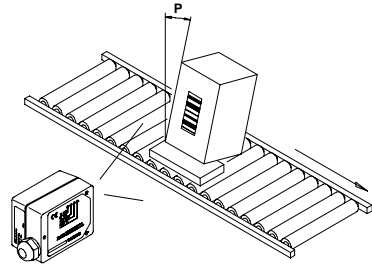


Figure 2.10 - Pitch Angle

The **Skew** angle is represented by the value **S** in Figure 2.11. Position the reader to **assure about 15°** for the **Skew** angle. This avoids the direct reflection of the laser light emitted by the DS2200.

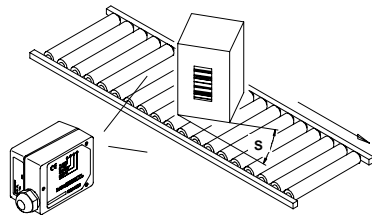


Figure 2.11 - Skew angle

For the raster version, this angle refers to the most inclined or external raster line, so that all other raster lines assure **more** than 15° Skew.

The **Tilt** angle is represented by the value **T** in Figure 2.12. Position the reader in order to **minimize** the **Tilt** angle.

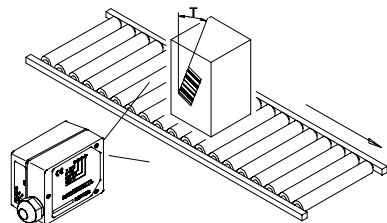


Figure 2.12 - Tilt angle

## 2.5 TYPICAL LAYOUTS

The following typical layouts refer to system hardware configurations. Dotted lines in the figures refer to optional hardware configurations within the particular layout.

*These layouts also require the correct setup of the software configuration parameters. Complete software configuration procedures can be found in the **Guide To Rapid Configuration** in the WinHost Help On Line.*

### 2.5.1 Point-to-Point

In this layout data is transmitted to the Host on the RS232 Auxiliary serial interface. *The Local Echo communication mode must be enabled (default) see the Winhost Help On Line.*

*When On-Line Operating mode is used, the scanner is activated by an External Trigger (photoelectric sensor) when the object enters its reading zone.*

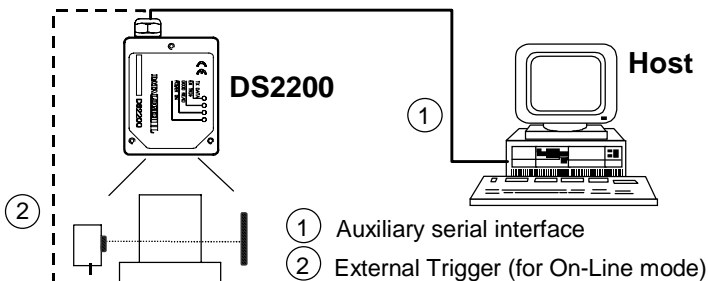


Figure 2.13 - Point to Point layout

### 2.5.2 RS485 Master/Slave

The RS485 Master/Slave connection is used to collect data from several scanners to build a multi-point or a multi-sided reading system; there can be one Master and up to 5 Slaves connected together.

The Slave scanners are connected together using the RS485 half-duplex main serial interface. Every Slave scanner must have a multidrop address in the range 0-4.

The Master scanner is also connected to the Host on the RS232 auxiliary serial interface.

The External Trigger signal is unique to the system; there is a single reading phase and a single message from the Master scanner to the Host computer.

**It is necessary to bring the External Trigger signal to all the scanners.**

The main and auxiliary ports are connected as shown in the figure below.

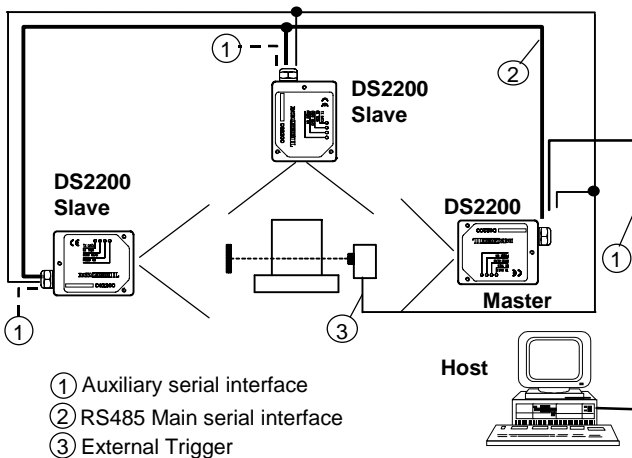


Figure 2.14 – Master/Slave layout

**NOTE**

*The auxiliary serial port of the slave scanners can be used in Local Echo communication mode to control any single scanner (visualize data) or to configure it using the WinHost utility or Host Mode programming procedure.*

The termination resistors of the RS485 bus must not be installed.

### 2.5.3 Multiplexer

Each scanner is connected to a Multiplexer (for example MX4000) with the RS485 half-duplex main interface.

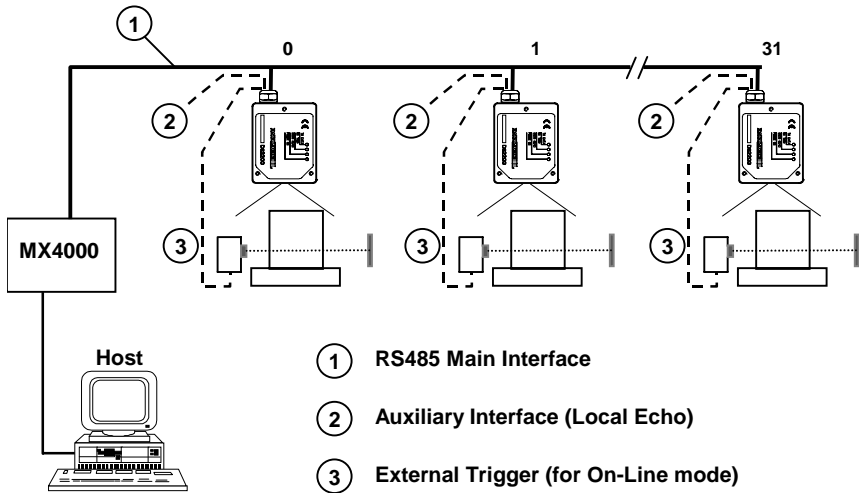


Figure 2.15 - Multiplexer layout

The auxiliary serial interface can be used in Local Echo mode to control any single scanner (visualize collected data) or to configure it using the Winhost utility or Host Mode programming procedure.

When On-Line Operating mode is used, the scanner is activated by an External Trigger (photoelectric sensor) when the object enters its reading zone.

### 3 READING FEATURES

The number of scans performed on the code by the DS2200 and therefore the decoding capability is influenced by the following parameters:

- number of scans per second
- code motion speed
- label dimensions
- scan direction with respect to code motion

At least 5 scans during the code passage should be allowed to ensure a successful read.

#### 3.1 STEP LADDER MODE

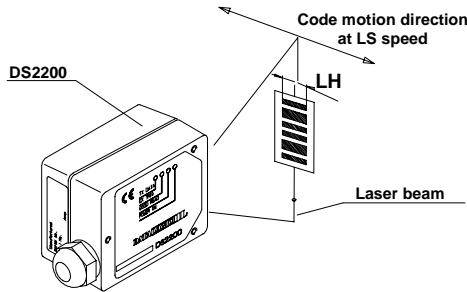


Figure 3.1 - "Step Ladder" scanning mode

If scanning is perpendicular to the code motion direction (Figure 3.1 - "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

For example, the DS2200 (500 scans/sec.) for a 25 mm high code moving at 500 mm/s performs:

$$[(25/500) * 500] - 2 = 23 \text{ effective scans.}$$

## 3.2 PICKET FENCE MODE

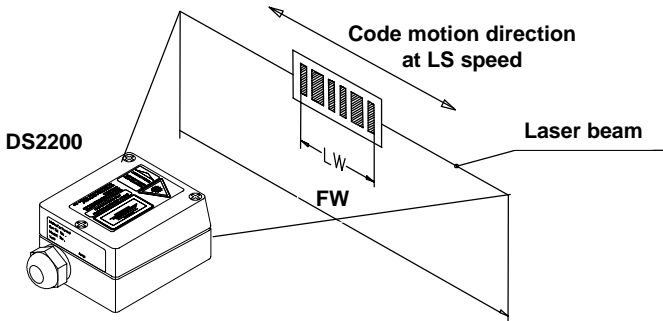


Figure 3.2 - "Picket Fence" scanning mode

If scanning is parallel to the code motion, (Figure 3.2 - "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

For example, for a 50 mm wide code moving in a point where the reading field is 100 mm wide at a 1000 mm/s speed, the DS2200 (500 scans per sec.), performs:

$$[((100-50)/1000) * 500] - 2 = 23 \text{ scans}$$

### 3.3 PERFORMANCE

The DS2200 scanner is available in different versions according to the reading performance.

Version	Max Code Resolution	Speed
	mm (mils)	scans/s
1XXX	0.15 (6)	500
2XXX	0.07 (3)	500

Version	Reading Distance
1XXX	50 mm (2.0 in) - 220 mm (8.7 in) on 0.60 mm (24 mils) codes
2XXX	40 mm (1.6 in) - 125 mm (4.9 in) on 0.20 mm (8 mils) codes

Refer to the diagrams given in par. 3.4 for further details on the reading features. These diagrams are taken on various resolution sample codes at a 25 °C ambient temperature, depending on the conditions listed under each diagram.

#### 3.3.1 Raster

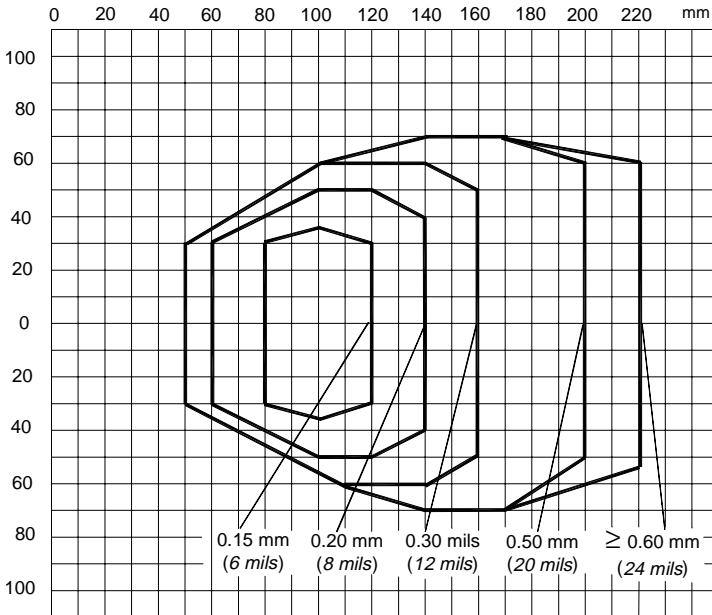
Raster versions are available. If standard devices do not satisfy specific requirements, contact your nearest Datalogic distributor, supplying code samples, to obtain complete information on the reading possibilities.

The max. capture of the Raster version is about 15 mm (0.6 in) at 220 mm (8.7 in).

### 3.4 READING DIAGRAMS

The following diagrams show the reading distance for barcodes with different densities.

#### DS2200-1XXX Standard Resolution



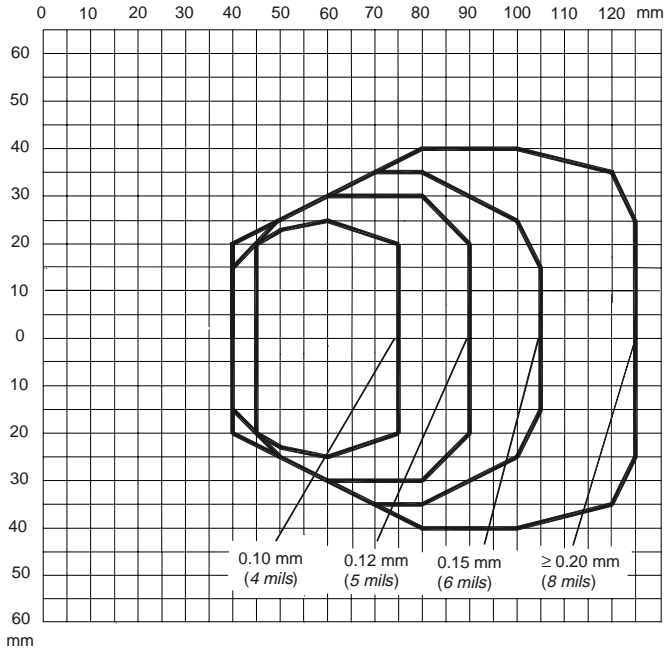
**NOTE**

(0,0) is the center of the laser beam output window

**CONDITIONS:**

- Code = Interleaved 2/5 or Code 39
- PCS = 0.90
- "Pitch" angle = 0°
- "Skew" angle = 15°
- "Tilt" angle = 0°

### DS2200-2XXX High Resolution



#### NOTE

(0,0) is the center of the laser beam output window.

#### CONDITIONS:

- Code = Interleaved 2/5 or Code 39
- PCS = 0.90
- "Pitch" angle = 0°
- "Skew" angle = 15°
- "Tilt" angle = 0°

## 4 MAINTENANCE

---

### 4.1 CLEANING

Clean the windows periodically for continued correct operation of the reader.

Dust, dirt, etc. on the windows may alter the reading performance.

Repeat the operation frequently in particularly dirty environments.

Use soft material and alcohol to clean the windows and avoid any abrasive substances.

#### **WARNING**

Clean the windows of the DS2200 when the scanner is turned off or, at least, when the laser beam is deactivated.

# 5 TECHNICAL FEATURES

	DS2200-1XXX	DS2200-2XXX
<b>ELECTRICAL FEATURES</b>		
<b>Power</b>		
Maximum input voltage	5 Vdc ± 5%	
Power consumption max.	2 W	
<b>Serial Interfaces</b>		
Main	RS485 Half-Duplex	
Auxiliary	RS232	
Baud Rates	150 to 115200	
<b>Inputs</b>	External Trigger	
<b>Outputs</b>	User-defined OUT1 and OUT2	
V <sub>CE</sub> max.	50 Vdc	
Collector current max.	50 mA continuous	
V <sub>CE</sub> saturation	0.3V at 10 mA max.	
Power dissipation max.	200 mW at 40 °C (Ambient temp.)	
<b>OPTICAL FEATURES</b>		
Light source	Semiconductor laser diode	
Wave length (Note 1)	630 ~ 680 nm	
Safety class	Class 2 - IEC 825-1; Class II - CDRH	
<b>READING FEATURES</b> (Note 2)		
Scan rate	500 scans/sec	
Aperture angle	52°	60°
Max. Reading distance	220 mm, (8.7 in)	125 mm (4.9 in)
Maximum resolution	0.15 mm (6 mils)	0.07 mm (3 mils)
<b>USER INTERFACE</b>		
LED indicators	Power ON, Good Read, Ext Trig, TX Data	

<b>SOFTWARE FEATURES</b>	
<b>READABLE CODE SYMBOLOGIES</b>	
<ul style="list-style-type: none"> <li>• EAN/UPC (including Add-on 2 and Add-on 5)</li> <li>• 2/5 Interleaved</li> <li>• Code 39 (Standard and Full ASCII)</li> <li>• Codabar</li> <li>• Code 93</li> <li>• Code 128</li> <li>• EAN 128</li> <li>• Pharmacode</li> </ul> Other symbologies available on request	
<b>CODE SELECTION</b>	up to six codes during one reading phase
<b>DECODING SAFETY</b>	can enable multiple good reads of same code
<b>HEADERS AND TERMINATORS</b>	up to four headers and four terminators
<b>OPERATING MODES</b>	On Line, Automatic, Serial On Line, Test
<b>CONFIGURATION MODES</b>	<ul style="list-style-type: none"> <li>• through menus using WinHost utility</li> <li>• receiving commands from one of the serial ports (HOST MODE)</li> </ul>
<b>PARAMETER STORAGE</b>	Non-volatile internal EEPROM
<b>ENVIRONMENTAL FEATURES</b>	
Operating temperature (Note 3)	0 to 40 °C (32 to 104 °F)
Storage temperature	-20 to 70 °C (-4 to 158 °F)
Humidity max.	90% non condensing
Vibration resistance	IEC 68-2-6 test FC 1.5 mm; 10 to 55 Hz; 2 hours on each axis
Shock resistance	IEC 68-2-27 test EA 30G; 11 ms; 3 shocks on each axis
Protection class	IP65
<b>PHYSICAL FEATURES</b>	
Mechanical dimensions	50 x 40 x 28 mm (1.97 x 1.57 x 1.10 in.)
Weight without cable	150 g. (5.29 oz.)

**Note 1:** The features given are typical at a 25 °C ambient temperature (if not otherwise indicated).

**Note 2:** Further details given in par. 3.3 and 3.4.

**Note 3:** If the reader is used in high temperature environments (over 35 °C), use of the Beam Shutter is advised (see the WinHost configuration program).