



# **DS2400N**

## **REFERENCE MANUAL**



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DS2400N Reference Manual

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## CONVENTIONS

This manual uses the following conventions:

“User” or “Operator” refers to anyone using a DS2400N.

“Device” refers to the DS2400N.

“You” refers to the System Administrator or Technical Support person using this manual to install, mount, operate, maintain or troubleshoot a DS2400N.

## REFERENCE DOCUMENTATION

The documentation related to the DS2400N is listed below:

- C-BOX 100 Installation Manual
- INT-30 20 mA Current Loop Interface Board for C-BOX 100
- C-BOX 300/310 Installation Manual
- C-BOX 400/410 Installation Manual
- Genius™ Help On Line

## SERVICES AND SUPPORT

Datalogic provides several services as well as technical support through its website. Log on to [www.datalogic.com](http://www.datalogic.com) and click on the [links](#) indicated for further information including:

- **PRODUCTS**  
Search through the links to arrive at your product page where you can download specific **Manuals** and **Software & Utilities**
- **SERVICES & SUPPORT**
  - **Datalogic Services** - Warranty Extensions and Maintenance Agreements
  - **Authorised Repair Centres**
- **CONTACT US**  
E-mail form and listing of Datalogic Subsidiaries

## PATENTS

This product is covered by one or more of the following patents:

U.S. patent 5,992,740

European patent 789,315 B1

# SAFETY REGULATIONS

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## LASER SAFETY

The following information is provided to comply with the rules imposed by international authorities and refers to the correct use of the DS2400N 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 EN 60825-1 and CDRH 21 CFR 1040 at the date of manufacture. The scanner is classified as a Class 2 laser product according to EN 60825-1 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 motor and laser beam can be switched off through a software command (see also the Genius™ Help On Line).



**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 front of the scanner (Figure A, 9).

Warning labels indicating exposure to laser light and the device classification are applied onto the body of the scanner (Figure A, 1).

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 EN 60825-1 regulations and as a Class IIIb laser product according to CDRH regulations.

Any violation of the optic parts in particular can cause radiation up to the maximum level of the laser diode (35 mW at 630 to 680 nm).



### Warning and Device Class Labels

## POWER SUPPLY

- **This product is intended to be installed by Qualified Personnel only.**
- **All Models:**  
This accessory device is intended to be supplied by a UL Listed or CSA Certified Power Unit with «Class 2» or LPS power source, which supplies power directly to the scanner via the 25-pin connector.

## CE COMPLIANCE

### Warning:

This is a Class A product. In a domestic environment this product may cause radio interference in which case the user may be required to take adequate measures.

## WEEE COMPLIANCE





# GENERAL VIEW

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## DS2400N

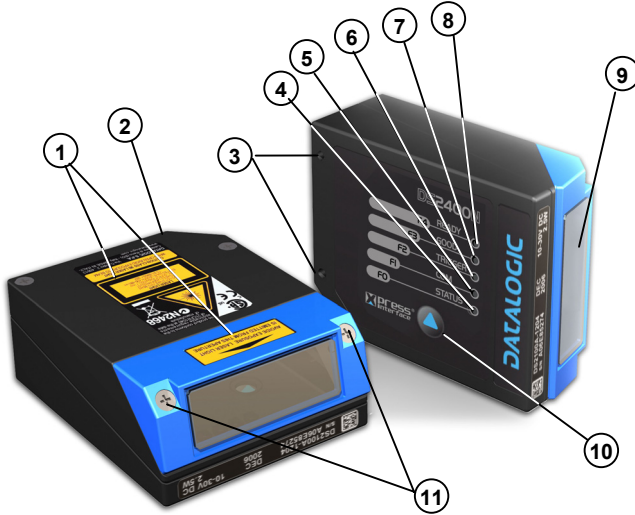


Figure A

- |                                   |                            |
|-----------------------------------|----------------------------|
| ① Warning and Device Class Labels | ⑦ Good LED                 |
| ② Power ON LED                    | ⑧ Ready LED                |
| ③ Mounting Holes                  | ⑨ Laser Beam Output Window |
| ④ Status LED                      | ⑩ Xpress key               |
| ⑤ COM LED                         | ⑪ Accessory Mounting Holes |
| ⑥ Trigger LED                     |                            |



# 1 RAPID CONFIGURATION

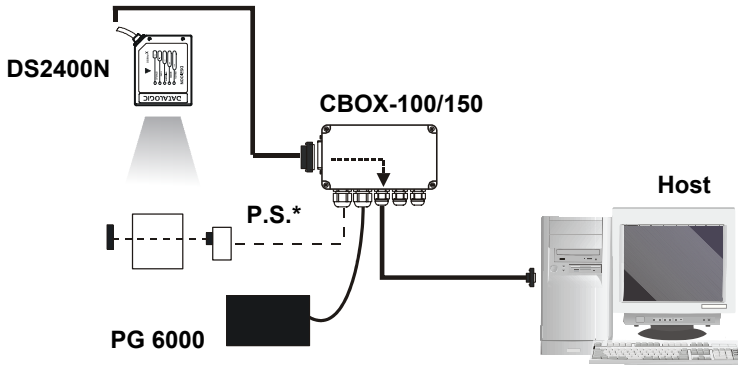
## STEP 1 – CONNECT THE SYSTEM

To connect the system in a Stand Alone configuration, you need the hardware indicated in Figure 1.

In this layout the data is transmitted to the Host on the main serial interface.

In Local Echo communication mode, data is transmitted on the RS232 auxiliary interface independently from the main interface selection.

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



\* Presence Sensor (for On-Line mode)

Figure 1 – DS2400N in Stand Alone Layout

## C-BOX 100/150 Pinout for DS2400N

The table below gives the pinout of the C-BOX 100/150 terminal block connectors. Use this pinout when the DS2400N reader is connected in a network by means of the C-BOX 100/150:

C-BOX 100/150 Terminal Block Connectors				
Power		Outputs		
1, 3, 5	VS	21	OUT 1+	
2, 4, 6	GND	22	OUT 1-	
7, 8	EARTH GROUND	23	OUT 2+	
20, 40	Reserved	24	OUT 2-	
Inputs		25	NC	
27	EXT TRIG A (polarity insensitive)	26	NC	
28	EXT TRIG B (polarity insensitive)	Auxiliary Interface		
29	NC	35	TX AUX	
30	IN2-	37	RX AUX	
31, 33	NC	ID-NET™		
32, 34	NC	36	ID-NET-	
39	GND	38	ID-NET+	
Main Interface				
	RS232	RS485 Full-Duplex	RS485 Half-Duplex	20 mA C.L. (with INT-30 only)
11, 15	TX 232	TX 485+	RTX 485+	see INT-30 instructions
12, 16	RTS 232	TX 485-	RTX 485-	
17	RX 232	RX 485+		
18	CTS 232	RX 485-		
10, 14, 19	SGND	SGND	SGND	
9, 13		RS485 Cable Shield	RS485 Cable Shield	



### CAUTION

*Do not connect GND and SGND to different (external) ground references. GND and SGND are internally connected through filtering circuitry which can be permanently damaged if subjected to voltage drops over 0.8 Vdc.*

## STEP 2 – MOUNTING AND POSITIONING THE SYSTEM

1. To mount the DS2100N, use the mounting bracket to obtain the most suitable position for the reader as shown in the figures below.

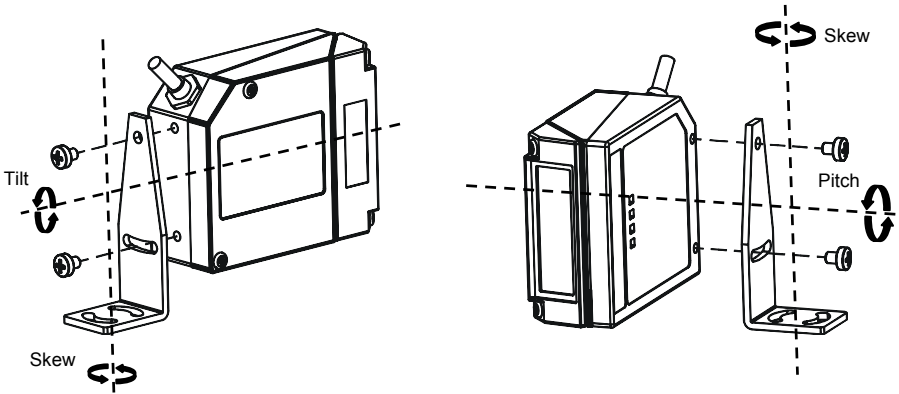


Figure 2 - Positioning with Mounting Bracket

2. When mounting the DS2100N take into consideration these three ideal label position angles: **Pitch 0°**, **Skew 10° to 30°** and **Tilt 0°**.

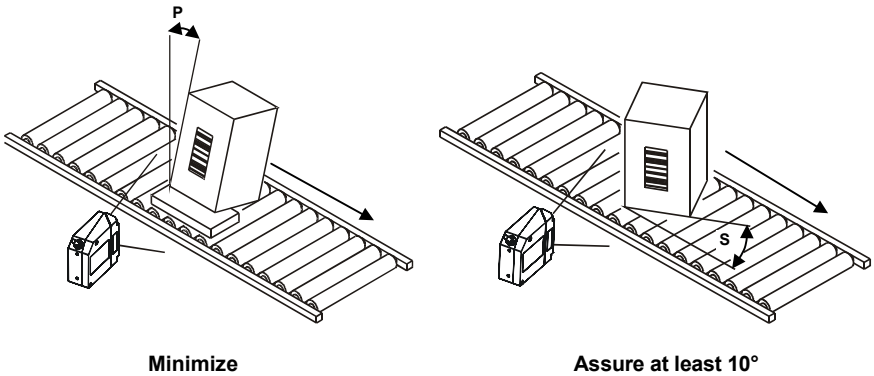
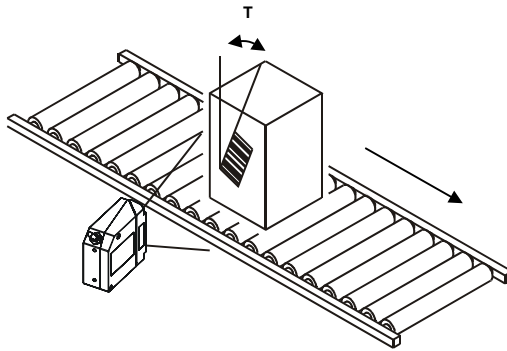


Figure 3 – Pitch and Skew Angles



**Minimize**

**Figure 4 – Tilt Angle**

3. Refer to the Reading Diagrams in the Appendix of this Quick Reference Guide to decide the distance your scanner should be positioned at.

### STEP 3 – X-PRESS™ CONFIGURATION

X-PRESS™ is the intuitive Human Machine Interface designed to improve ease of installation and maintenance.

Status and diagnostic information are clearly presented by means of the five colored LEDs, whereas the single push button gives immediate access to the following relevant functions:

- *Test Mode (F1)* with bar graph visualization to check static reading performance
- *AutoLearn (F2)* to self-detect and auto-configure for reading unknown barcodes (by type and length)
- *AutoSetup (F3)* to self-optimize and auto-configure reading performance in demanding applications



The colors and meaning of the five LEDs are illustrated in the following table:

<b>F4</b>	READY (green)	This LED indicates the device is ready to operate.
<b>F3</b>	GOOD (green)	This LED confirms successful reading.
<b>F2</b>	TRIGGER (yellow)	This LED indicates the status of the reading phase.
<b>F1</b>	COM (yellow)	This LED indicates active communication on main serial port.
<b>F0</b>	STATUS (red)	This LED indicates a NO READ result.

During the reader startup (reset or restart phase), all the LEDs blink for one second.

On the back of the reader near the cable, the “POWER ON” LED indicates the laser scanner is correctly powered.

## Auto Learn

If you are configuring your scanner using X-PRESS™, you must start with the *Auto Learn* procedure.

1. Enter the *Auto Learn* function (F2) by pressing the X-PRESS™ push button.
2. Hold the push button pressed until the F2 LED is on.
3. Release the button to enter the *Auto Learn* function.  
Once entered, the reader starts a procedure to automatically detect and recognize barcodes (by type and length), which are presented to it (\*). The laser turns on and the TRIGGER LED blinks to indicate the ongoing process.

The procedure is as follows:

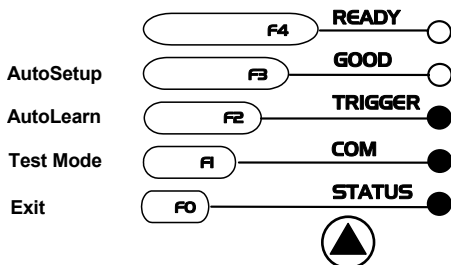


Figure 5 – X-PRESS™ Interface: Auto Learn Function

- A) **place** the desired barcode on the scanline.
- B) **wait** until the TRIGGER LED stays steady on (indicating the reader has detected the barcode).
- C) **repeat**, if needed, the above two steps to program up to 10 different barcodes (either by length or by symbology). If more than one barcode is detected, the Multi Label mode is enabled (refer to the "2000 Family Software Configuration Parameter Guide" Help file).

4. **Exit** the process by pressing the X-PRESS™ push button once. The scanner will restart at the end of the process, and then the detected barcodes are automatically configured in scanner memory.



### NOTE

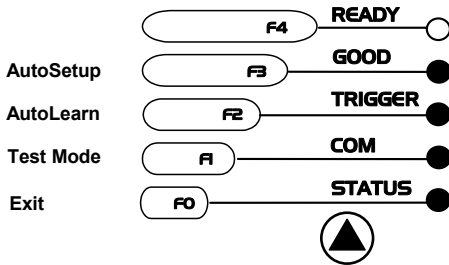
*If the barcode cannot be read because of low contrast or excessive ambient light, you can perform the AutoSetup function to optimize the optical parameters. Then you can perform AutoLearn to recognize the barcode symbology.*



### Auto Setup (Optional)

At the end of the *Auto Learn* procedure, you have the possibility to follow the *Auto Setup* procedure to set up the reading parameters.

1. Enter the *Auto Setup* function (F3) by pressing the X-PRESS™ push button.
2. Hold the push button pressed until the F3 LED is on.
3. Release the button to enter the *Auto Setup* function.
4. Once entered, if a barcode label is positioned in front of the scanline, the scanner automatically performs the optimal setup of the reading parameters for that specific barcode.



The procedure is as follows:

- A) **place** the desired barcode on the scanline.
- B) **enter** the AutoSetup function (the laser turns on and the GOOD LED blinks to indicate the ongoing process)
- C) **wait** until the GOOD LED stays steady on (indicating the reader has detected the barcode)

**Figure 6 – X-PRESS™ Interface: Auto Learn Function**

This procedure ends either when the barcode is successfully decoded or after a timeout of about 7 (seven) seconds. The scanner will restart at the end of the process, and then the optimized reading parameters for that barcode are automatically configured in scanner memory.



**NOTE**

*If your application has been configured using X-PRESS™, go to STEP 5.*

## STEP 4 – INSTALLING GENIUS™ CONFIGURATION PROGRAM

Genius™ is a Datalogic scanner configuration tool providing several important advantages:

- Wizard approach for low skilled users;
- Multi-language version;
- Defined configuration directly stored in the reader;
- Communication protocol independent from the physical interface allowing to consider the reader as a remote object to be configured and monitored.

**To install Genius™, turn on the PC that will be used for the configuration, running Windows 98, 2000/NT or XP, then insert the Genius™ CD-ROM, wait for the CD to autorun and follow the installation procedure.**

This configuration procedure assumes scanner connection to a C-BOX 100/150. Genius™, running on a laptop computer, is connected to the scanner auxiliary port through the C-BOX 100/150 9-pin connector.

### Wizard for Quick Reader Setup

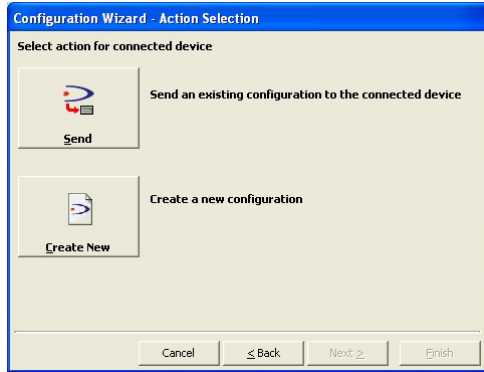
After installing the Genius™ software program the following window appears asking the user to choose the desired configuration level.



Figure 7 - Genius™ Wizard Opening Window

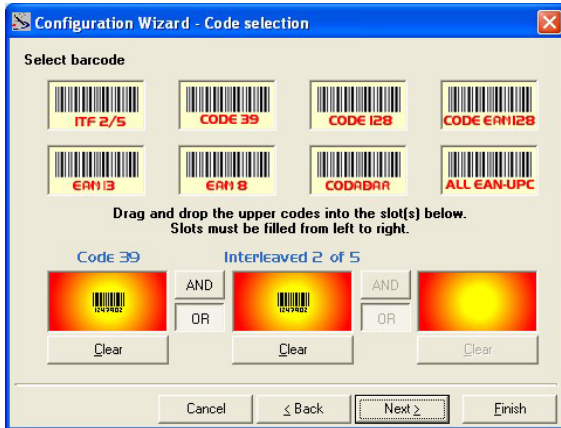
The Wizard option is advised to low skilled users, since it shows a step-by-step scanner configuration.

1. Select the *Create a new configuration* button.

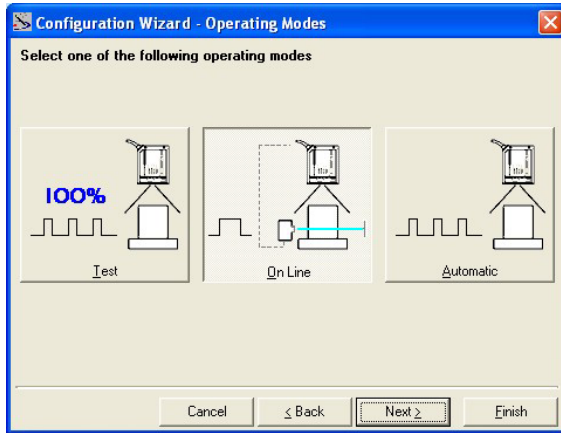


You will be guided through the configuration being asked to define the following parameters:

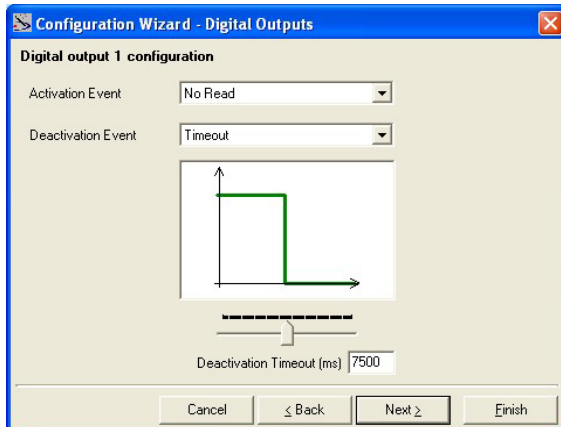
- a. Barcode selection and definition



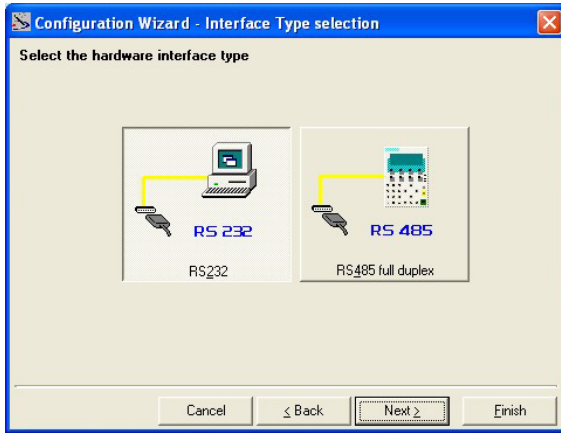
## b. Operating mode selection and definition



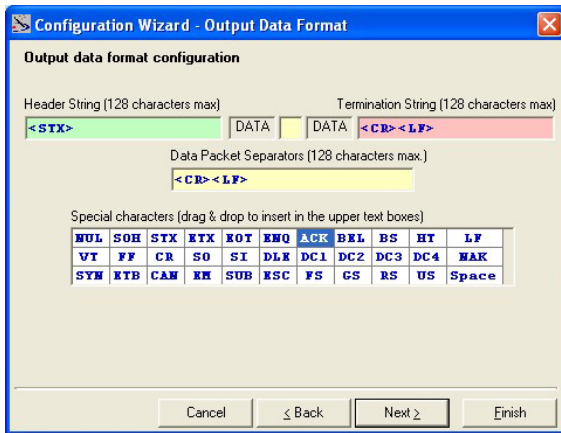
## c. Digital Outputs configuration



d. Hardware interface selection



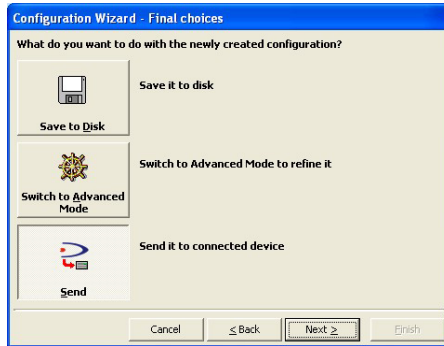
e. Output data format configuration



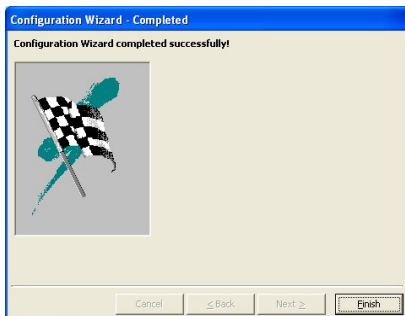
The **On Line** operating Mode requires the reader to be connected to an external Presence Sensor using EXT TRIG/PS A and EXT TRIG/PS B inputs.

The **Automatic** operating mode does not require connection to an external Presence Sensor. When working in this mode the reader is continuously scanning, while the reading phase is activated each time a barcode enters the reader reading zone. The reader stops reading after an N number of scans without a code. Barcode characters are transmitted on the serial interface. In case of a failed reading phase no message is sent to the host computer.

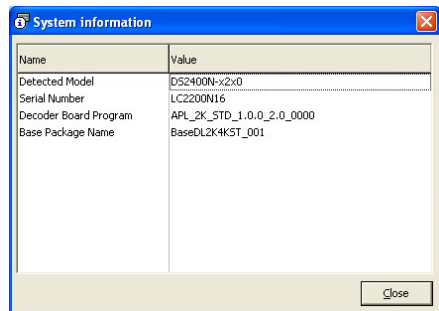
2. After defining the parameter values the following window appears allowing to complete the reader configuration as follows:
  - Saving the configuration to disk;
  - Switching to Advanced mode;
  - Sending the configuration to the scanner.



3. After sending the configuration to the scanner you have completed the configuration process.



4. By clicking Finish, the System Information window will be displayed with specific information concerning the scanner.



### STEP 5 – TEST MODE

Use a code suitable to your application to test the system. Alternatively, you can use the Datalogic Test Chart (Code 39, Code Interleaved 2/5).

1. Enter the *Test mode* function (F1) by pressing the X-PRESS™ push button.
2. Hold the push button pressed until the F1 LED is on.
3. Release the button to enter the *Test mode* function.  
Once entered, the Bar Graph on the five LEDs is activated and if the scanner starts reading barcodes the Bar-Graph shows the Good Read Rate. In case of no read condition, only the STATUS LED is on and blinks.

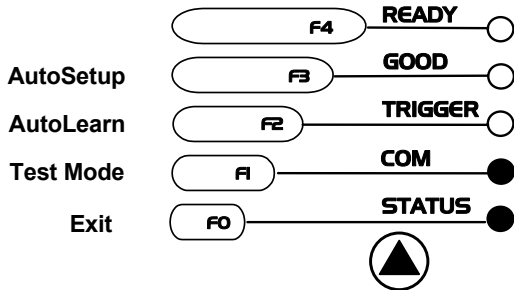



Figure 8 – X-PRESS™ Interface: Test Mode Function

4. To exit the Test Mode, press the X-PRESS™ push button once.



**NOTE**

*By default, the Test Mode exits automatically after two minutes.*

## ADVANCED SCANNER CONFIGURATION

For further details on advanced product configuration, refer to the complete Reference Manual on the installation CD-ROM or downloadable from the web site through this link: [www.datalogic.com/DS2400N](http://www.datalogic.com/DS2400N).

The following are alternative or advanced scanner configuration methods:

### Host Mode Programming

The scanner can also be configured from a host computer using the Host Mode programming procedure, by commands via the serial interface. See the Host Mode Programming file on the CD-ROM.

### Advanced Genius™ Configuration

The ADVANCED selection available when starting the Genius™ program is addressed to expert users being able to complete a detailed scanner configuration. By choosing this option it is possible either to start a new scanner configuration or to open and modify an old one. The desired parameters can be defined in the following window, similar to the MS Explorer:

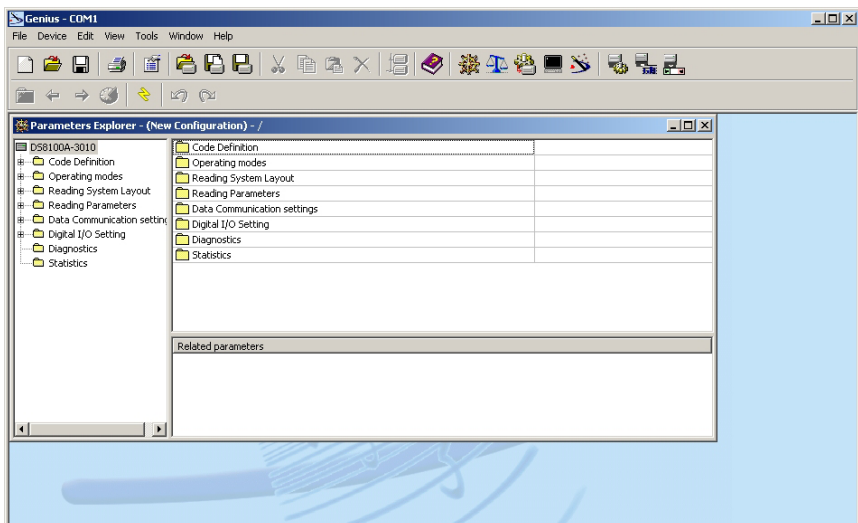


Figure 9 - Genius™ Parameter Explorer Window



## Alternative Layouts

- The ID-NET™ is a built-in high-speed interface dedicated for high-speed scanner interconnection. ID-NET™ is in addition to the Main and Auxiliary serial interfaces.  
If you need to install an ID-NET™ network refer to the DS2400N Reference Manual.  
The scanner can also be configured by reading programming barcodes. See the ID-NET™ Setup Procedure Using Programming Barcodes printable from the CD-ROM.
- If you need to install a Pass-Through network refer to the DS2400N Reference Manual.
- If you need to install a Multiplexer network refer to the DS2400N Reference Manual.
- If you need to install an RS232 Master/Slave (for backward compatibility) refer to the DS2400N Reference Manual.

## 2 INTRODUCTION

---

### 2.1 PRODUCT DESCRIPTION

The DS2400N laser scanner satisfies the most advanced needs of a wide range of users. It has been developed focusing on the realistic requirements of its target market. The outstanding result is an extremely compact, cost-effective and easy to use industrial scanner.

**Standard Application Program** A standard application program is factory-loaded onto the DS2400N. This program controls barcode reading, serial port interfacing, data formatting and many other operating and control parameters.

It is completely configurable from a host computer through the Genius™ utility program provided on CD-ROM with the scanner, or via the serial interface (Genius™ based Host Mode Programming).

**Custom Application Programs** If the Standard Application Program does not meet your requirements, please contact your local Datalogic distributor.

Some of the main features of DS2400N are listed below:

- ACB (Advanced Code Builder)
- small dimensions and light weight
- software programmable scanning speed on all models
- linear and raster versions
- completely configurable via serial interface (Genius™)
- 3 serial communication interfaces
- supply voltage from 10 to 30 Vdc
- reads all popular codes
- 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

The DS2400N uses a solid state laser diode as a light source; the light emitted has a wavelength between 630 and 680 nm. Refer to the section "Safety precautions" at the beginning of this manual for information on laser safety.

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

### 2.1.1 Indicators

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

<b>READY</b>	(green)	This LED indicates the device is ready to operate. (Figure A, 8)
<b>GOOD</b>	(green)	This LED confirms successful reading. (Figure A, 7)
<b>TRIGGER</b>	(yellow)	This LED indicates the status of the reading phase. (Figure A, 6)
<b>COM</b>	(yellow)	This LED indicates active communication on main serial port. (Figure A, 5)
<b>STATUS</b>	(red)	This LED indicates a NO READ result. (Figure A, 4)

During the reader startup (reset or restart phase), all the LEDs blink for one second.

On the back of the reader near the cable, the “POWER ON” LED indicates the laser scanner is correctly powered.

The screw holes on the body of the reader are for mechanical fixture (Figure A, 3).

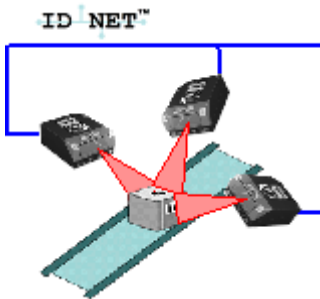
## 2.2 ID-NET™

The ID-NET™ is a built-in high-speed interface dedicated for high-speed scanner interconnection. The ID-NET™ is in addition to the Main and Auxiliary serial interfaces.



The following network configurations are available:

- **ID-NET™ M/S Synchronized:** Single station – multiple scanners

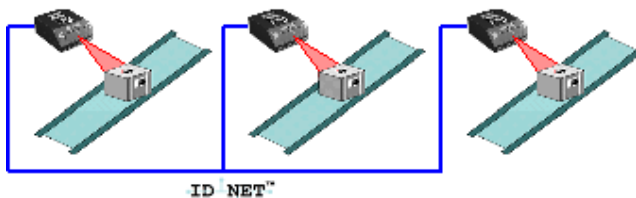


ID-NET™ interface allows local connection of multiple scanners reading different sides of the same target. All scanners share a single presence sensor and activate/deactivate simultaneously.

At the end of each reading phase a single data message is transmitted to the host.

Thanks to ID-NET™, data communication among scanners is highly efficient so that an immediate result will be available.

- **ID-NET™ M/S Multidata:** Multiple stations – single scanner



ID-NET™ interface allows connection of scanners reading objects placed on independent conveyors. All scanners are typically located far away from each other and they use a dedicated presence sensor.

At the end of each reading phase, each scanner transmits its own data message to the host.

Thanks to ID-NET™, data collection among readers is accomplished at a high speed without the need of external multiplexing device. This leads to an overall cost reduction and to a simple system wiring.

## 2.2.1 How To Setup/Configure the Scanner Network

A complete ID-NET™ scanner network can be rapidly setup, as follows:

### **Mounting & Connection**

1. Mechanically mount/install all the readers.
2. Wire ID-NET™ (refer to par. 3.3).
3. Connect the planned Master scanner to a PC by means of the Genius™ configuration software.
4. Power up the entire system.

### **Configuration**

1. Program the role and address of each slave scanner using Genius™ (connect to each scanner individually).
2. Configure the network through the Master scanner via Genius™ (see the Rapid Guide to Configuration Network Setup in the Help On-Line):
  - a. open the “Local Device Network Settings” window and select the Master Role and send the updated configuration to the device.
  - b. click on the “Express Network Setup” button to start the automatic net detection.
  - c. once the procedure has been completed, a dialog box will appear asking whether to send the configuration to the Master. Choose the “Yes” option to complete this procedure.

The scanner network is ready.

**NOTE**

*An alternative method of programming scanner address and role assignment can be accomplished by using the “Connectivity Programming Barcodes” (refer to the “ID-NET™ Setup Procedure Using Programming Barcodes” document on the product CD).*

## 2.3 X-PRESS™ HUMAN MACHINE INTERFACE

X-PRESS™ is the intuitive Human Machine Interface designed with the precise goal of improving ease of installation and maintenance.



Status and diagnostic information are clearly presented by means of five-colored LEDs, whereas the single multi-function key gives immediate access to relevant functions:

- *Test Mode (F1)* with Bar-graph visualization to check static reading performances
- *Autolearn (F2)* to self-detect unknown barcodes
- *Autosetup (F3)* to self-optimize reading performance in demanding application



X-PRESS™ is the common interface adopted in all new products: “*You learn one, you can use them all*”.

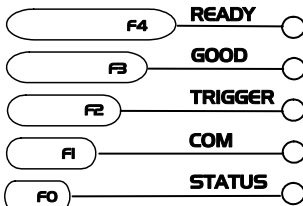
The colors and meaning of the five LEDs are illustrated at par 2.1.1.

### 2.3.1 Diagnostic Indication

The “STATUS” and “READY” LEDs blink simultaneously to signal the presence of a failure.

Diagnostic message transmission on interfaces can be enabled to provide details about specific failure conditions.

At the same time one or more LEDs light up according to the following scheme:

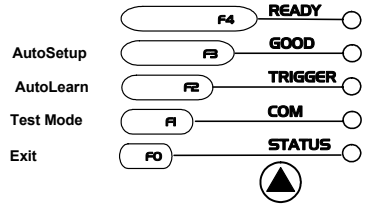


LED	Status
READY	BLINK
GOOD	ON to indicate any Failure different than Motor or Laser failures.
TRIGGER	ON to indicate a Motor Failure.
COM	ON to indicate a Laser Failure.
STATUS	BLINK

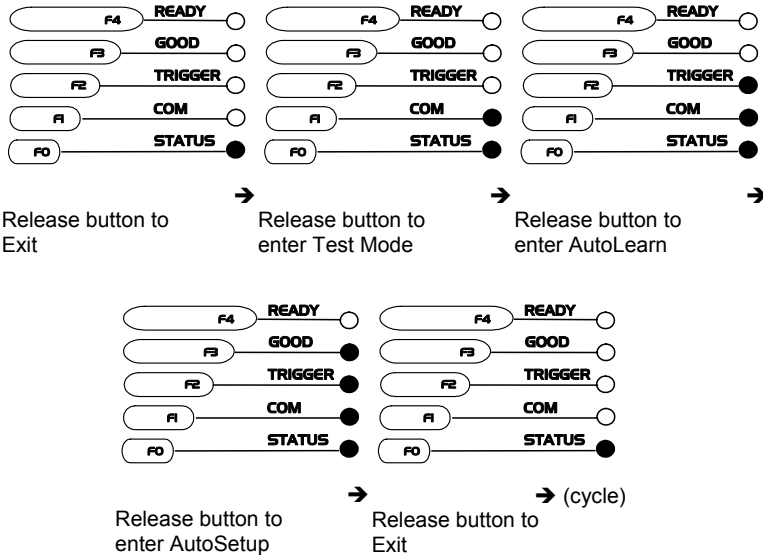
### 2.3.2 X-PRESS™ Functions

Quick access to the following functions is provided by an easy procedure using the push button:

- 1 – **Press** the button (the F0 LED will give a visual feedback).
- 2 – **Hold** the button until the specific function LED is on (F1, F2 or F3).
- 3 – **Release** the button to enter the specific function.



Once button is pressed, the cycle of LEDs activation is as follows:



### Test Mode (F1) Function

Once entered, the Bar Graph on the five LEDs is activated and if the scanner starts reading barcodes the Bar-Graph shows the Good Read Rate. In case of no read condition, only the STATUS LED is on and blinks.

To exit the Test Mode, press the X-PRESS™ push button once.

## AutoLearn (F2) Function

Once entered, the reader starts a procedure to automatically detect and recognize barcodes (by type and length), which are presented to it (\*). The laser turns on and the TRIGGER LED blinks to indicate the ongoing process.

The procedure is as follows:

- **place** the desired barcode on the scanline.
- **wait** until the TRIGGER LED stays steady on (indicating the reader has detected the barcode)
- **repeat**, if needed, the above two steps to program up to 10 different barcodes (either by length or by symbology). If more than one barcode is detected, the Multi Label mode is enabled (refer to the “2000 Family Software Configuration Parameter Guide” Help file)
- **exit** the process by pressing the X-PRESS™ push button once

The scanner will restart at the end of the process, and then the detected barcodes are automatically configured in scanner memory.

(\*) = in case of Programming Barcodes (refer to the “ID-NET™ : programming barcodes and setup procedure” document in the product CD)

## AutoSetup (F3) Function

Once entered, if a barcode label is positioned in front of the scanline, the scanner automatically performs the optimal setup of the reading parameters for that specific barcode.

The procedure is as follows:

- **place** the desired barcode on the scanline.
- **enter** the *AutoSetup* function (the laser turns on and the GOOD LED blinks to indicate the ongoing process)
- **wait** until the GOOD LED stays steady on (indicating the reader has detected the barcode)

This procedure ends either when the barcode is successfully decoded or after a timeout of about 7 (seven) seconds.

The scanner will restart at the end of the process, and then the optimized reading parameters for that barcode are automatically configured in scanner memory.



### NOTE

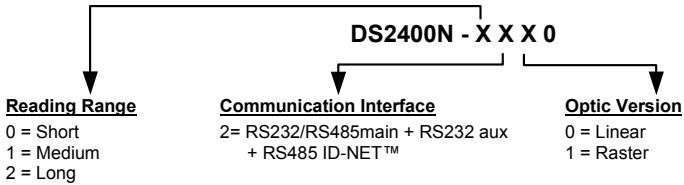
*The AutoSetup function does not modify the programmed barcode symbologies. If needed, the AutoLearn function can be performed after Autosetup.*



## 2.4 MODEL DESCRIPTION

The DS2400N scanner is available in versions that differ in regard to the following parameters:

- Reading range
- Linear or raster reading



The following tables display each version's reading performance.

Version	Max Code Resolution	Speed
	mm (mils)	scans/s
02X0	0.20 (8)	600 to 1000
12X0	0.25 (10)	600 to 1000
22X0	0.35 (14)	600 to 1000

Version	Reading Distance
02X0	75 mm (3 in) - 340 mm (13.4 in) on 0.35 mm (14 mils) codes
12X0	100 mm (3.9 in) - 440 mm (17.3 in) on 0.50 mm (20 mils) codes
22X0	190 mm (7.5 in) - 600 mm (23.6 in) on 0.50 mm (20 mils) codes

See reading diagrams in par. 4.4 for further details.

## 2.5 ACCESSORIES

The following accessories are available on request for the DS2400N:

<b>Name</b>	<b>Description</b>	<b>Part Number</b>
GFC-200	Contact Reading Mirror	93A201106
GFC-2000	105° Reading Mirror	93A201080
GFC-2100	90° Reading Mirror	93A201000
OM2000	Oscillating Mirror	93A251031
INT-30 (for C-Box 100)	20 mA Current Loop Interface Board	93A151022
C-BOX 100	Passive Connection Box	93ACC1510
C-BOX 150	Parameters Storage Connection Box	93A301066
C-BOX 200 (*)	Active Connection Box	93ACC1520
C-BOX 300/310 (*)	Profibus Connection Box	93A301000, 93A301030
C-BOX 400/410 (*)	DeviceNet Connection Box	93A301010, 93A301040
MEP-542/543	Photocell Kit PNP/NPN	93ACC1727, 93ACC1728
PG-6000/6001/6002	24 V Power Supply Unit EU/UK/US	93ACC1720, 93ACC1719, 93ACC1718

(\*) = partially compatible; refer to your local technical support office for details.

## 3 INSTALLATION

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### 3.1 PACKAGE CONTENTS

Verify that the DS2400N reader and all the parts supplied with the equipment are present and intact when opening the packaging; the list of parts includes:

- DS2400N reader with cable
- DS2400N Quick Guide
- Barcode test chart (PCS = 0.9)
- Genius™ CD-ROM
- Mounting kit: - bracket  
- screws

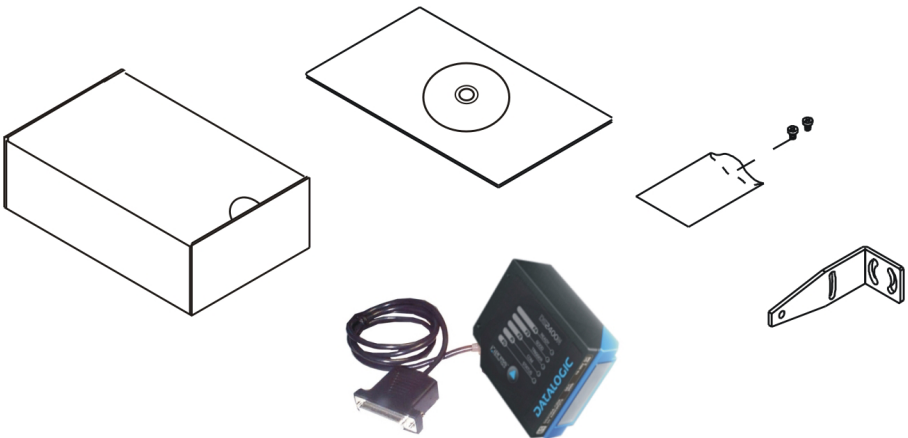
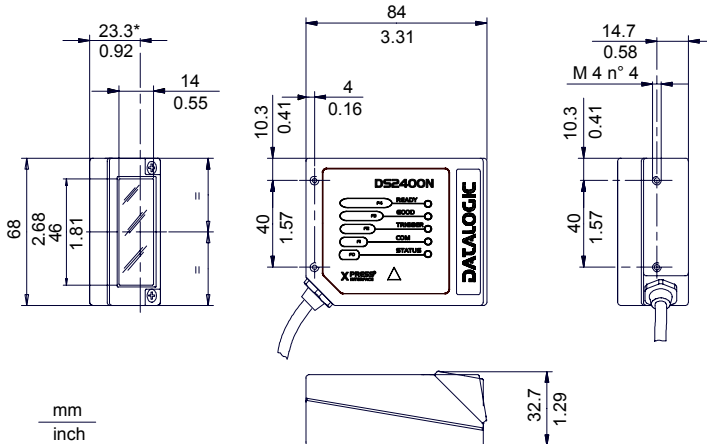


Figure 10 - DS2400N Package Contents

### 3.2 MECHANICAL INSTALLATION

DS2400N can be installed to operate in different positions. The four screw holes (M4 x 5) on the body of the reader are for mechanical fixture (Figure A, 3). The diagrams below give the overall dimensions of the scanner and mounting bracket and may be used for installation.

Refer to par. 3.5 for correct positioning.



\* The quote refers to the scan line

Figure 11 – DS2100N Overall Dimensions

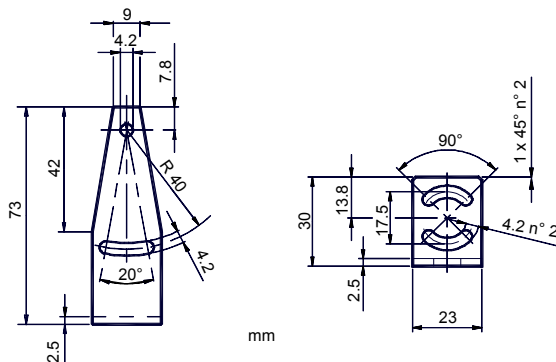


Figure 12 – Mounting Bracket Overall Dimensions

### 3.2.1 Mounting DS2400N

Using the DS2400N mounting bracket you can obtain the most suitable position for the reader as shown in the figure below:

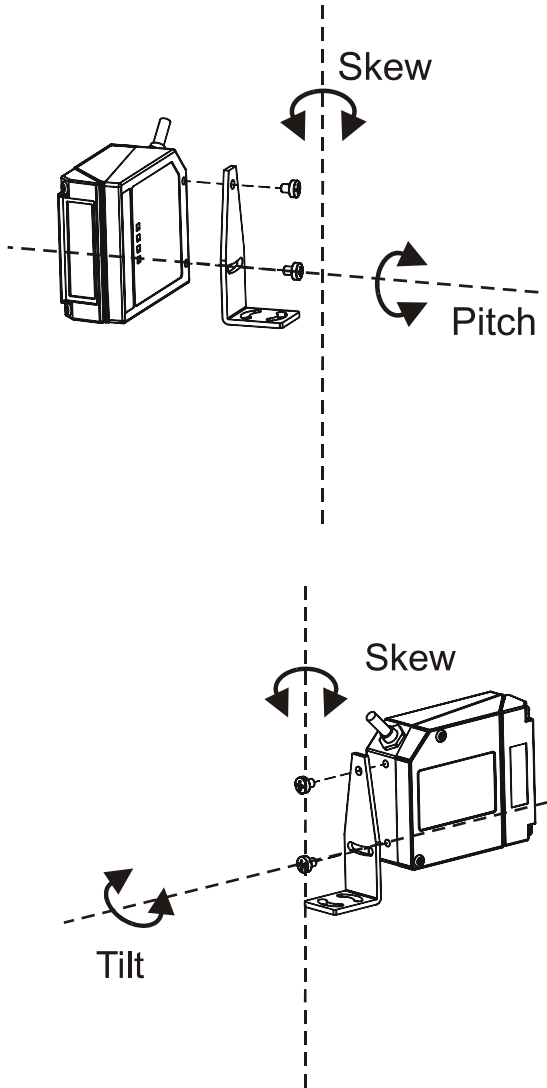


Figure 13 – Positioning with Mounting Bracket

### 3.2.2 Mounting Scanner Accessories

GFC-2X00s are deflection mirrors available on request for DS2400N.

- The GFC-2000 is a 75° deflection mirror
- The GFC-2100 is a 90° deflection mirror

The reading position with respect to the scanner is shown below for each mirror.

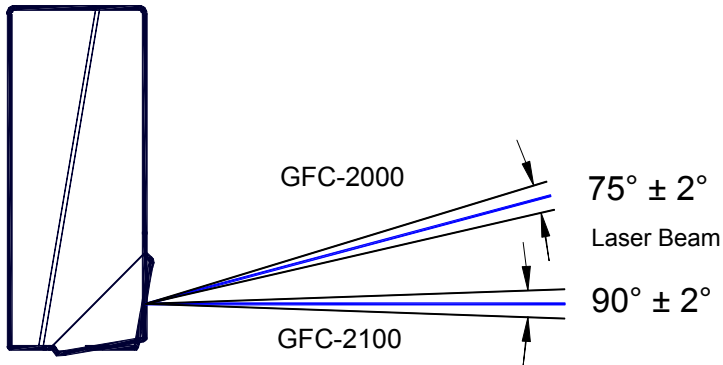


Figure 14 - GFC-2X00 Laser Beam Output Position

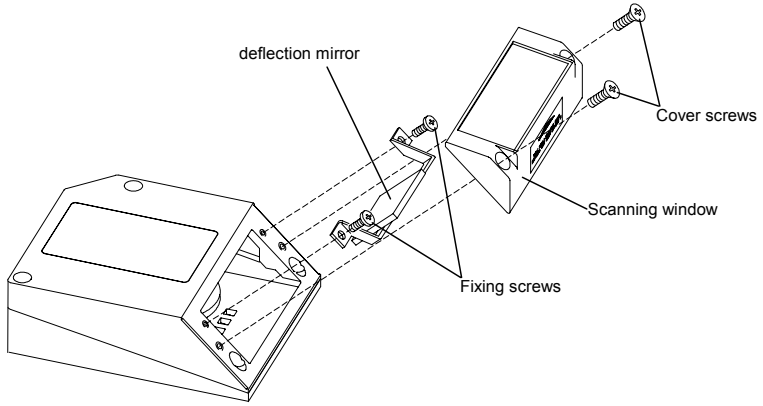
The installation of the deflection mirror is very easy (Figure 15).



**CAUTION**

*Avoid any contact with the deflection mirror, mirrored rotor, the lenses or other optical components, otherwise the performance of the reader will be reduced.*

1. Turn off the device.
2. Remove the DS2400N scanning window unscrewing the two cover screws.
3. Fix the mirror to the device by means of the two fixing screws.
4. Remount the scanning window so that the opening face is now at 90° with respect to the DS2400N body.



**Figure 15 - Installation of the Deflection Mirror**

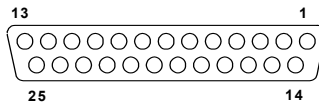
### 3.3 ELECTRICAL CONNECTIONS

All DS2400N models are equipped with a cable terminated by a 25-pin female D-sub connector for connection to the power supply and input/output signals. The details of the connector pins are indicated in the following table:



**CAUTION**

*Do not connect GND and SGND to different (external) ground references. GND and SGND are internally connected through filtering circuitry which can be permanently damaged if subjected to voltage drops over 0.8 Vdc.*



**Figure 16 - 25-pin Female D-sub Connector**

25-pin D-sub female connector pinout				
Pin	Name	Function		
13, 9	VS	Power supply input voltage +		
25	GND	Power supply input voltage -		
1	CHASSIS	Cable shield connected to chassis		
18	EXT TRIG A	External Trigger A (polarity insensitive)		
19	EXT TRIG B	External Trigger B (polarity insensitive)		
10	IN2 -	Input 2 -		
8	OUT1 +	Output 1 +		
22	OUT1 -	Output 1 -		
11	OUT2 +	Output 2 +		
12	OUT2 -	Output 2 -		
20	RXAUX	Auxiliary RS232		
21	TXAUX	Auxiliary RS232		
23	ID-NET +	High speed internal network +		
24	ID-NET -	High speed interconnection network -		
6, 10, 14, 15, 16, 17	NC	Not Connected		
Pin	Name	RS232	RS485 Full-Duplex	RS485 Half-Duplex
2	MAIN INTERFACE (SW SELECTABLE)	TX232	TX485+	RTX485+
3		RX232	RX485+	RTX485-
4		RTS232	TX485-	
5		CTS232	RX485-	SGND
7		SGND	SGND	



The table below gives the pinout of the C-BOX 100 terminal block connectors. Use this pinout when the DS2400N reader is connected in a network by means of the C-BOX 100:

<b>C-BOX 100 Terminal Block Connectors</b>				
<b>Power</b>				
1, 3, 5	VS			
2, 4, 6	GND			
7, 8	EARTH GROUND			
20, 40	Reserved			
<b>Inputs</b>				
27	EXT TRIG A (polarity insensitive)			
28	EXT TRIG B (polarity insensitive)			
29	NC			
30	IN2-			
31, 33	NC			
32, 34	NC			
39	GND			
<b>Outputs</b>				
21	OUT 1+			
22	OUT 1-			
23	OUT 2+			
24	OUT 2-			
25	NC			
26	NC			
<b>Auxiliary Interface</b>				
35	TX AUX			
37	RX AUX			
<b>ID-NET™</b>				
36	ID-NET-			
38	ID-NET+			
<b>Main Interface</b>				
	<b>RS232</b>	<b>RS485 Full-Duplex</b>	<b>RS485 Half-Duplex</b>	<b>20 mA C.L. (with INT-30 only)</b>
11, 15	TX 232	TX 485+	RTX 485+	see INT-30 instructions
12, 16	RTS 232	TX 485-	RTX 485-	
17	RX 232	RX 485+		
18	CTS 232	RX 485-		
10, 14, 19	SGND	SGND	SGND	
9, 13		RS485 Cable Shield	RS485 Cable Shield	

### 3.3.1 Power Supply

Power can be supplied to the scanner through the pins provided on the 25-pin connector used for communication with the host (Figure 17):

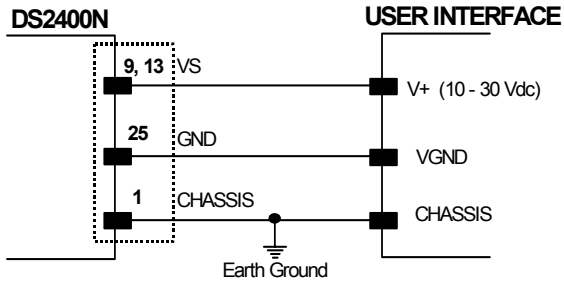


Figure 17 - Power Supply Connections

The power must be between 10 and 30 Vdc only.

It is recommended to connect pin 1 (CHASSIS) to a common earth ground.

### 3.3.2 Main Serial Interface

The signals relative to the following serial interface types are available on the input/output connector of DS2400N.

If the interface type is not compatible with the current communication handshaking, then the system forces the handshake to **none**.

**The main interface type and the relative parameters (baud rate, data bits, etc.) can be set using the Genius™ utility program or the Genius™ based Host Mode Programming procedure.**

Details regarding the connections and use of the interfaces are given in the next paragraphs.

## RS232 Interface

The serial interface is used in this case for point-to-point connections; it handles communication with the host computer and allows both transmission of code data and the programming of the scanner. This is the default setting.

The following pins are used for RS232 interface connection:

Pin	Name	Function
2	TX232	transmit data
3	RX232	receive data
4	RTS232	request to send
5	CTS232	clear to send
7	SGND	signal ground

It is always advisable to use shielded cables. The overall maximum cable length must be less than 15 m (49.2 ft).

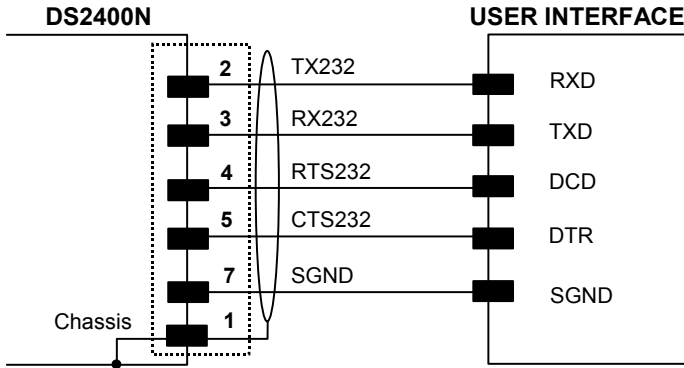


Figure 18 – RS232 Main Interface Connections using Hardware Handshaking

The RTS232 and CTS232 signals control data transmission and synchronize the connected devices.

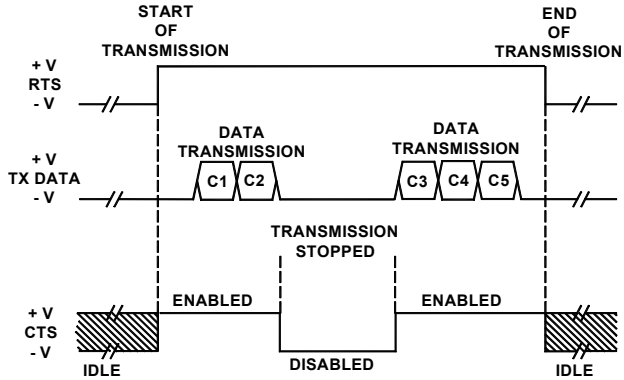


Figure 19 - RS232 Control Signals

If the RTS/CTS handshaking protocol is enabled, the DS2400N activates the RTS232 output to indicate a message is to be transmitted. The receiving unit activates the CTS232 input to enable the transmission.

### RS485 Full-Duplex Interface

The RS485 full-duplex interface (5 wires + shield) is used for non-pollled communication protocols in point-to-point connections over longer distances than those acceptable for RS232 communications or in electrically noisy environments.

The connector pinout follows:

Pin	Name	Function
2	TX485+	RS485 transmit data +
4	TX485-	RS485 transmit data -
3	RX485+	RS485 receive data +
5	RX485-	RS485 receive data -
7	SGND	signal ground

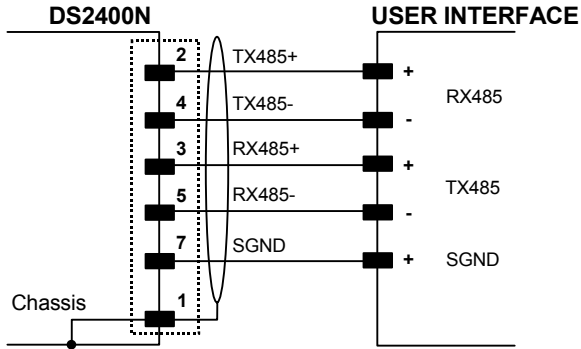


Figure 20 - RS485 Full-duplex Connections

## RS485 Half-Duplex Interface

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

It can be used in a master/slave layout or for Multidrop connections with a Datalogic Multiplexer, (see par. 3.6.4 and 3.6.5).

The connector pinout follows:

Pin	Name	Function
2	RTX485+	RS485 transmit/receive data +
4	RTX485-	RS485 transmit/receive data -
7	SGND	signal ground

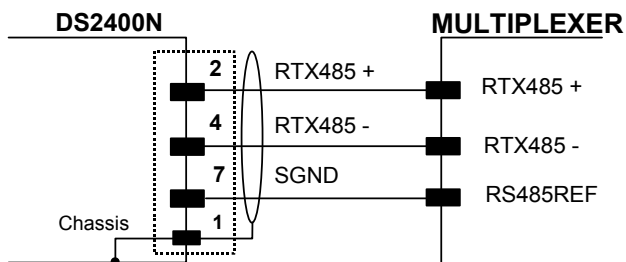


Figure 21 - RS485 Half-duplex Connections

This interface is forced by software when the protocol selected is MUX32 protocol.

In a Multiplexer layout or for slaves, the Multidrop address must also be set via serial channel by the Genius™ utility or by the Host Programming Mode.

**Errore. L'origine riferimento non è stata trovata.** shows a multidrop configuration with DS2400N scanners connected to a Multiplexer.



CAUTION

*This is an example of multidrop wiring. Consult the multiplexer manual for complete wiring instructions.*

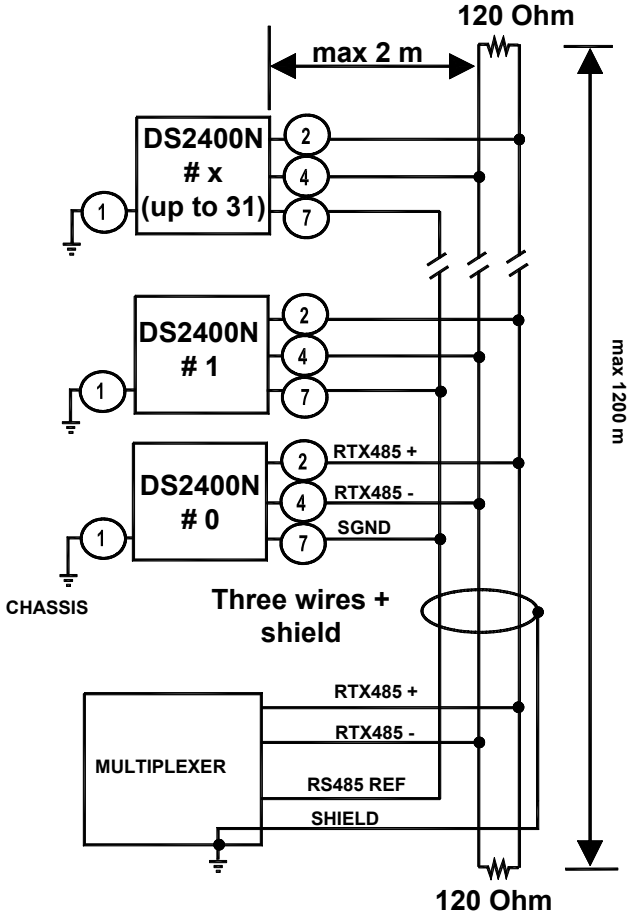


Figure 22 - DS2400N Multidrop Connection to a Multiplexer

### 20 mA Current Loop Interface (C-Box 100 w/INT-30 Accessory Only)

To adapt DS2400N to 20 mA current loop interfaces, it must be connected to a C-Box 100, which is equipped with an INT-30 (20 mA current loop adapter accessory board).

The INT-30 converts 20 mA current loop signals into RS232 signals to the scanner. See the C-Box 100 Installation Manual and the INT-30 instructions.

### 3.3.3 ID-NET™

<b>C-BOX 100/150 Pin</b>	<b>Name</b>	<b>Function</b>
38	ID-NET+	High speed internal network+
36	ID-NET-	High speed internal network-
39	GND	ground

The following instructions are referred to Figure 23, Figure 24 and Figure 25:

- Use DeviceNet cables (drop type 2 x AWG 24 + 2 x AWG 22).
- Cable Shield connected only to Master earth.
- Max 1000 meter ID-NET cable length.
- Connect only 36, 38 and not 39 (use only 2 wires).
- DC Voltage Power cable (VS – GND) should be handled as a signal cable (i.e. do not put it together with AC cable):
  - Wire dimensioning must be checked in order to avoid voltage drop greater than 0.8 Volt.
  - Cable should lie down as near as possible to the ID-NET cable (avoiding wide loop between them).
- Scanner's chassis may be connected to earth.
- Network inside the same building.



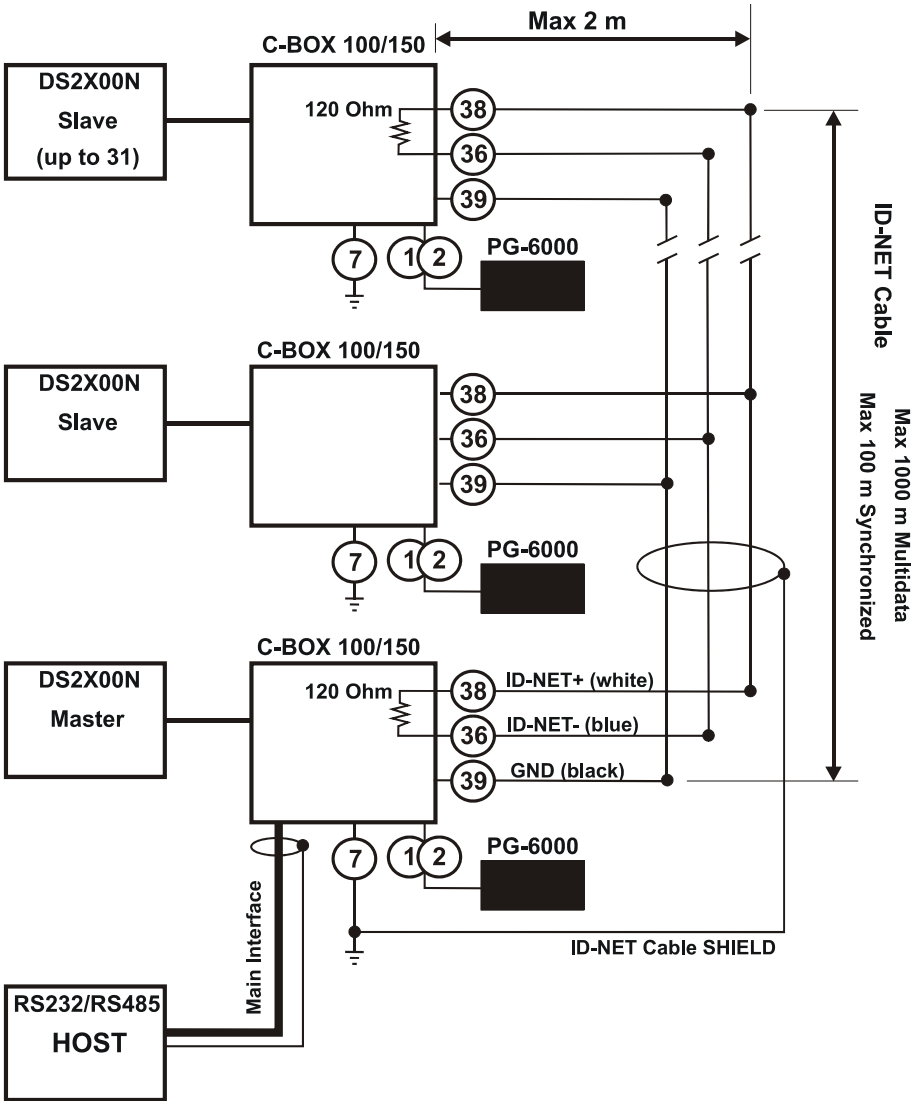


Figure 23 – ID-NET™ Network Connections with isolated power blocks

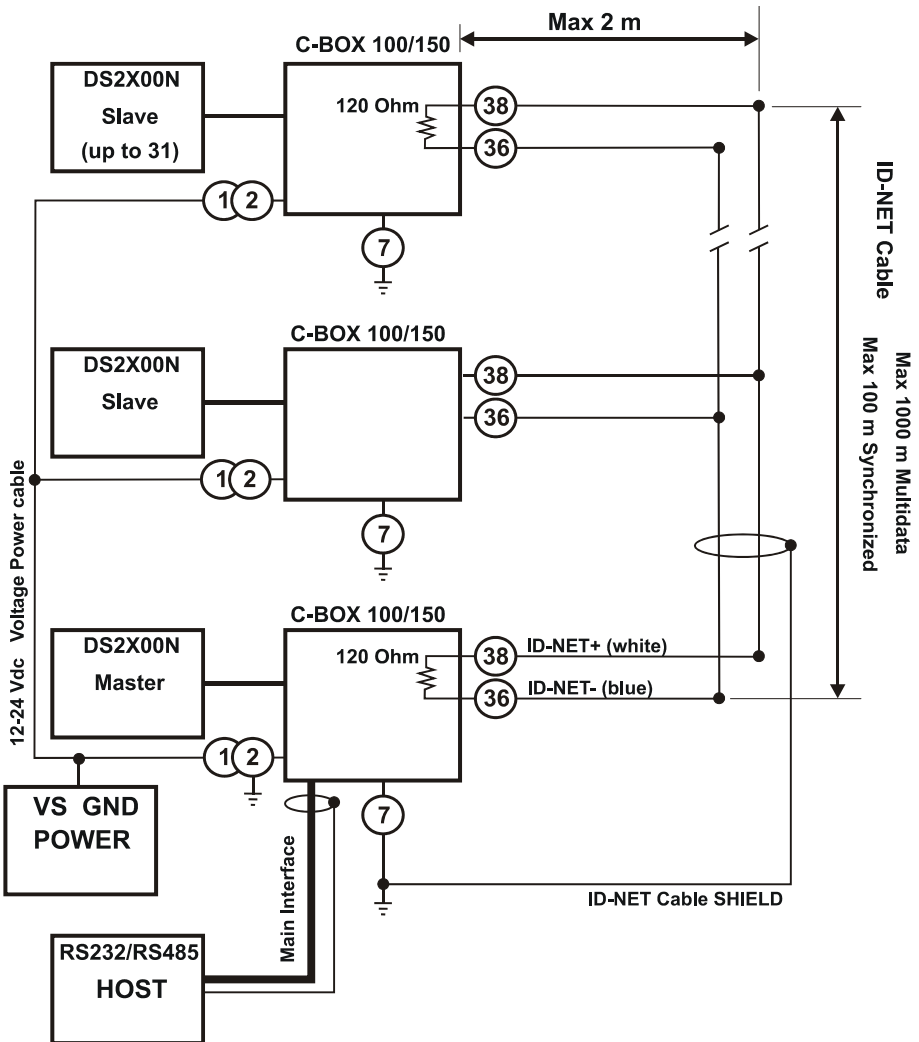


Figure 24 - ID-NET™ Network Connections with Common Power Branch Network

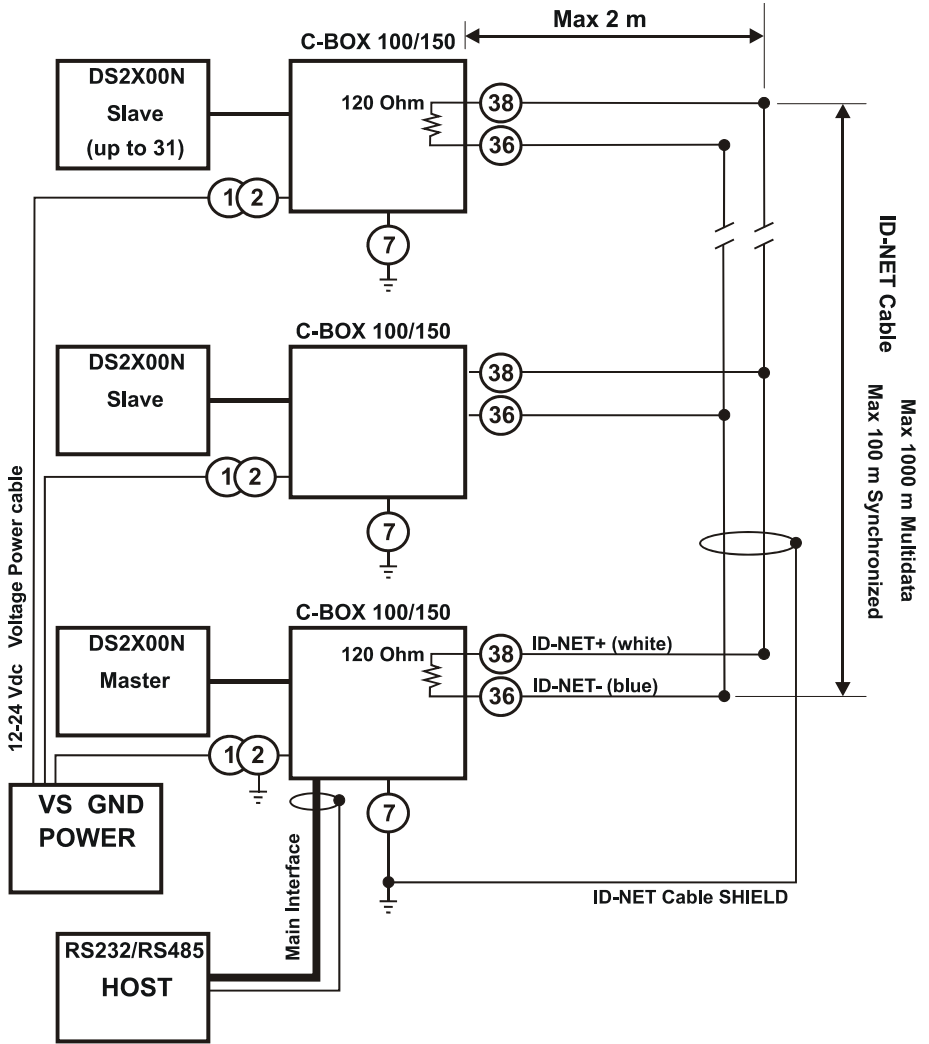
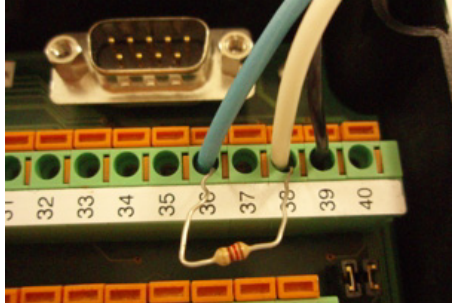


Figure 25 – ID-NET™ Network Connections with Common Power Star Network

## ID-NET™ Network Termination

The network must be properly terminated by a 120 Ohm resistor in the C-BOX 100 of the first and last scanner of the network.



### 3.3.4 Auxiliary RS232 Interface

The auxiliary serial interface is used exclusively for RS232 point-to-point connections.

The parameters relative to the aux interface (baud rate, data bits, etc.) as well as particular operating modes such as LOCAL ECHO can be defined using the Genius™ utility program or Genius™ based Host Mode Programming installed from the CD-ROM.

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

Pin	Name	Function
20	RXAUX	receive data
21	TXAUX	transmit data
7	SGND	signal ground

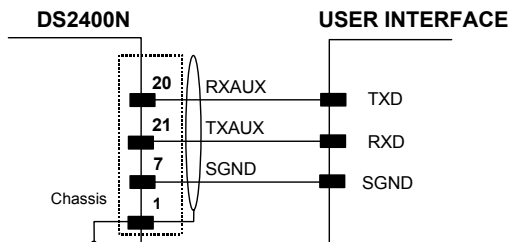


Figure 26 - RS232 Auxiliary Interface Connections using Hardware Handshaking

### 3.3.5 Inputs

The inputs available on the connector supplied with the scanner are the pins relative to the External Trigger and generic input, as indicated below:

Pin	Name	Function
18	EXT TRIG A	external trigger A
19	EXT TRIG B	external trigger B
10	IN2 -	Input 2 -
25	GND	Power ground/IN2 reference

The External Trigger input is used in the On-Line operating Mode and tells the scanner to scan for a code. The active state of this input is selected in software. Refer to the Genius™ Help On Line.

The yellow Trigger LED (Figure A, 6) is on when the External Trigger forces a current flow through the EXT TRIGA and EXT TRIGB pins.

This input is optocoupled and can be driven by both an NPN and PNP type command. The connections are indicated in the following diagrams:

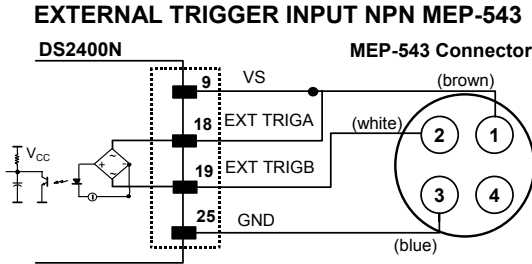


Figure 27 - External Trigger command using NPN MEP-543 Photocell

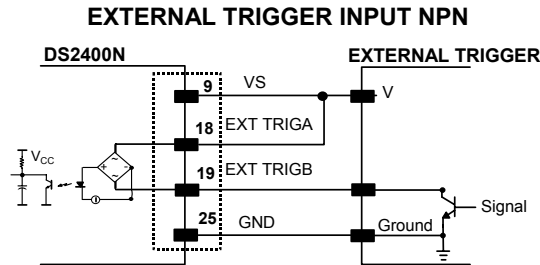


Figure 28 - External Trigger NPN using DS2100 power

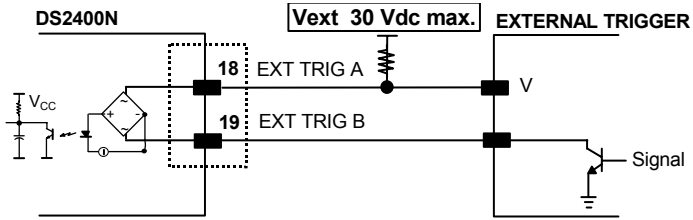


Figure 29 - External Trigger NPN command using external power

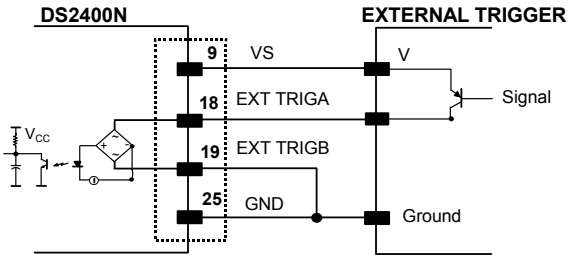
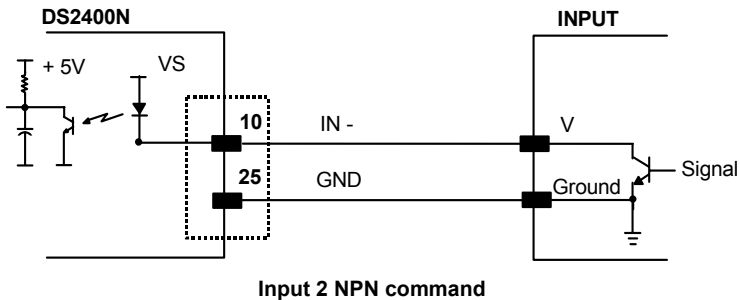


Figure 30 - Input PNP Command Using DS2400N Power

**Electrical features:** Maximum voltage: 30 Vdc  
Maximum current: 12 mA

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

### IN2 INPUT NPN Only



### Code Verifier

If the DS2400N is used as a Code Verifier, it is possible to indicate to the scanner what code to store as the verifier code by means of an external hardware input.

The Code Verifier parameter must be enabled and the configuration parameters to allow correct Code Type reading must be saved to the scanner in order to read the verifier code.

The next read code will be stored as the verifier code in the scanner's NON-VOLATILE (EEPROM) memory.

### 3.3.6 Outputs

Two general purpose outputs are available. These outputs can only be connected as open collector configurations. The following pins are present on the 25-pin connector of the scanner:

Pin	Name	Function
8	OUT1+	output 1 +
11	OUT2+	output 2 +
22	OUT1-	output 1 -
12	OUT2-	output 2 -

The meaning of the two outputs OUT1 and OUT2 can be defined by the user. Refer to the Genius™ Help On Line.

By default, OUT1 is associated with the No Read event, which activates when the code signaled by the external trigger is not decoded, and OUT2 is associated with the Right event, which activates when the code is correctly decoded.

These outputs are both level and pulse configurable.

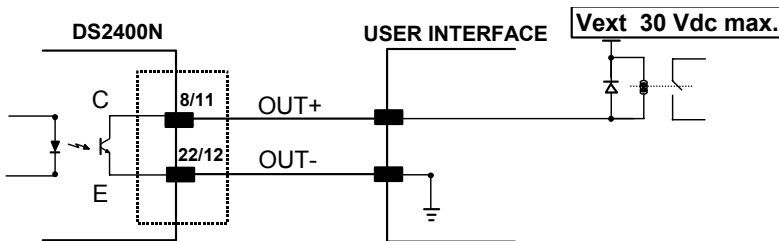
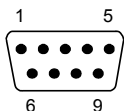
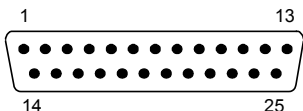


Figure 31 - Output Connections

**V<sub>CE</sub> max = 40 Vdc**  
**I max = 40 mA continuous**

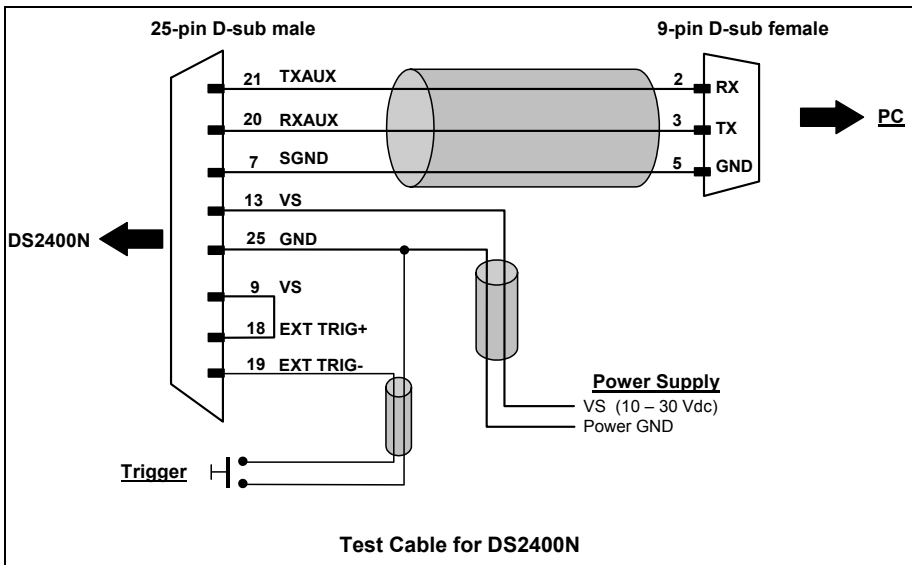
### 3.4 USER INTERFACE

The following table contains the pinout for standard RS232 PC Host interface. For other user interface types please refer to their own manual.

RS232 PC-side connections			
 <p>9-pin male connector</p>		 <p>25-pin male connector</p>	
Pin	Name	Pin	Name
2	RX	3	RX
3	TX	2	TX
5	GND	7	GND
7	RTS	4	RTS
8	CTS	5	CTS

#### How To Build A Simple Interface Test Cable:

The following wiring diagram shows a simple test cable including power, external (push-button) trigger and PC RS232 COM port connections.





### 3.5 POSITIONING

The DS2400N scanner is able to decode moving barcode labels at a variety of angles, however significant angular distortion may degrade reading performance.

When mounting the DS2400N take into consideration these three ideal label position angles: **Pitch 0°**, **Skew 10° to 30°** and **Tilt 0°**.

Follow the suggestions for the best orientation:

The **Pitch** angle is represented by the value **P** in Figure 32. Position the reader in order to **minimize** the **Pitch** angle.

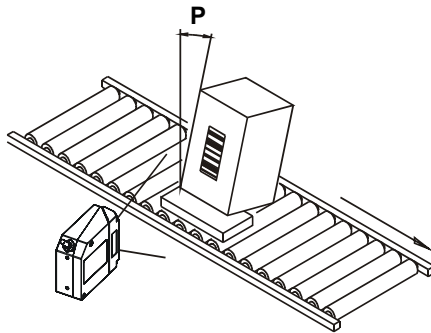


Figure 32 - Pitch Angle

The **Skew** angle is represented by the value **S** in Figure 33. Position the reader to **assure at least 10°** for the **Skew** angle. This avoids the direct reflection of the laser light emitted by the DS2400N.

For the raster version, this angle refers to the most inclined or external raster line, so that all other raster lines assure **more** than 10° Skew.

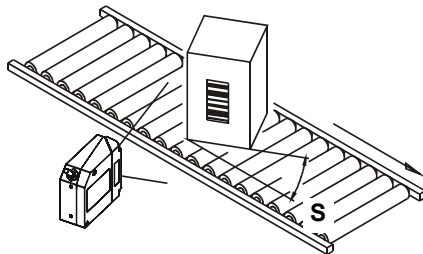
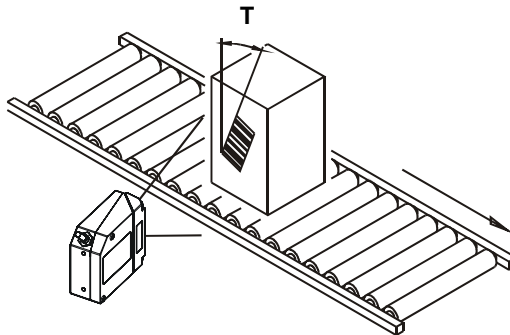


Figure 33 - Skew Angle

The **Tilt** angle is represented by the value **T** in Figure 34. Position the reader in order to **minimize** the **Tilt** angle.



**Figure 34 - Tilt Angle**

By using the ACB (Advanced Code Builder) software parameter, the tilt angle is less critical and can be decoded even if the scan line doesn't cross the entire code. See par. **4.1** or the Help On Line for details.

### 3.6 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.

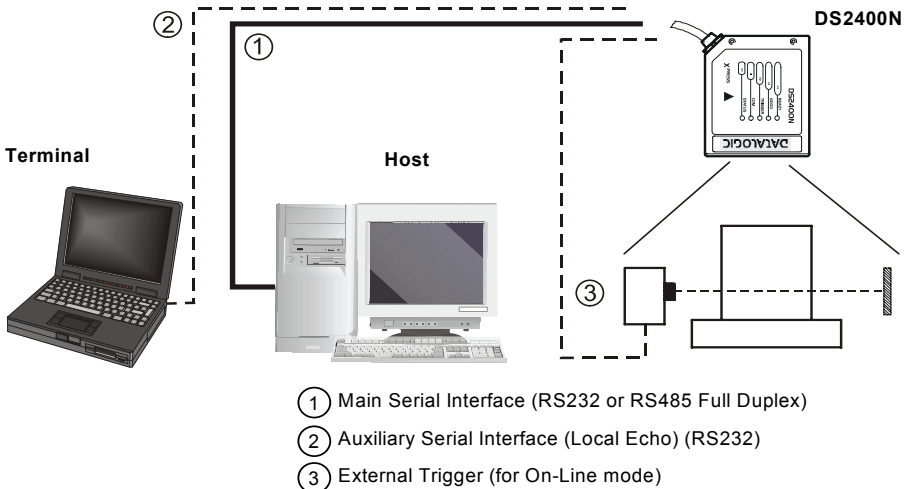
These layouts also require the correct setup of the software configuration parameters. Complete software configuration procedures can be found in the **Guide To Rapid Configuration** in the Genius™ Help On Line.

#### 3.6.1 Point-to-Point

In this layout the data is transmitted to the Host on the main serial interface. A Genius™ based Host Mode programming can be accomplished either through the main interface or the auxiliary interface.

In Local Echo communication mode, data is transmitted on the RS232 auxiliary interface independently from the main interface selection.

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 35 - Point-to-Point Layout**

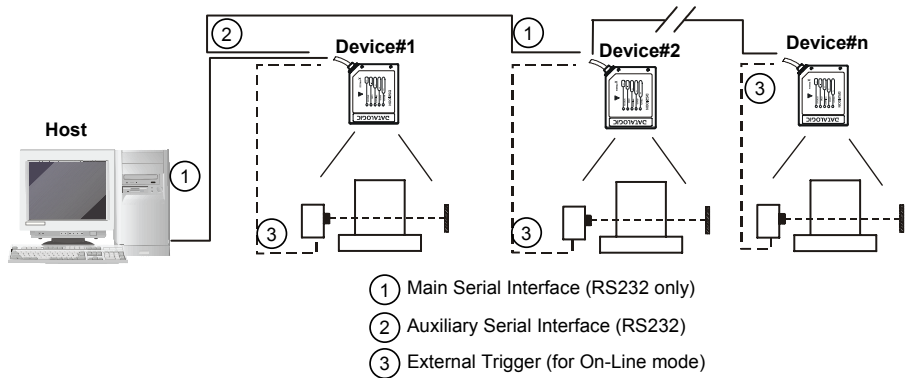
### 3.6.2 Pass Through

Pass through mode allows two or more devices to be connected to a single external serial interface.

Each DS2400N transmits the messages received by the auxiliary interface onto the main interface. All messages will be passed through this chain to the host.

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

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



**Figure 36 - Pass through Layout**

### 3.6.3 RS232 Master/Slave

The RS232 master/slave connection is used to collect data from several scanners to build either a multi-point or a multi-sided reading system; there can be one master and up to 9 slaves connected together.

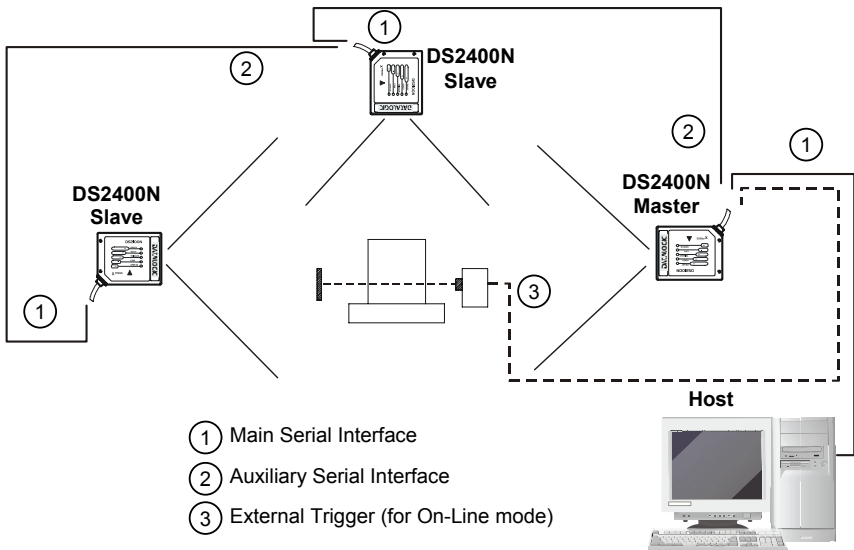
The Slave scanners use RS232 only on the main and auxiliary serial interfaces. Each slave DS2400N transmits the messages received by the auxiliary interface onto the main interface. All messages will be passed through this chain to the master.

The master scanner is connected to the Host on the main serial interface. The possible main interface types for the Master scanner are RS232 or RS485. (20 mA C.L. can also be used if the INT-22 accessory is installed).

Either On-Line or Serial On-Line Operating modes can be used in this layout.

**When On-Line Operating mode is used, the external trigger signal is unique to the system, however it is not necessary to bring the external trigger signal to the Slave scanners.**

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



**Figure 37 - RS232 Master/Slave Layout**

### 3.6.4 ID-NET™

The RS485 ID-NET™ 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 32 slaves connected together.

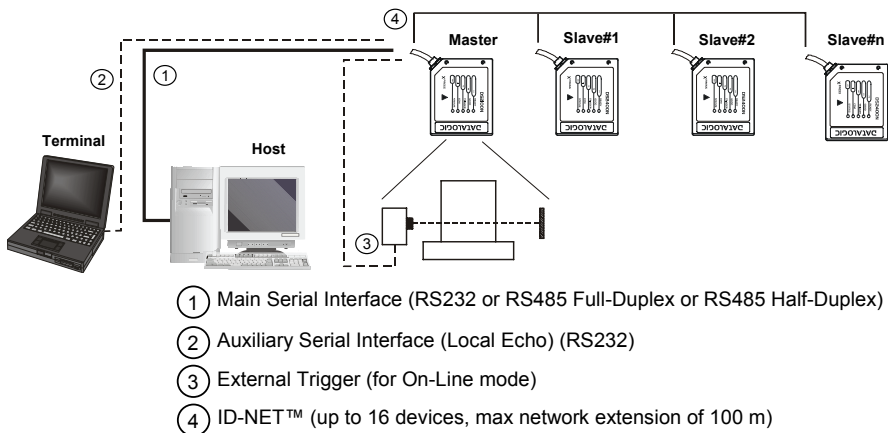
The slave scanners are connected together using RS485 half-duplex on the ID-NET™ interface. Every slave scanner must have a multidrop address in the range 0-31.

The master scanner is also connected to the Host on the RS232/RS485 main serial interface.

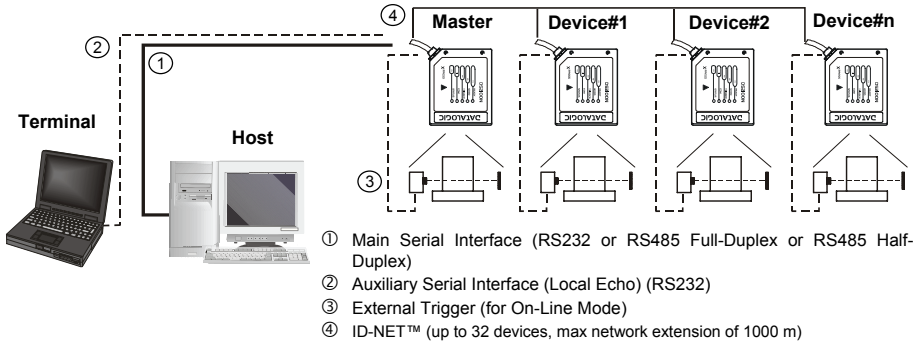
The External Trigger signal is unique to the system; there is a single reading phase and a single message from the master scanner to the Host computer.

**It is not 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 38 – ID-NET™ M/S Synchronized Layout**



**Figure 39 – ID-NET™ M/S Multidata**



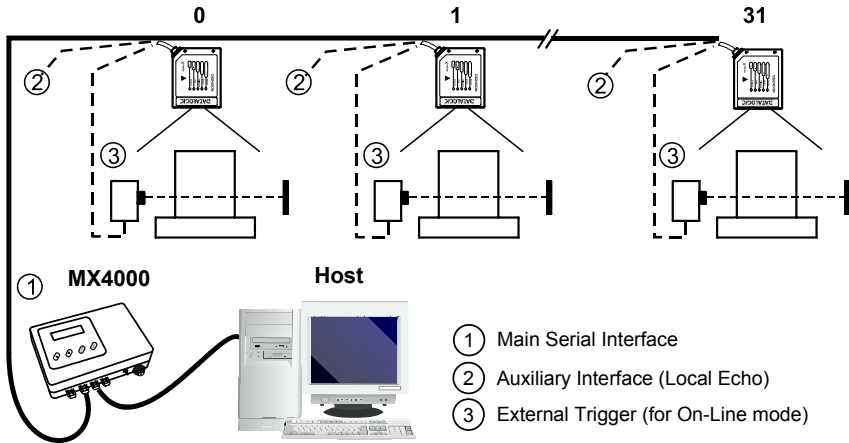
**NOTE**

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

*The termination resistors of the RS485 bus must be installed inside the first and last C-BOX.*

### 3.6.5 Multiplexer Layout

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



**Figure 40 - Multiplexer Layout**

The auxiliary serial interface of the slave scanners can be used in Local Echo communication mode to control any single scanner (visualize collected data) or to configure it using the Genius™ utility program or Genius™ based 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.

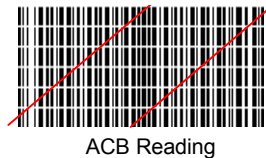
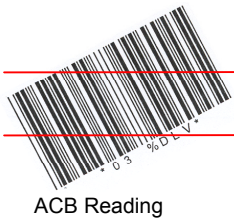
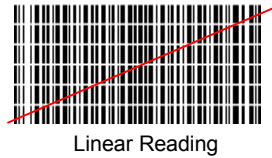
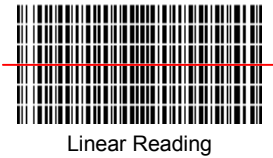


# 4 READING FEATURES

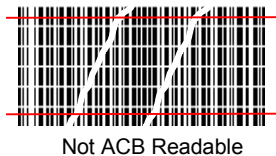
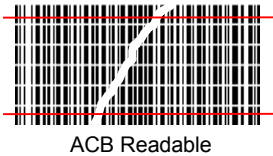
## 4.1 ADVANCED CODE BUILDER (ACB)

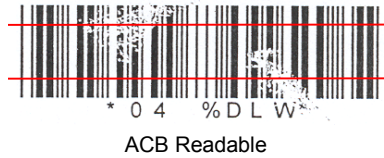
In addition to linear reading, the Advanced Code Builder (ACB) allows code reading by “stitching” together two partial reads of it. ACB is not as powerful as Advanced Code Reconstruction due to limits on tilt angle, speed and Multi-label function; but it is effective in the case of close-to-linear, small height codes, damaged codes, or poor print quality codes.

ACB is used to read a code label when the scan line does not cross the label along its entire length (excessive tilt angle).



ACB reads two fragments of a label containing a start or a stop character and a number of digits, and puts them together to build the complete label. ACB also has an intrinsic ability to increase the reading percentage of damaged codes as in the examples below:



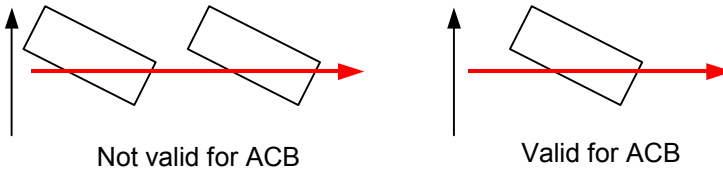


ACB is disabled by default but can be enabled for the following code types:

- Code 25 Interleaved
- Code 39 Family
- Codabar
- Code 128/EAN128
- EAN/UPC (without ADD-Ons)
- Code 93

#### 4.1.1 Important ACB Reading Conditions

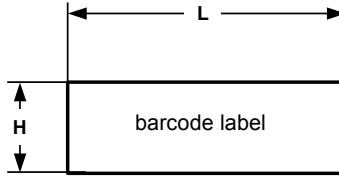
- **Do not use ACB for omni-directional reading stations.**
- ACB can be activated for each symbology independently from the others.
- ACB requires that the code be in movement with respect to the scanner.
- ACB requires fixed length barcode reading.
- The codes read with ACB enabled must pass in front of the scanner one at a time.



- Code concatenation and ACB are not compatible and therefore cannot be enabled simultaneously on the same code.
- For correct operation, ACB requires at least 5 scans for each of the two fragments.

### 4.1.2 Tilt Angle Improvement with ACB

ACB allows barcode reading with an increased tilt angle. The tilt angle depends upon the code aspect ratio defined as H/L according to the table below:



Aspect Ratio H/L	Max theoretical linear tilt angle	Max practical ACB angle
0.33	18°	30°
0.25	14°	23°
0.125	7°	11°

## 4.2 LINEAR CODE READING

For linear code reading, the number of scans performed on the code by the DS2400N 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

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

### 4.2.1 Step-Ladder Mode

If scanning is perpendicular to the code motion direction (Figure 41), the number of effective scans performed by the reader is given by the following formula:

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

Where:

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

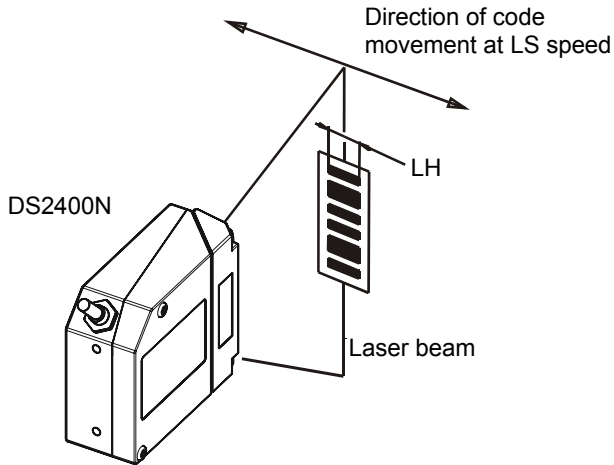


Figure 41 - "Step-Ladder" Scanning Mode

For example, the DS2400N (800 scans/sec.) for a 25 mm high code moving at 1250 mm/s performs:

$$[(25/1250) * 800] - 2 = 14 \text{ effective scans}$$

### 4.2.2 Picket-Fence Mode

If scanning is parallel to the code motion, (Figure 42), the number of effective scans is given by the following formula:

**SN =  $\lceil ((FW-LW)/LS) * SS \rceil - 2$**     Where:

- 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

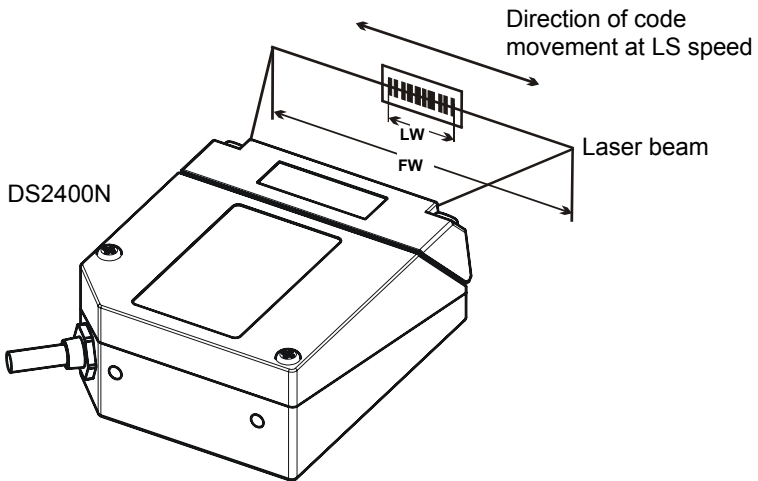


Figure 42 - "Picket-Fence" Scanning Mode

For example, for a 100 mm wide code moving in a point where the reading field is 200 mm wide at a 2000 mm/s speed, the DS2400N (800 scans per sec.), performs:

$$\lceil ((200-100)/2000) * 800 \rceil - 2 = 38 \text{ effective scans}$$

### 4.3 PERFORMANCE

The DS2400N scanner is available in different versions according to the reading performance.

Version	Max Code Resolution	Speed
	mm (mils)	scans/s
02X0	0.20 (8)	600 to 1000
12X0	0.25 (10)	600 to 1000
22X0	0.35 (14)	600 to 1000

Version	Reading Distance
02X0	75 mm (3 in) - 340 mm (13.4 in) on 0.35 mm (14 mils) codes
12X0	100 mm (3.9 in) - 440 mm (17.3 in) on 0.50 mm (20 mils) codes
22X0	190 mm (7.5 in) - 600 mm (23.6 in) on 0.50 mm (20 mils) codes

Refer to the diagrams given in par. 4.4 for further details on the reading features. They are taken on various resolution sample codes at a 25 °C ambient temperature, depending on the conditions in the notes under the diagrams.

#### 4.3.1 Raster

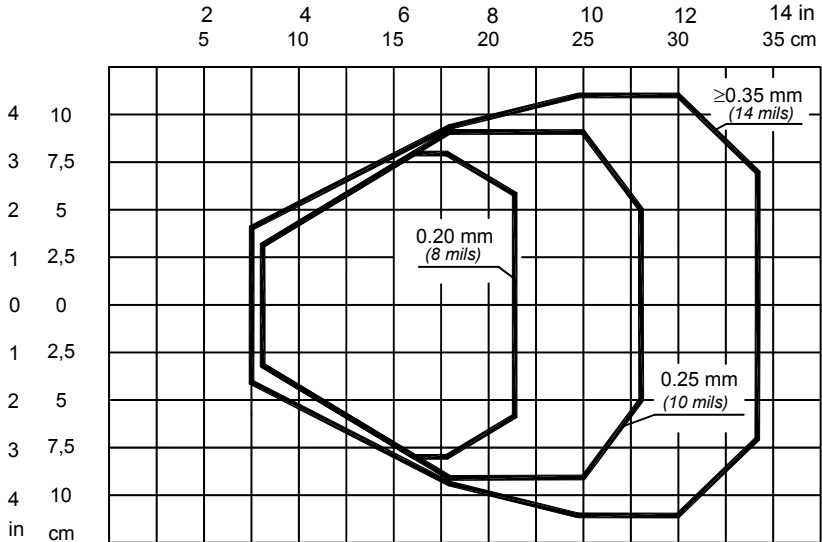
Raster versions are available. If standard devices do not satisfy specific requirements, contact your nearest Datalogic distributor, supplying code samples, to obtain complete information on the reading possibilities.

The reading characteristics for the raster version is given in the table below. The distance between the top and bottom scan lines is given at different reading distances measured from the laser beam output window.

	Reading Distance	
	300 mm (11.8 in)	600 mm (23.6 in)
<b>Raster Capture</b>	18 mm (0.7 in)	35 mm (1.4 in)

### 4.4 READING DIAGRAMS

#### DS2400N-0200 (Short Reading Range)



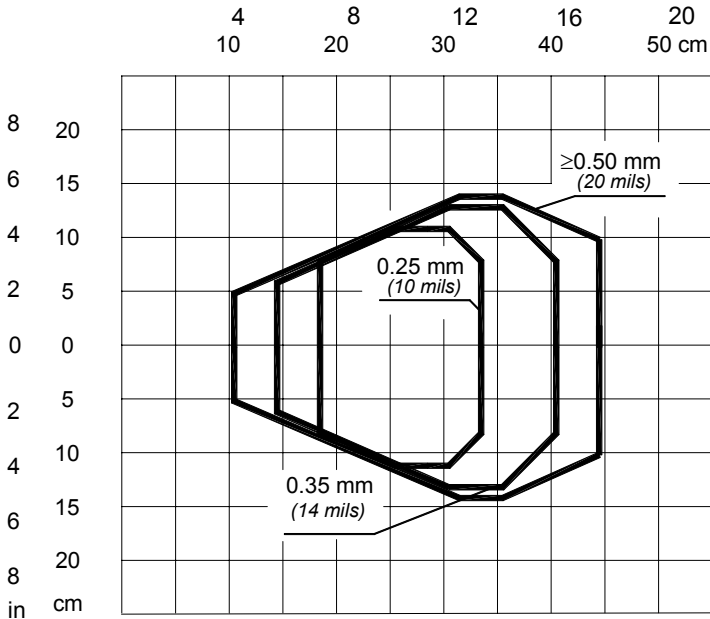
**Note:** (0,0) is the center of the laser beam output window.

#### CONDITIONS

- Optic Version = Linear
- Code = Interleaved 2/5 or Code 39
- PCS = 0.90
- "Pitch" angle = 0°
- "Skew" angle = 10°
- "Tilt" angle = 0°
- \*Code Resolution = High
- \*Code Reading Condition = Standard
- \*Scanning Speed = Speed\_3 (800 scans/sec)

\* Parameters selectable in Genius™.

## DS2400N-1200 (Medium Reading Range)



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

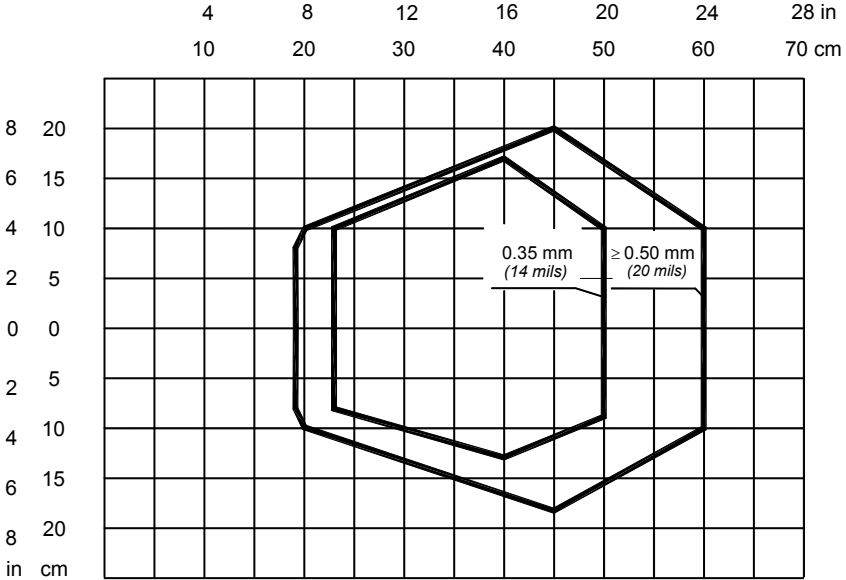
### CONDITIONS

Optic Version	=	Linear
Code	=	Interleaved 2/5 or Code 39
PCS	=	0.90
"Pitch" angle	=	0°
"Skew" angle	=	10°
"Tilt" angle	=	0°
*Code Resolution	=	High for 0.25 mm (10 mils) codes Standard for 0.35 mm, (14 mils) codes and greater
*Code Reading Condition	=	Standard
*Scanning Speed	=	Speed_3 (800 scans/sec)

\* Parameters selectable in Genius™.



**DS2400N-2200** (Long Reading Range)



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

**CONDITIONS**

- Optic Version = Linear
- Code = Interleaved 2/5 or Code 39
- PCS = 0.90
- "Pitch" angle = 0°
- "Skew" angle = 10°
- "Tilt" angle = 0°
- \*Code Resolution = High for 0.35 mm (14 mils) codes  
= Standard for 0.50 mm (20 mils) codes and greater
- \*Code Reading Condition = Standard
- \*Scanning Speed = Speed\_3 (800 scans/sec)

\* Parameters selectable in Genius™.

## 5 MAINTENANCE

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### 5.1 CLEANING

Clean the laser beam output window periodically for continued correct operation of the reader.

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

Repeat the operation frequently in particularly dirty environments.

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



**WARNING**

*Clean the window of the DS2400N when the scanner is turned off or, at least, when the laser beam is deactivated.*

## 6 TROUBLESHOOTING

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### 6.1 GENERAL GUIDELINES

When wiring the device, pay careful attention to the pin number of the signals and whether you are referring to the scanner connector or to the C-BOX 100/150 spring clamp connectors.

If you need information about a certain reader parameter you can refer to the Genius™ program help files.

Either connect the device and select the parameter you're interested in by pressing the F1 key, or select **Help/Parameters Help/2000 Software Configuration Parameters Guide** from the command menu.

If you're unable to fix the problem and you're going to contact your local Datalogic office or Datalogic Partner or ARC, we suggest providing (if possible) the Device Configuration files (\*.ddc). Connect through Genius™ and click the Save icon from the toolbar. Also note the exact Model, Serial Number and Order Number of the device.

<b>TROUBLESHOOTING GUIDE</b>	
<b>Problem</b>	<b>Suggestions</b>
<b>Power On:</b> the "Power On"/"Ready" LED is not lit	Is power connected? If using a power adapter (like PG 220), is it connected to a wall outlet? If using rail power, does rail have power? If using C-Box 100, does it have power (check switch and LED)? Measure voltage either at pin 13 and pin 25 (for 25-pin connector) or at spring clamp 1 and 2 (for C-BOX 100).
<b>On line Mode:</b> EXT TRIGGER LED is not lit (when external trigger activates)	Is sensor connected to EXT TRIG pins (18 and 19 for 25-pin connector)? Is power supplied to photo sensor? Is power supplied to EXT TRIG+ (NPN output)? Is EXT TRIG- grounded (PNP output)? Is the correct polarity observed (current flowing from EXT TRIG+ to EXT TRIG-)? Are the photo sensor LEDS (if any) working correctly? Is the sensor/reflector system aligned?
<b>On line Mode:</b> EXT TRIGGER LED is correctly lit but nothing happens (no reading results)	Is the software configuration consistent with the application condition (operating mode etc.)? In the Genius™ program select the OPERATING MODE tab and check for related parameters
<b>Serial On line Mode:</b> the reader is not triggered (no reading results)	In the Genius™ program select the OPERATING MODE tab and check if serial on line is enabled as operating mode Are the Start – Stop characters correctly assigned? Is the serial trigger source correctly connected and configured?
<b>On line Mode and Serial On Line:</b> Reader doesn't respond correctly to the expected external signals end	In the Genius™ program select the OPERATING MODE tab and check the TIMEOUT parameterization.

<b>TROUBLESHOOTING GUIDE</b>	
<b>Problem</b>	<b>Suggestions</b>
<p><b>Reading:</b> Not possible to read the target barcode (always returns No Read)</p>	<p>Check synchronization of reading pulse with object to read Is the scan line correctly positioned? Place barcode in the center of scan line and run TEST MODE (selectable by Genius™ as an Operating Mode). If you still have trouble, check the following:</p> <ul style="list-style-type: none"> <li>• Is the reading distance within that allowed (see reading diagrams)?</li> <li>• Is the Tilt angle too large?</li> <li>• Is the Skew angle less than 10° (direct reflection)?</li> <li>• Choose the CODE tab and enable different code types (except Pharmacode). LENGTH = Variable</li> <li>• Is the Bar Code quality sufficient?</li> </ul> <p>If you had no success, try to perform the test using the BARCODE TEST CHART included with the product.</p>
<p><b>Communication:</b> Device is not transmitting anything to the host</p>	<ul style="list-style-type: none"> <li>• Is the serial cable connected?</li> <li>• Is the correct wiring respected?</li> <li>• Are serial host settings equivalent to the serial device setting?</li> <li>• If using C-BOX 100, be sure the RS485 termination switch is positioned to OFF.</li> </ul>
<p><b>Communication:</b> Data transferred to the host are incorrect, corrupted or incomplete</p>	<ul style="list-style-type: none"> <li>• In the Genius™ program select the DATA FORMAT tab and check for values of HEADER, TERMINATOR, SEPARATOR, FILL CHARACTERS</li> <li>• Also check the CODE FIELD LENGTH value</li> <li>• Are the COM port parameters correctly assigned?</li> </ul>
<p><b>Communication:</b> Always returns the Reader Failure Character (&lt;BEL&gt; char as default)</p>	<ul style="list-style-type: none"> <li>• Contact your local Datalogic office or Datalogic Partner or ARC, because either a Motor or Laser failure has occurred.</li> <li>• Note the exact model and Serial Number of the device</li> </ul>
<p><b>How do I obtain my units' serial numbers?</b></p>	<ul style="list-style-type: none"> <li>• The device's serial number is printed on a label that is affixed to the body of the reader.</li> <li>• Serial numbers consist of 9 characters: one letter, 2 numbers, and another letter followed by 5 numbers.</li> </ul>

## 7 TECHNICAL FEATURES

	DS2400N-0XX0	DS2400N-1XX0	DS2400N-2XX0
<b>ELECTRICAL FEATURES</b>			
<b>Input Power</b>			
Supply voltage	10 to 30 Vdc		
Power consumption max.	5 W		
<b>Serial Interfaces</b>			
Main	RS232; RS485 Full-duplex / Half-duplex; (20 mA C.L. only with C-Box 100 and INT-30 accessory)		
Auxiliary	RS232		
Baudrate	1200 to 115200		
ID-NET™ Interface	RS485 Half Duplex		
Baudrate	up to 500000		
<b>Inputs</b>			
External Trigger	Optocoupled, polarity insensitive		
IN2	not-optocoupled NPN only		
Voltage	Ext. Trig.: 5 to 30 Vdc IN2: (VS -5) to 0 Vdc		
Current Consumption	12 mA max.		
<b>Outputs</b>			
OUT1, OUT2	Optocoupled		
V <sub>CE</sub>	30 Vdc max.		
Collector current	40 mA continuous max.; 130 mA pulsed		
V <sub>CE</sub> saturation	1V at 10 mA max.		
Power dissipation max.	80 mW at 45 °C (ambient temperature)		
<b>OPTICAL FEATURES</b>			
Light source	Semiconductor laser diode		
Wave length (Note 1)	630 to 680 nm		
Safety class	Class 2 - EN 60825-1; Class II - CDRH		
<b>READING FEATURES</b> (Note 2)			
Scan rate	software programmable (600 to 1000 scans/sec)		
Aperture angle	50°		
Maximum Reading distance	340 mm (13.4 in)	440 mm (17.3 in)	600 mm (23.6 in)
Maximum resolution	0.20 mm (8 mils)	0.25 mm (10 mils)	0.35 mm (14 mils)
<b>USER INTERFACE</b>			
LED indicators	READY, GOOD, TRIGGER, COM, STATUS, POWER ON X-PRESS™ button		

<b>SOFTWARE FEATURES</b>	
<b>READABLE CODE SYMBOLOGIES</b> * EAN/UPC (including Add-on 2 and Add-on 5 2/5 Interleaved * Code 39 (Standard and Full ASCII) * Code 128 * EAN 128 * Codabar * Code 93 * ABC Codabar ISBT 128 Pharmacode * = ACB Readable. Other symbologies available on request.	
<b>Code Selection</b>	up to ten different codes during one reading phase
<b>Decoding Safety</b>	can enable multiple good reads of same code
<b>Headers and Terminators</b>	Up to 128-byte header string Up to 128-byte terminator string
<b>Operating Modes</b>	On-Line, Serial On-Line, Verifier, Automatic, Continuous, Test
<b>Configuration Modes</b>	<ul style="list-style-type: none"> <li>• Genius™ utility program</li> <li>• Genius™ based Host Mode Programming</li> <li>• X-PRESS™ Functions</li> </ul>
<b>Special Functions</b>	ACB (Advanced Code Builder) Motor Off
<b>Parameter Storage</b>	Non-volatile internal Flash
<b>ENVIRONMENTAL FEATURES</b>	
Operating temperature (Note 3)	0 to +45 °C (+32 to +113 °F)
Storage temperature	-20 to +70 °C (-4 to +158 °F)
Humidity max.	90% non condensing
Vibration resistance	IEC 68-2-6 test FC 14 mm @ 2 to 10 Hz; 1.5 mm @ 13 to 55 Hz; 2 g @ 70 to 200 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	68 x 84 x 34 mm (2.68 x 3.31 x 1.34 in)
Weight	330 g (11.6 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. 4.3.

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

# GLOSSARY

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## **ACB (Advanced Code Builder)**

Advanced Code Builder (ACB) allows code reading by “stitching” together two partial reads of it. ACB is effective in reading codes positioned close-to-linear, small height codes, damaged codes, or poor print quality codes. See par. 4.1.

## **Aperture**

Term used on the required CDRH warning labels to describe the laser exit window.

## **Barcode**

A pattern of variable-width bars and spaces which represents numeric or alphanumeric data in machine-readable form. The general format of a barcode symbol consists of a leading margin, start character, data or message character, check character (if any), stop character, and trailing margin. Within this framework, each recognizable symbology uses its own unique format.

## **Barcode Label**

A label that carries a barcode and can be affixed to an article.

## **Baud Rate**

A unit used to measure communications speed or data transfer rate.

## **CDRH (Center for Devices and Radiological Health)**

This organization (a service of the Food and Drug Administration) is responsible for the safety regulations governing acceptable limitations on electronic radiation from laser devices. Datalogic devices are in compliance with the CDRH regulations.

## **Code Positioning**

Variation in code placement that affects the ability of a scanner to read a code. The terms Pitch, Skew, and Tilt deal with the angular variations of code positioning in the X, Y and Z axes. See pars. 0 and 3.5. Variations in code placement affect the pulse width and therefore the decoding of the code. Pulse width is defined as a change from the leading edge of a bar or space to the trailing edge of a bar or space over time. Pulse width is also referred to as a transition. Tilt, pitch, and skew impact the pulse width of the code.

## **Decode**

The process of translating a barcode into data characters using a specific set of rules for each symbology.

## **Decoder**

As part of a barcode reading system, the electronic package which receives the signals from the scanner, performs the algorithm to interpret the signals into



meaningful data and provides the interface to other devices. The decoder is normally integrated into the scanner.

**EAN**

European Article Number System. The international standard barcode for retail food packages.

**FLASH**

An on-board non-volatile memory chip.

**Full Duplex**

Simultaneous, two-way, independent transmission in both directions.

**Half Duplex**

Transmission in either direction, but not simultaneously.

**Host**

A computer that serves other terminals in a network, providing services such as network control, database access, special programs, supervisory programs, or programming languages.

**Interface**

A shared boundary defined by common physical interconnection characteristics, signal characteristics and meanings of interchanged signals.

**LED (Light Emitting Diode)**

A low power electronic device that can serve as a visible or near infrared light source when voltage is applied continuously or in pulses. It is commonly used as an indicator light and uses less power than an incandescent light bulb but more than a Liquid Crystal Display (LCD). LEDs have extremely long lifetimes when properly operated.

**Multidrop Line**

A single communications circuit that interconnects many stations, each of which contains terminal devices. See RS485.

**Parameter**

A value that you specify to a program. Typically parameters are set to configure a device to have particular operating characteristics.

**Picket-Fence Orientation**

When the barcode's bars are positioned vertically on the product, causing them to appear as a picket fence. The first bar will enter the scan window first. See par. 4.2.2.

**Pitch**

Rotation of a code pattern about the X-axis. The normal distance between center line or adjacent characters. See pars. 0 and 3.5.

**Position**

The position of a scanner or light source in relation to the target of a receiving element.

**Protocol**

A formal set of conventions governing the formatting and relative timing of message exchange between two communicating systems.

**Raster**

The process of projecting the laser beam at varied angles spaced evenly from each other. Typically, the mirrored rotor surfaces are angled to create multiple scan lines instead of a single beam.

**Resolution**

The narrowest element dimension which can be distinguished by a particular reading device or printed with a particular device or method.

**RS232**

Interface between data terminal equipment and data communication equipment employing serial binary data interchange.

**RS485**

Interface that specifies the electrical characteristics of generators and receivers for use in balanced digital multipoint systems such as on a Multidrop line.

**Scanner**

A device that examines a printed pattern (barcode) and either passes the uninterrupted data to a decoder or decodes the data and passes it onto the Host system.

**Serial Port**

An I/O port used to connect a scanner to your computer, identifiable by a 9-pin or 25-pin connector.

**Signal**

An impulse or fluctuating electrical quantity (i.e.: a voltage or current) the variations of which represent changes in information.

**Skew**

Rotation about the Y-axis. Rotational deviation from correct horizontal and vertical orientation; may apply to single character, line or entire encoded item. See pars. 0 and 3.5.

**Step-Ladder Orientation**

When the barcode's bars are positioned horizontally on the product, causing them to appear as a ladder. The ends of all bars will enter the scan window first. See par. 4.1.

**Symbol**

A combination of characters including start/stop and checksum characters, as required, that form a complete scannable barcode.

**Tilt**

Rotation around the Z axis. Used to describe the position of the barcode with respect to the laser scan line. See pars. 0 and 3.5.

**Trigger Signal**

A signal, typically provided by a photoelectric sensor or proximity switch, which informs the scanner of the presence of an object within its reading zone.

**UPC**

Acronym for Universal Product Code. The standard barcode type for retail food packaging in the United States.

**Visible Laser Diode**

A light source used in scanners to illuminate the barcode symbol. Generates visible red light at wavelengths between 630 and 680 nm.

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**DS2400N; Laser Scanner**

e tutti i suoi modelli  
and all its models  
et tous ses modèles  
und seine Modelle  
y todos sus modelos

sono conformi alle Direttive del Consiglio Europeo sottoelencate:  
are in conformity with the requirements of the European Council Directives listed below:  
sont conformes aux spécifications des Directives de l'Union Européenne ci-dessous:  
der nachstehend angeführten Direktiven des Europäischen Rats:  
cumple con los requisitos de las Directivas del Consejo Europeo, según la lista siguiente:

<b>89/336/EEC EMC Directive</b>	e	<b>92/31/EEC, 93/68/EEC</b>	emendamenti successivi
	and		further amendments
	et		ses successifs amendements
	und		späteren Abänderungen
	y		successivas enmiendas

Basate sulle legislazioni degli Stati membri in relazione alla compatibilità elettromagnetica ed alla sicurezza dei prodotti.

On the approximation of the laws of Member States relating to electromagnetic compatibility and product safety.

Basée sur la législation des Etats membres relative à la compatibilité électromagnétique et à la sécurité des produits.

Über die Annäherung der Gesetze der Mitgliedsstaaten in bezug auf elektromagnetische Verträglichkeit und Produktsicherheit entsprechen.

Basado en la aproximación de las leyes de los Países Miembros respecto a la compatibilidad electromagnética y las Medidas de seguridad relativas al producto.

---

Questa dichiarazione è basata sulla conformità dei prodotti alle norme seguenti:

This declaration is based upon compliance of the products to the following standards:

Cette déclaration repose sur la conformité des produits aux normes suivantes:

Diese Erklärung basiert darauf, daß das Produkt den folgenden Normen entspricht:

Esta declaración se basa en el cumplimiento de los productos con las siguientes normas:

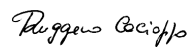
**EN 55022 (Class A ITE), August 1994:**  
**Amendment A1 (Class A ITE), October 2000:**

LIMITS AND METHODS OF MEASUREMENTS OF RADIO DISTURBANCE  
CHARACTERISTICS OF INFORMATION TECHNOLOGY EQUIPMENT

**EN 61000-6-2, October 2001:**

ELECTROMAGNETIC COMPATIBILITY (EMC)  
PART 6-2: GENERIC STANDARDS - IMMUNITY FOR INDUSTRIAL  
ENVIRONMENTS

Lippo di Calderara, March 1st, 2007



Ruggero Cacioppo  
Quality Assurance Supervisor