



# Matrix-I000™

## Reference Manual





# **Matrix-1000™**

## **REFERENCE MANUAL**





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Matrix-1000™ Reference Manual

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## REFERENCES

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### CONVENTIONS

This manual uses the following conventions:

"User" refers to anyone using a Matrix-1000™ reader.

"Reader" refers to the Matrix-1000™ reader.

"You" refers to the System Administrator or Technical Support person using this manual to install, configure, operate, maintain or troubleshoot a Matrix-1000™ reader.

### REFERENCE DOCUMENTATION

For further details refer to: the VisiSet™ Help On Line, Matrix Reading Methods, Matrix Host Mode Programming, Matrix SW Parameter Guide, provided as supplementary documentation on CD-ROM.

### SERVICE, SUPPORT AND WARRANTY

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

- **Datalogic Services - Warranty Extensions and Maintenance Agreements**
- **Downloads - Software Downloads, Manuals and Catalogues**
- **Contact Us - Listing of Datalogic Subsidiaries and Quality Partners**
- **Authorised Repair Centres**

## SAFETY PRECAUTIONS

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

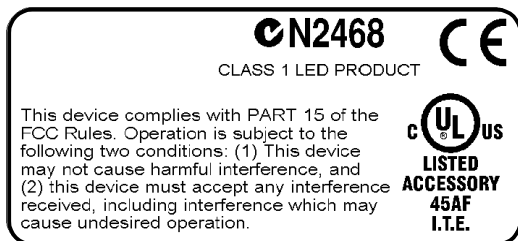
### POWER SUPPLY

ATTENTION: READ THIS INFORMATION BEFORE INSTALLING THE PRODUCT

- This product is intended to be installed by Qualified Personnel only.

This product is intended to be connected to a UL Listed Computer which supplies power directly to the reader or a UL Listed Direct Plug-in Power Unit marked LPS or "Class 2", rated 10 to 30 V, minimum 1 A.

### COMPLIANCE LABEL



TO EN60825-1:2001

# GENERAL VIEW

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## Matrix-1000™

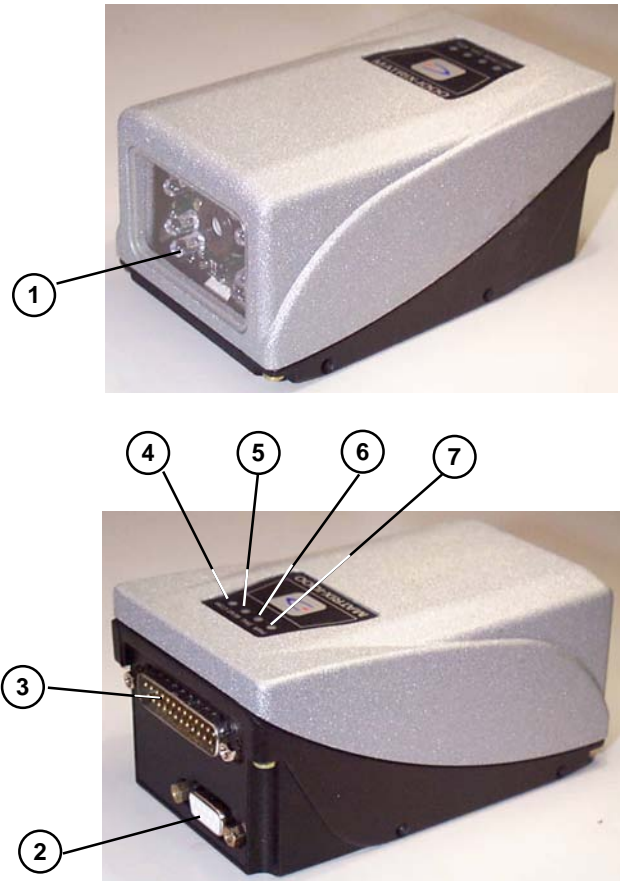


Figure A

- |                            |                        |
|----------------------------|------------------------|
| ① Reading Window           | ⑤ Good Read LED        |
| ② Auxiliary Interface      | ⑥ External Trigger LED |
| ③ Main/Auxiliary Interface | ⑦ Power On LED         |
| ④ Main Tx LED              |                        |

# GUIDE TO INSTALLATION

---

The following can be used as a checklist to verify all of the steps necessary for complete installation of the Matrix-1000™ compact 2D reader.

- 1) Read all information in the section "Safety Precautions" at the beginning of this manual.
- 2) Correctly mount the reader using the bracket provided (sub-pars. under 2.2).
- 3) Position the reader at the correct reading distance according to your model (par. 2.5).
- 4) Make electrical connections to your Matrix-1000™ reader by either:
  - a) Connecting the test cable to the Matrix-1000™ reader (par.2.4).
  - b) Providing correct and complete system cabling according to the signals necessary for the layout of your application.
    - Layout: Point-to-point or Multidrop, etc. (sub-pars: 2.6);
    - Cabling: Power, Main RS485, Auxiliary RS232, External Trigger Input and Output (sub-pars. under 2.3).
- 5) Configure the Matrix-1000™ reader by installing and running VisiSet™ from the CD-ROM provided onto the configuration PC (pars. 3.1, 3.2, 3.3). See the Rapid Guide to Configuration in the VisiSet™ Help On Line. The main steps are:
  - a) Select the codes to be read
  - b) Set-up the communication parameters
  - c) Define data formatting parameters
  - d) Fine tune your Matrix-1000™ reader using the VisiSet™ Calibration Tool (par. 3.4.2).

Specific VisiSet™ parameter details are also available in the Help On Line.

- 6) Exit the configuration program and run your application.

The installation is now complete.

# 1 GENERAL FEATURES

---

## 1.1 INTRODUCTION

Matrix-1000™ is an area CCD reader for industrial application using 2D, 1D, stacked and postal codes.

Matrix-1000™ uses imaging technology and provides complete reading system functions by integrating: lighting system, image acquisition, image processing, decoding and communication into a single compact unit.

This technology intrinsically provides omni-directional reading.

### **Standard Application Program**

A Standard Application Program is factory-loaded onto Matrix-1000™. This program controls code reading, data formatting, serial port, and many other operating and control parameters. It is completely user configurable from a Laptop or PC using the dedicated configuration software named VisiSet™ provided on CD-ROM with the reader.

There are different programmable operating modes to suit various code reading system requirements.

A Calibration Tool is provided to verify the exact positioning of the reader and to maximize its reading performance.

### **Programmability**

If your requirements are not met by the Standard Application Program, Custom Application Programs can be requested at your local Datalogic distributor.

## 1.2 DESCRIPTION

Some of the main features of this reader are given below:

- Decoding of most popular linear and stacked barcodes, 2D code symbologies and postal codes
- Omni-directional reading
- Frame rate up to 30 frames/sec (1800 frames/min)
- Moving code reading
- Calibration Tool to verify exact code positioning in the Field of View and to maximize the reading performance
- Parameter configuration via Windows-based VisiSet™ software
- Different operating modes to suit various application requirements
- User-defined database of acquisition recipes (parameter sets)
- Verifier option with a user-defined match code database
- Diagnostic software tools
- 2 serial communication interfaces
- General purpose optocoupled I/Os
- Supply voltage ranges from 10 to 30 Vdc

The reader is contained in a magnesium alloy housing; the mechanical dimensions are 121 x 73 x 57 mm and it weighs about 330 g.

The protection class of the enclosure is IP64; therefore the reader is particularly suitable for industrial environments where protection against harsh external conditions is required.

Electrical connection of Power, serial interfaces and I/O signals is provided through a 25-pin connector (see Figure A, 3). In addition there is a 9-pin Auxiliary interface connector for reader configuration (see Figure A, 2).

The following indicators are located on the top of the reader:

<b>PWR</b>	red LED indicates that the reader is connected to the power supply (see Figure A, 7);
<b>TRIG</b>	yellow LED indicates external trigger activity (Figure A, 6); for details refer to par 2.3.4;
<b>READ</b>	red LED signals successful code decoding (Figure A, 5). It is also used to signal successful startup. At power on this LED turns on and after a few seconds turns off. If the startup is not successful, this LED remains on.
<b>COM</b>	green LED indicates data transmission on the main serial interface (Figure A, 4).

### 1.3 MODEL DESCRIPTION

The Matrix-1000™ reader is available in different versions according to the Optical Characteristics.

#### MATRIX - 10X1



##### Optics

- 2 = High Density (HD)
- 3 = Standard Density (SD)
- 4 = Low Density (LD)
- 5 = Medium Range (MR)

### 1.4 AVAILABLE ACCESSORIES

Order no.	Accessory	Description
93A051190	CAB-6001	cable to C-BOX100 1 m
93A051200	CAB-6002	cable to C-BOX100 2 m
93A051210	CAB-6005	cable to C-BOX100 5 m
93ACC1510	C-BOX 100	passive connection box
93A301000	C-BOX 300	Connection box PROFIBUS
93A301030	C-BOX 310	Connection box PROFIBUS with display
93A301010	C-BOX 400	Connection box DeviceNet
93A301040	C-BOX 410	Connection box DeviceNet with display
93ACC1718	PG6002	AC/DC power supply unit (US)
93ACC1719	PG6001	AC/DC power supply unit (UK)
93ACC1720	PG6000	AC/DC power supply unit (EU)
93A201090	GFC-MATRIX-1000	90° deflection mirror

## 1.5 APPLICATION EXAMPLES

The Matrix-1000™ wide choice of fields of view and high performance of decoding libraries allow the reading of many small codes (see 96 vial application in Figure 1) as well as deformed and / or overprinted codes also when they are damaged or printed on high reflective surfaces (see Figures 2, 3, 4).



**Figure 1 - 96-vial Rack with DataMatrix Codes to Track Each Vial Throughout its Biomedical Analysis Process**



**Figure 2 - Unidose Flow-Pack with PDF417 Code**



**Figure 3 - Overprinted Barcode Readable by Matrix-1000™ also Through the Envelope Window Film**



**Figure 4 - Barcode Printed on Curved Surface Readable by Matrix-1000™ in spite of Image Optical Distortion**

The Matrix-1000™ is particularly suitable for applications requiring an array of readers to cover a very large reading area (see Figure 5).



**Figure 5 - Ten readers connected to a Datalogic MX4000 through a multidrop network.**

## 2 INSTALLATION

### 2.1 PACKAGE CONTENTS

Verify that the Matrix-1000™ reader and all the parts supplied with the equipment are present and intact when opening the packaging; the list of parts includes:

- ☐ Matrix-1000™ reader
- ☐ Quick Reference Guide
- ☐ Test chart
- ☐ Matrix family CD-ROM
- ☐ Auxiliary port connector cover
- ☐ Mounting kit
  - Mounting screws and washers (4 ea.)
  - Mounting bracket



**Figure 6 - Package Contents**

## 2.2 MECHANICAL INSTALLATION

Matrix-1000™ can be installed to operate in different positions. The eight screw holes (M4 x 5) on the body of the reader are for mechanical fixture (Figure 7).

The diagram below gives the overall dimensions of the reader and may be used for its installation.

Refer to paragraph 2.5 for correct positioning.

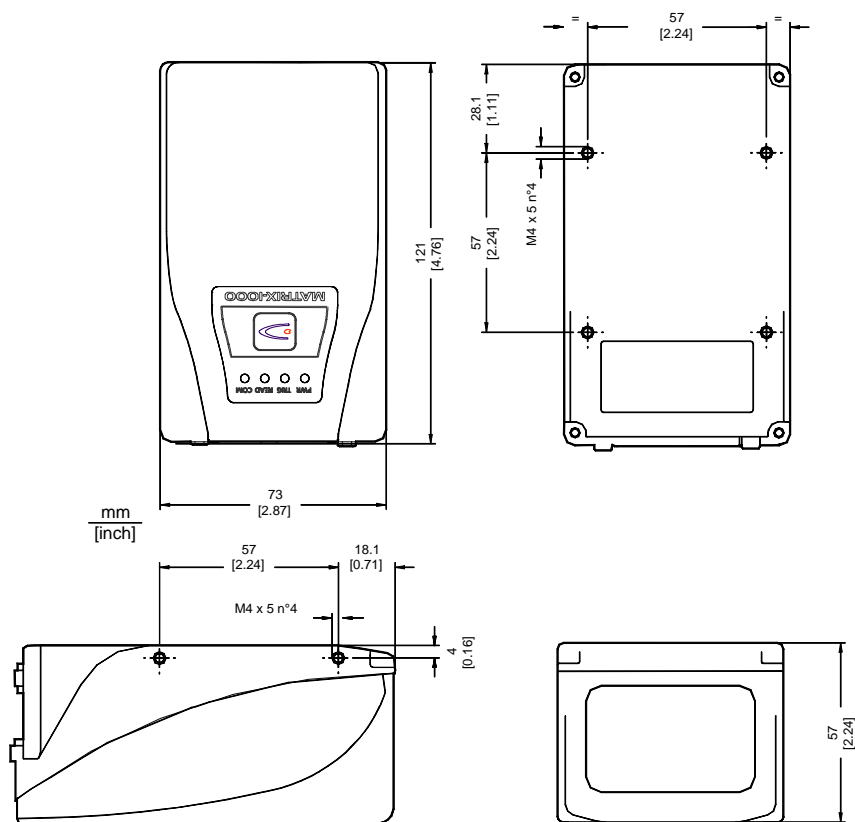


Figure 7 - Overall Dimensions

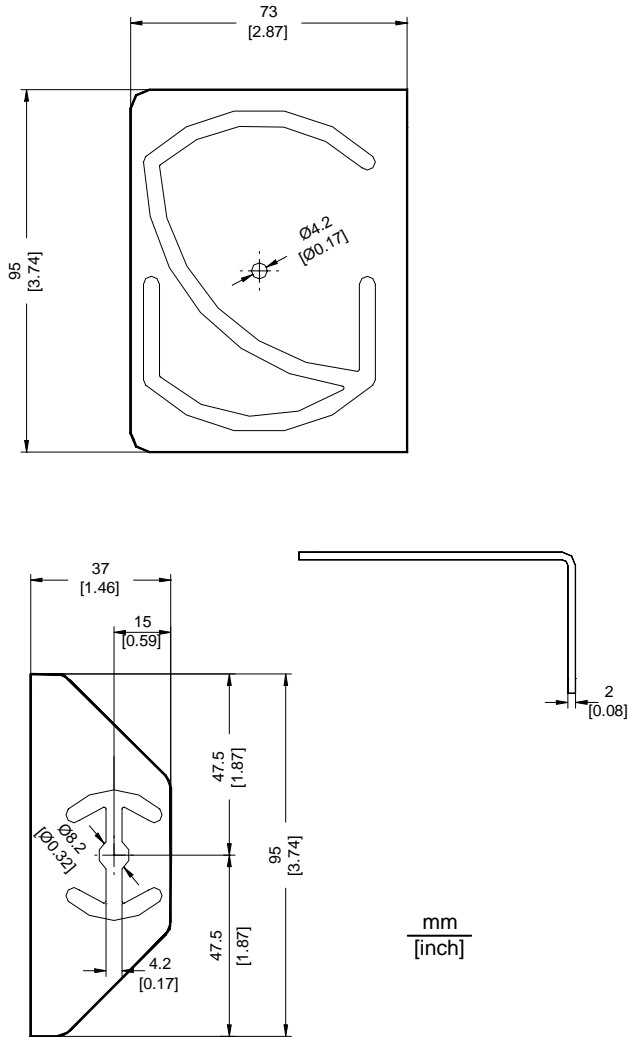
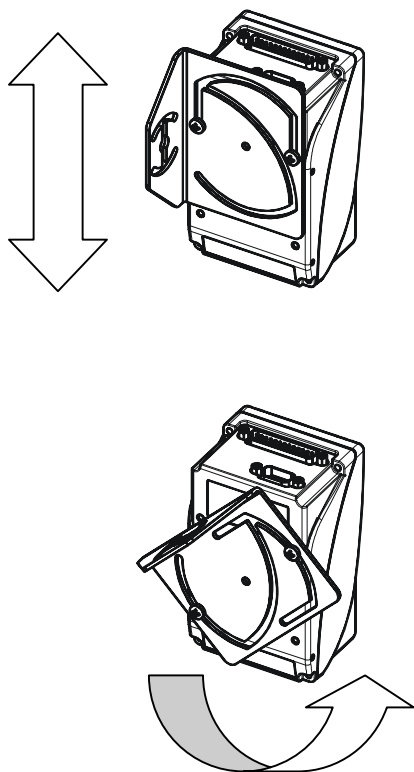


Figure 8 - Mounting Bracket Dimensions

### 2.2.1 Mounting Matrix-1000™

Using the Matrix-1000™ mounting bracket you can obtain vertical shift and rotation of the reader as shown in the diagram below:



**Figure 9 - Positioning with Mounting Brackets**

## 2.3 ELECTRICAL CONNECTIONS

The Matrix-1000™ reader is equipped with a 25-pin male 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:

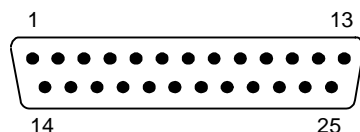


Figure 10 - 25-pin male D-Sub Connector

25-pin male D-sub connector pinout		
Pin	Name	Function
1	SHIELD	Cable shield internally connected by capacitor to the chassis
2	RTX485+	Rx or Tx data of RS485 Half Duplex Main Interface - positive pin
4	RTX485-	Rx or Tx data of RS485 Half Duplex Main Interface - negative pin
7	SGND	Reference GND of RS485 Half Duplex Main Interface
3,5	NC	
20	RXAUX	Received data of RS232 Auxiliary Interface (referred to GND)
21	TXAUX	Transmitted data of RS232 Auxiliary Interface (referred to GND)
8, 22	NC	Not connected
11, 12	NC	Not connected
16	OUT 3 +	Configurable digital output 3 - positive pin
17	OUT 3 -	Configurable digital output 3 - negative pin
18	EXT_TRIG A	External trigger (polarity insensitive)
19	EXT_TRIG B	External trigger (polarity insensitive)
6, 10	NC	Not connected
14, 15, 24	NC	Not connected
9,13	VS	Supply voltage - positive pin
23, 25	GND	Supply voltage - negative pin

There is also a separate 9-pin female D-sub connector for the Auxiliary port connection with the following pinout:

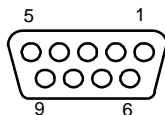


Figure 11 - 9-pin female D-Sub Connector

9-pin female D-sub connector pinout		
Pin	Name	Function
2	TXAUX	Transmitted data of RS232 Auxiliary Interface
3	RXAUX	Received data of RS232 Auxiliary Interface
5	GND	Reference GND of RS232 Auxiliary Interface
1,4,6,7,8,9	N.C.	Not connected



**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.*

In order to meet EMC requirements:

- connect the reader chassis to the plant earth ground by means of a flat copper braid shorter than 100 mm;
- connect the main interface cable shield to pin 1 of the 25-pin connector;
- use two clip-on ferrite sleeves (type Stewart 28A2029-0A0 or equivalent) on the main interface cable near the reader 25-pin connector.

**C-BOX pinout for Matrix-1000™**

The table below gives the pinout of the C-BOX 100 terminal block connectors. Use this pinout when the Matrix-1000™ reader is connected 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, 30	NC
31, 33	NC
32, 34	NC
36	NC
<b>Outputs</b>	
21, 22	NC
23, 24	NC
25	OUT 3+
26	OUT 3-
<b>Auxiliary Interface</b>	
35	TX AUX
37	RX AUX
38, 39	GND
<b>Main Interface</b>	
<b>RS485 Half-Duplex</b>	
11, 15	RTX485+
12, 16	RTX485-
17	NC
18	NC
10, 14, 19	SGND
9, 13	RS485 Cable Shield

### 2.3.1 Power Supply

Power is supplied to the reader through the pins provided on the 25-pin connector (see Figure 12):

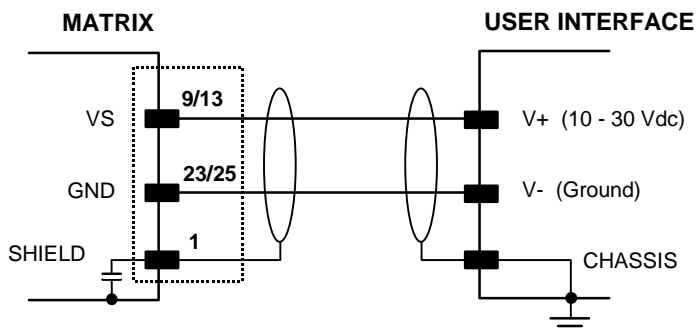


Figure 12 - Power Supply Connection

The allowed supply voltage range is 10 to 30 Vdc.

### 2.3.2 RS485 Half-Duplex Main Interface

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

It can be used for multidrop connections with a Datalogic Multiplexer, (see Figure 13 and par. 2.6.2).

The following pins of the 25-pin connector are used for RS485 half-duplex communication:

Pin	Name	Function
2	RTX485+	Transmitted/received data (+)
4	RTX485-	Transmitted/received data (-)
7	SGND*	Main reference ground

\*SGND is internally connected to the GND through a filtering circuit.

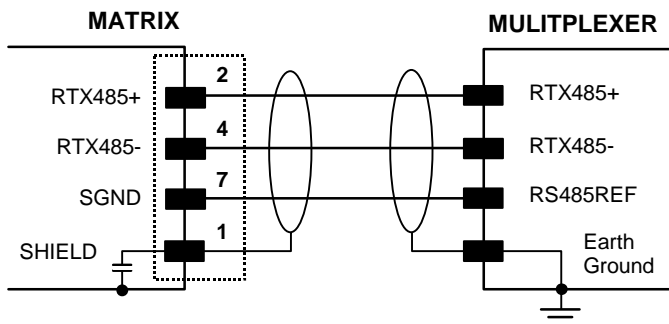


Figure 13 - RS485 Half-duplex Connections

The figure below shows a multidrop configuration with Matrix-1000™ readers connected to a Multiplexer.

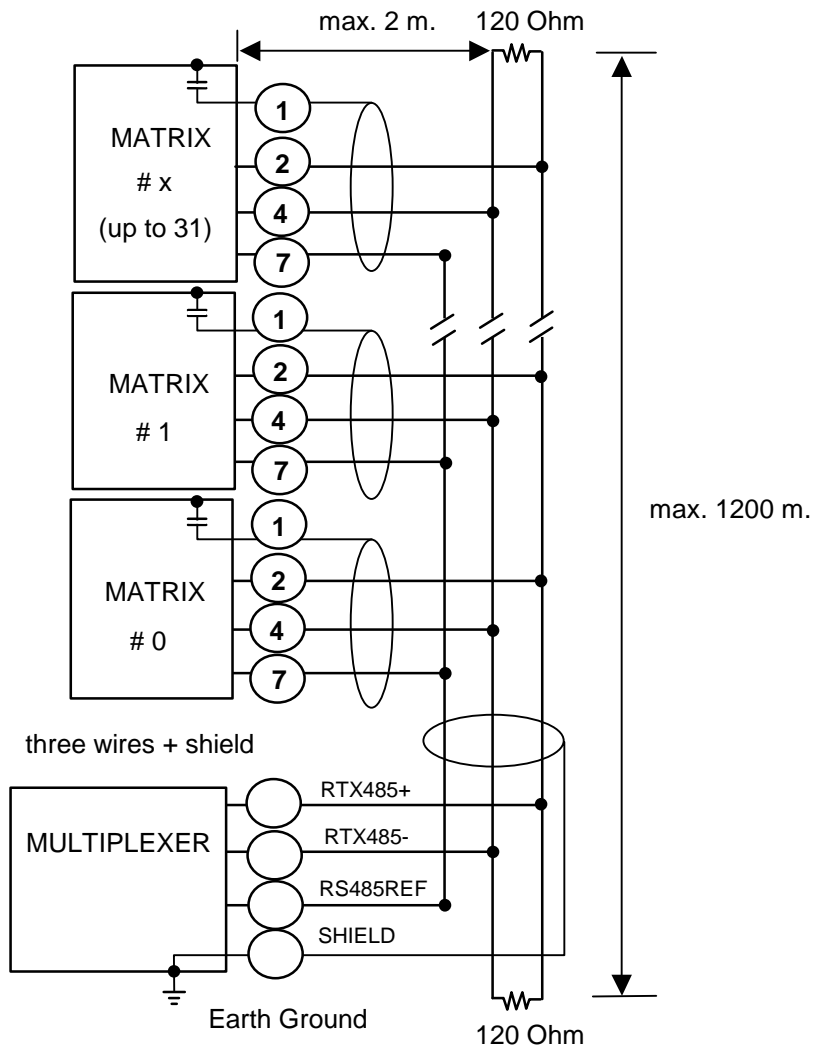


Figure 14 - Matrix-1000™ Multidrop Connection to a Multiplexer

### 2.3.3 Auxiliary RS232 Interface

The RS232 auxiliary interface is available for Point-to-Point connections. When it is connected to the host computer it allows both transmission of code data and reader configuration by VisiSet™.

***Its communication parameters (baud rate, data bits, etc.) can be defined by the user. For more details refer to the "Communication" folder in the VisiSet™ Help On Line.***

The RS232 interface is available on both Matrix-1000™ D-sub connectors with the following pinouts:

9-Pin	25-Pin	Name	Function
2	21	TXAUX	Transmitted data
3	20	RXAUX	Received data
5	23	GND	Ground

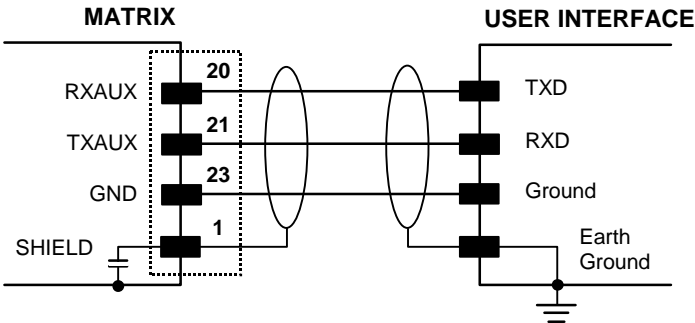


Figure 15 - RS232 Interface Connections Using 25-pin Connector

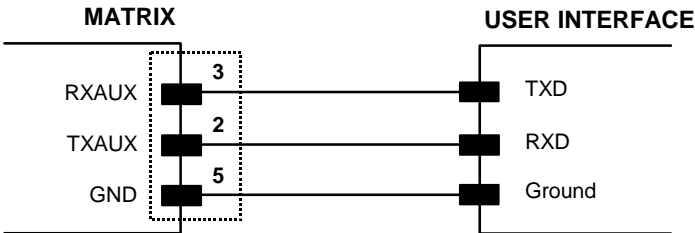


Figure 16 - RS232 Interface Connections Using 9-pin Connector

When the auxiliary interface is permanently connected as part of the system cabling, it is recommended to use the 25-pin connector and connect the cable shield as shown in Figure 15.

**CAUTION**

*Avoid simultaneous connection to 25-pin and 9-pin signals of the auxiliary RS232 interface.*

### 2.3.4 Input

An opto-coupled and polarity insensitive input is available on the 25-pin connector. The pinout is the following:

Pin	Name	Function
18	EXT_TRIG A	External trigger (polarity insensitive)
19	EXT_TRIG B	External trigger (polarity insensitive)

When current flows through the EXT\_TRIG input, the yellow LED (Figure A, 6) is on.

The External Trigger can be used in One Shot Mode or in Phase Mode. Its main functions are:

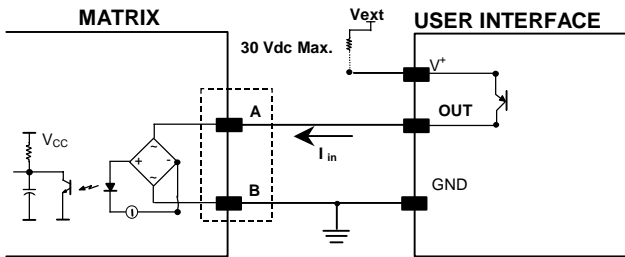
- acquisition trigger in One Shot Mode
- phase-ON/phase-OFF command in Phase Mode
- match code storage command.

This input can be driven by either a PNP or NPN type command. The connections are indicated in the following diagrams:



**NOTE**

*Polarity insensitive input assure full functionality even if pins A and B are exchanged.*



**Figure 17 - Input PNP Command Using External Power**

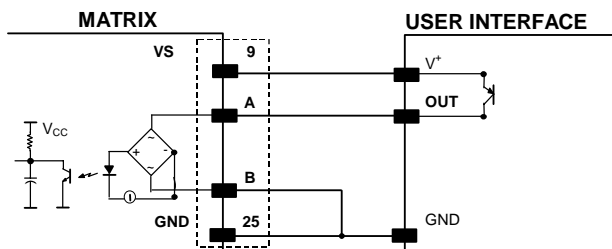


Figure 18 - Input PNP Command Using Matrix-1000™ Power

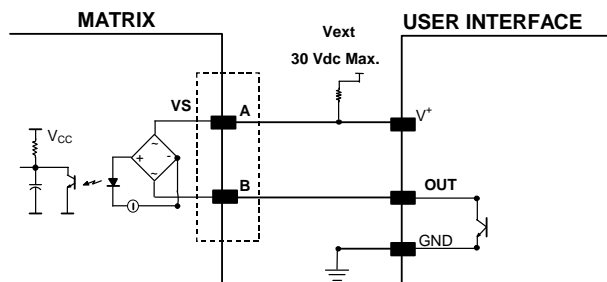


Figure 19 - Input NPN Command Using External Power

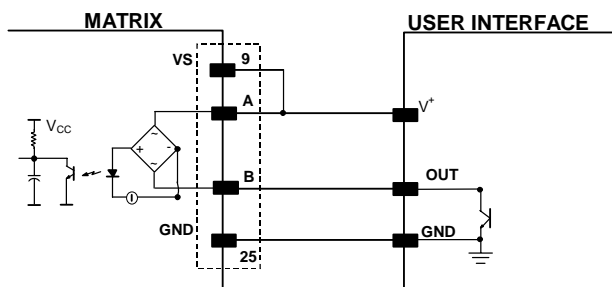


Figure 20 - Input NPN Command Using Matrix-1000™ Power

The electrical features of the input are:

INPUT	$ V_{AB} $ Min.	$ V_{AB} $ Max.	$I_{IN}$ Max.
Open	0 V	2 V	0 mA
Closed	4.5 V	30 V	10 mA

An anti-disturbance filter (debouncing) is implemented on the input, and is software programmable. The input active state can be defined by the user as well. Refer to the digital I/O folder in the VisiSet™ Help On Line for further details.

### 2.3.5 Outputs

One optocoupled general purpose output is available on the 25-pin connector. The pinout is the following:

Pin	Name	Function
16	OUT3+	Configurable digital output 3 - positive pin
17	OUT3-	Configurable digital output 3 - negative pin

It is typically used to signal the data collection result. It can also be used to control an external lighting system

The idle state, the activation/deactivation events and the other configuration parameters can be defined by the user. Refer to the Digital I/O folder in the VisiSet™ Help On Line for further details.

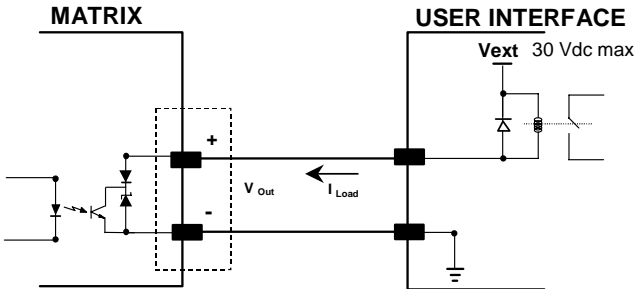


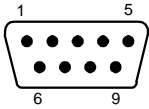
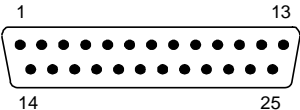
Figure 21 - Open Collector Output Connection

The electrical features of the output are the following:

OUTPUT	$I_{Load}$	$V_{Out}$
Open	0 mA	30 Vdc Max
Closed	10 mA	1.8 Vdc Max

$$P_D = V_{Out} \times I_{oLoad} = 170 \text{ mW Max.}$$

## 2.4 USER INTERFACE

RS232 PC-side connections					
					
9-pin male connector			25-pin male connector		
Pin	Name	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 diagrams show a simple test cable including power, external (push-button) trigger and PC RS232 COM port connections. **Test Cable for Matrix-1000™**

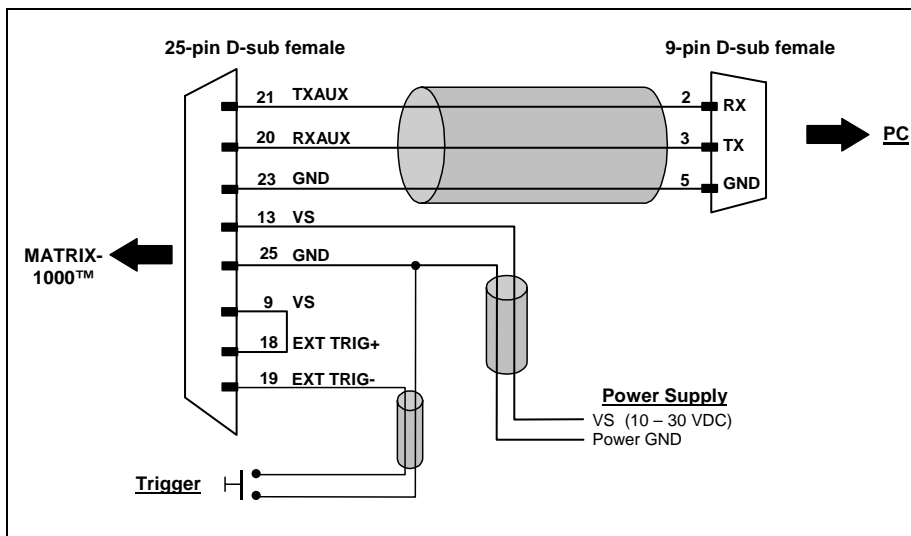
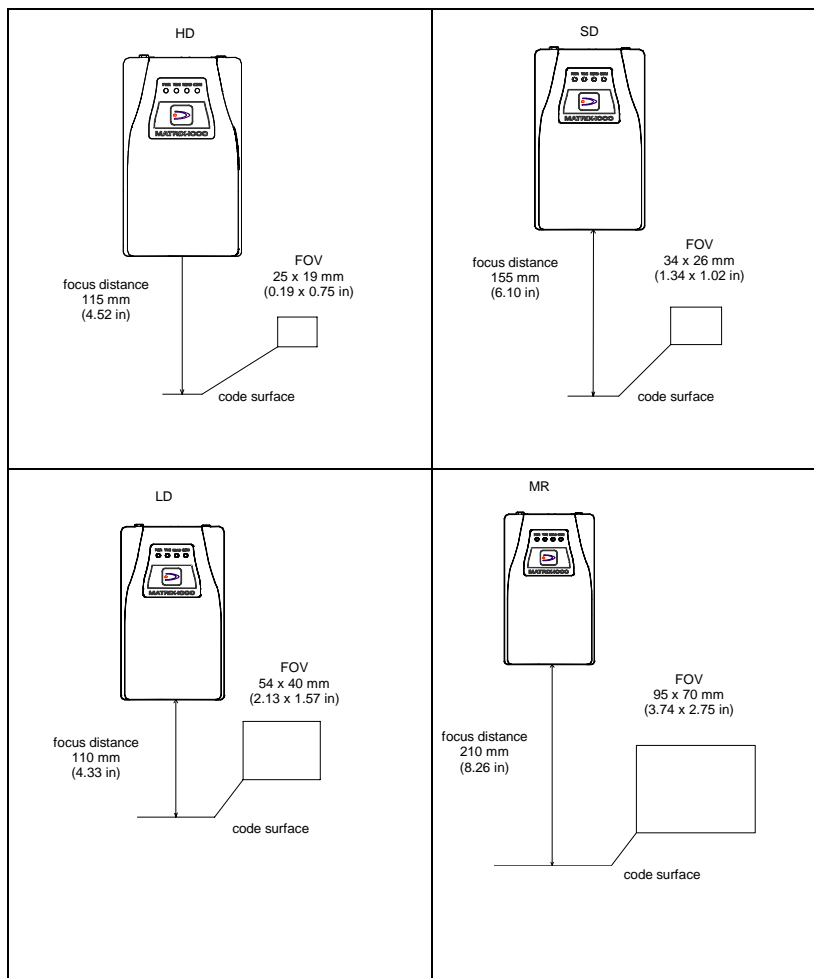


Figure 22- Test Cable

## 2.5 POSITIONING

Position the reader so that the distance from the reading window to the code surface is that indicated in the figure below for your model.



**Figure 23 - Positioning**

Special models with different FOV and focus distance are available on request. Refer to your local Datalogic distributor.

Matrix-1000™ is able to decode code labels at a variety of angles, however significant angular distortion may degrade reading performance.

When mounting Matrix-1000™, take into consideration these **ideal** label position angles: **Pitch 10° to 20° and Tilt 0°**.

**Note:** Since Matrix-1000™ is omni-directional on the code plane, the Pitch and Skew angles have the same significance with respect to the code plane. To simplify therefore, we will use Pitch to describe both these angles.

Follow the suggestions below for the best orientation:

The **Pitch** angles are represented by the values **P** and **S** in Figure 24. Position the reader in order to avoid the direct reflection of the light emitted by the Matrix-1000™ reader; it is advised to **assure at least 10°** for one of these angles. In some cases, such as low contrast or low illumination, it can be useful to use a **Pitch** angle = 0°.

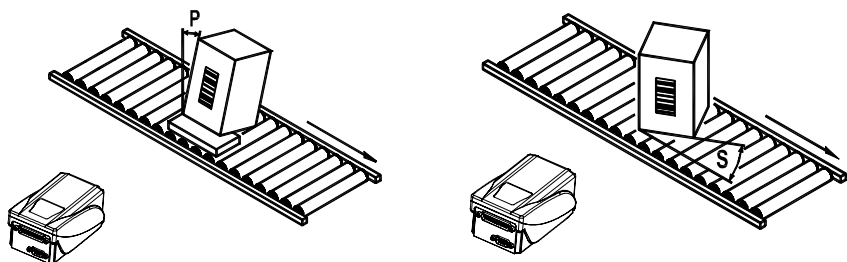


Figure 24 - Pitch angles

The **Tilt** angle is represented by the value **T** in Figure 25. Matrix-1000™ can read labels with any tilt angle.

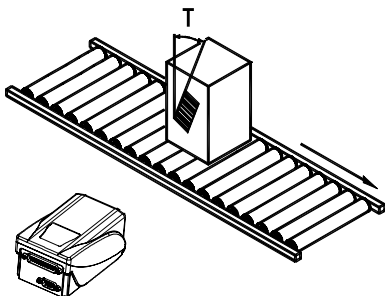


Figure 25 - Tilt angle

## 2.6 TYPICAL LAYOUTS

The following typical layouts refer to system hardware configurations. However, they also require the correct setup of the software configuration parameters. Dotted lines in the figures refer to optional hardware configurations within the particular layout.

### 2.6.1 Point-to-Point

In this layout the data is transmitted to the Host on the Matrix-1000™ aux serial interface.

Parameter configuration can always be accomplished using the Matrix-1000™ auxiliary interface.

*When either Phase Mode or One Shot operating mode are used, the reader can be activated by an external event (for example a pulse from a photoelectric sensor) when the object enters its reading zone.*

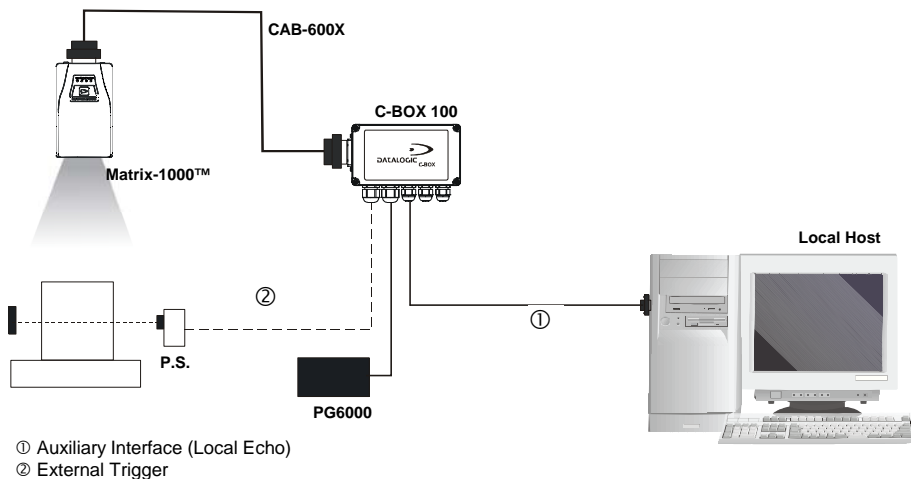
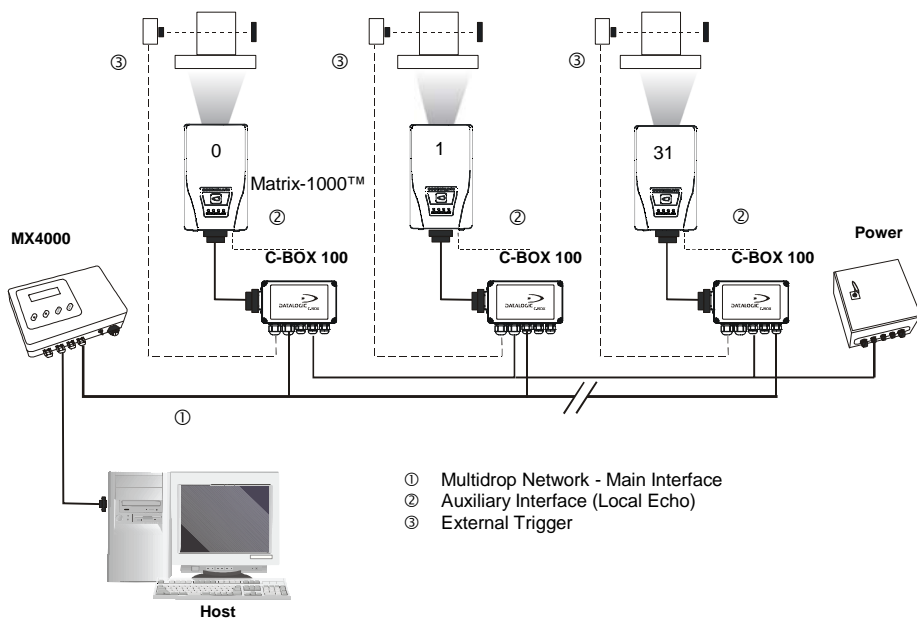


Figure 26 - Point-to-Point Layout

## 2.6.2 Multiplexer

Each reader is connected to a MX4000 through a multidrop network. Before proceeding with the connection it is necessary to select the MUX32 communication protocol and the multidrop address for each reader.



**Figure 27 - Multiplexer Layout**

*The Aux serial interface of each reader can be used for configuration purposes, using VisiSet™, or in Local Echo communication mode to control the single device operation.*

## 3 SOFTWARE CONFIGURATION

---

Software configuration of your Matrix-1000™ reader can be accomplished by VisiSet™ through the Matrix-1000™ auxiliary serial interface.

### 3.1 VISISET™ SYSTEM REQUIREMENTS

To install and run VisiSet™ you should have a Laptop or PC that meets or exceeds the following:

- Pentium processor
- Win 95/98/2000, NT 4.0 or XP
- 32 MB Ram
- 5 MB free HD space
- one free RS232 serial port with 115 Kbaud
- SVGA board (800x600) or better using more than 256 colors

### 3.2 INSTALLING VISISET™

To install VisiSet™, proceed as follows:

1. Turn on the Laptop or PC that will be used for configuration (connected to the Matrix-1000 auxiliary port).
2. After Windows finishes booting, insert the CD-ROM provided.
3. Launch VisiSet™ installation by clicking **Install VisiSet™**.
4. Follow the instructions in the installation procedure.

### 3.3 STARTUP

After completing the mechanical and electrical connections to Matrix-1000™, you can begin software configuration as follows:

1. Power on the Matrix-1000™ reader. Wait for the reader startup. The system bootstrap requires a few seconds to be completed. The reader automatically enters Run Mode.
2. Run the VisiSet™ program.
3. Press **Connect** on the VisiSet™ menu bar. The PC will automatically connect to the Matrix-1000™ reader.

Upon connection, Matrix-1000™ exits Run Mode and displays the Main Menu on VisiSet™ with all the commands necessary to monitor your reader's performance. You can select these commands using the mouse or by pressing the key corresponding to the letter shown on the button. See Figure 28.

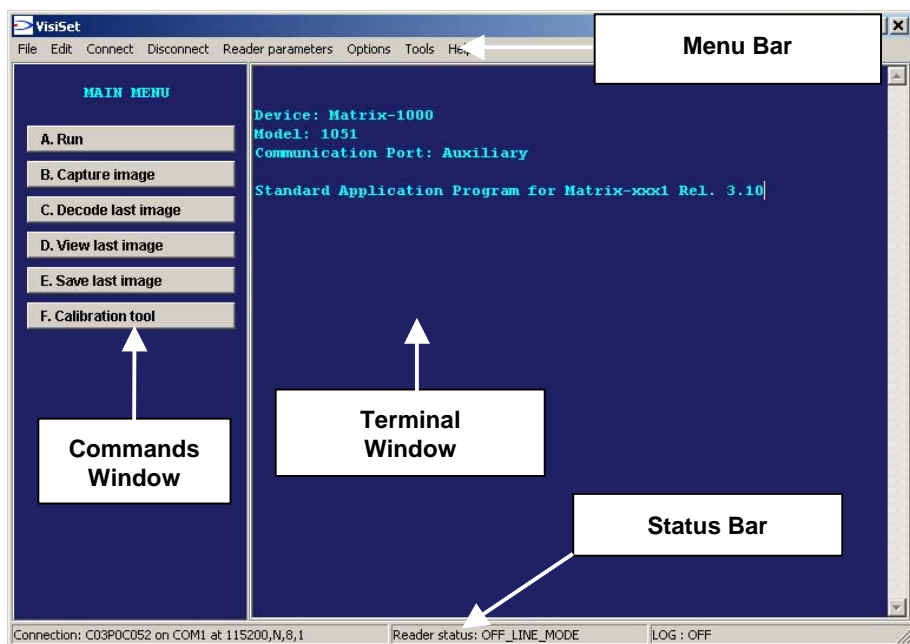


Figure 28 - Main Window

### 3.3.1 VisiSet™ Options

The **Options** item from the VisiSet™ menu (see Figure 28) presents a window allowing you to configure:

- the logging function (**Log**)
- VisiSet™ window properties (**Environment**)
- VisiSet™ serial communication (**Communication**)

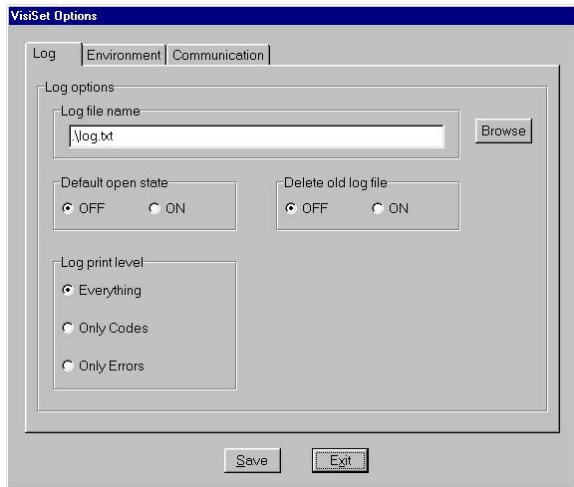
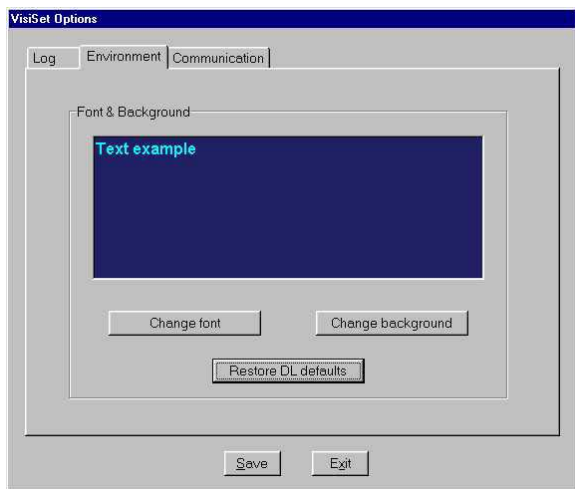
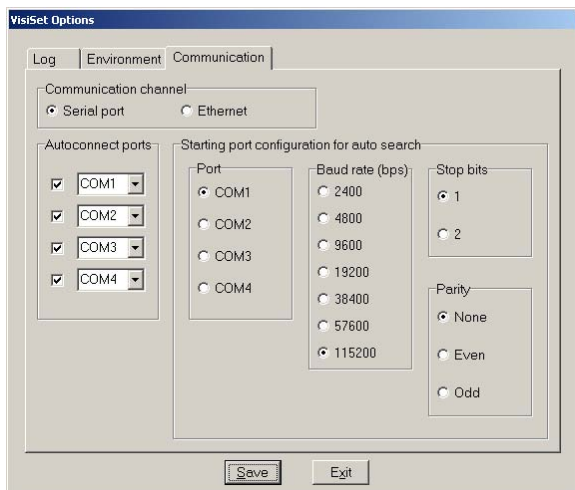


Figure 29 - Options - Log

**Figure 30 - Options - Environment****Figure 31 - Options - Communication**

### 3.4 CONFIGURATION

Once connected to Matrix-1000™ as described in par. 3.3, you can modify the configuration parameters as follows:

1. Press the Calibration Tool button from the Main Menu. Matrix-1000™ will download its permanent memory configuration parameters with the default values (if it is the first time) to VisiSet™. The Calibration Tool window will be displayed together with the Parameter Setup window working in Interactive Mode (see par. 3.4.1 and par. 3.4.2).
2. Edit the Matrix-1000™ configuration parameters according to your application requirements.
3. Use the **Calibration Tool** to fine tune the reading performance. See par. 3.4.2.
4. Close the Calibration Tool window and disable the Interactive Mode by pressing the interactive button.
5. Save the new configuration to the reader permanent memory by pressing the Send button.
6. Close the Parameter Setup window and press **Disconnect** on the VisiSet™ menu bar (see Figure 28) or launch **Run** Mode from the VisiSet™ Main menu.

**Disconnect** exits closing communication between Matrix-1000™ and VisiSet™, and causes Matrix-1000™ to enter Run Mode. The disconnected reader serial port is now available for other purpose.

**Run** command does not close communication between Matrix-1000™ and VisiSet™, and causes Matrix-1000™ to enter Run Mode. In this case the reader output messages are displayed on the VisiSet™ terminal and the statistics are displayed in the Statistics window (Statistics enabled).

### 3.4.1 Edit Reader Parameters

The Parameter Setup window displays the configuration parameters grouped in a series of folders. Each parameter can be modified by selecting a different item from the prescribed list in the box, or by typing new values directly into the parameter box.

By right clicking the mouse when positioned over the name of a specific Parameter or Group, a pop-up menu appears allowing you to directly manage that particular parameter or group.

You can **View the selected value** for each parameter.

You can **Restore the default value** of each parameter or of all the parameters of a group.

**Get properties** gives information about the parameter in the form of a pop-up hint that describes the default value and the range/list of valid values.

The **Short help** gives information about the parameter in the form of a pop-up hint.

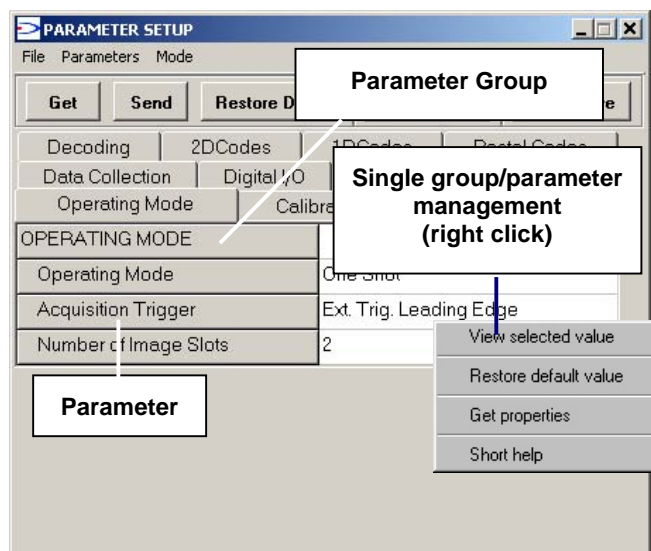


Figure 32 - Editing Parameters

Parameters to verify/modify:

<input type="checkbox"/> Operating mode	<p>Sets the parameters which customize the reader operating mode starting from three main modes:</p> <p>One-shot: acquires a single image based on the selected value for the Acquisition Trigger and Delayed Triggers.</p> <p>Continuous: continuously acquires images with a rate up to 30 frames per second depending on the decoding time.</p> <p>Phase Mode: acquires images during the reading phase depending on the selected value for the Acquisition Trigger and Delayed Triggers. The Phase-ON and Phase-OFF events mark respectively the beginning and end of the reading phase.</p>
<input type="checkbox"/> Calibration	Calibrates the acquisition parameters to maximize the reading performance (see par. 3.4.2)
<input type="checkbox"/> Communication	<p>Configures the parameters relative to each serial port regarding the transmission, message formatting and string receiving.</p> <p>Any change to the VisiSet™ communication port parameters (baud rate, data bits, etc.) is effective as soon as the reader is disconnected from VisiSet™.</p>
<input type="checkbox"/> Decoding	Sets the decoding parameters shared by several code symbologies.
<input type="checkbox"/> 1D & 2D, Postal Codes	Sets the characteristics of the code symbologies to be read.
<input type="checkbox"/> Data Collection	Defines the code-collection parameters and the output message format.
<input type="checkbox"/> Digital I/O	Configures the reader input/output parameters.
<input type="checkbox"/> Verifier	Sets the verifier mode to compare the read code to a user-defined database.
<input type="checkbox"/> Miscellaneous	Sets the reader name and the saved image format.

When all the configuration parameters are set correctly, save them to the Matrix-1000™ reader by pressing the Send button. See Figure 32.

For successive configuration of other readers or for backup/archive copies, it is possible to save the configuration onto your PC by selecting the **Save pars to file** option from the **File** menu.

**Load pars from file** (available in the **File** menu) allows you to configure a reader from a previously saved configuration file.

### 3.4.2 Calibration

VisiSet™ provides a Calibration Tool to maximize the reading performance by tuning the acquisition parameters and the time of the delayed triggers.

By selecting the Calibration Tool from the VisiSet™ Main Menu (F), the following window appears together with the Parameter Setup window:

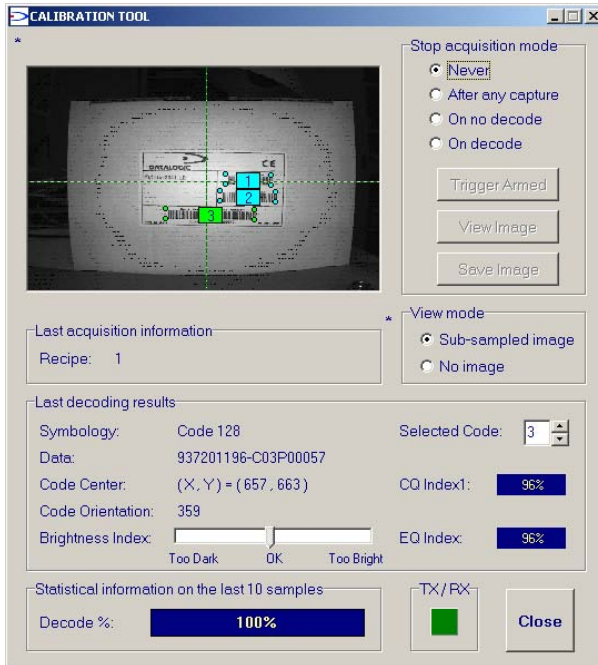


Figure 33 - Calibration OK

This tool provides a "real-time" image display while Matrix-1000™ is reading. It also gives immediate results on the performance of the installed Matrix-1000™ reader.

The Parameter Setup window works in Interactive Mode in order to cause each parameter setting to be immediately effective.



NOTE

*If you want to save the temporary configuration to permanent memory, you must first close the Calibration Tool window. Then, you must disable the Interactive Mode and select the **Permanent Memory** option from the **Send pars to reader** item in the Parameter menu.*

The following examples show some of the typical conditions occurring during the installation:

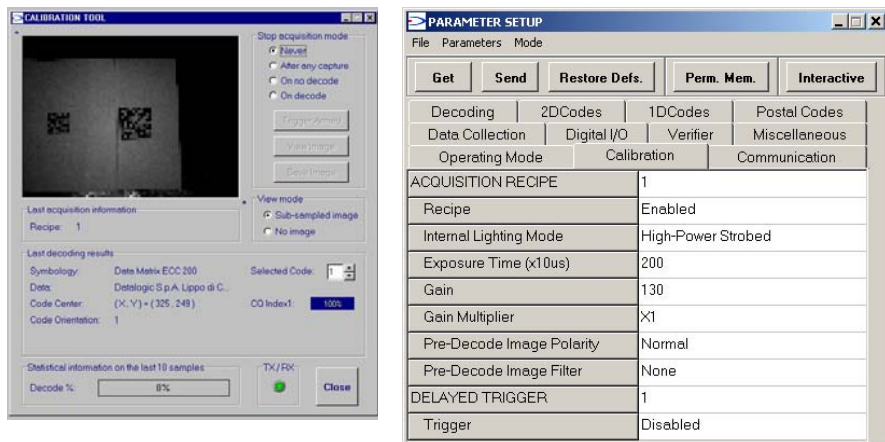


Figure 34 - Example Under Exposure: Too Dark

### Under-exposure:

To correct this result it is recommended to change the following parameters in their order of appearance:

1. increase the **Exposure Time (x 10  $\mu$ s)**
2. increase the **Gain**



### NOTE

*In general, a longer exposure time corresponds to a lighter image but is susceptible to blurring due to code movement. Exposure time is also limited by the Internal Lighting mode parameter. **Longer exposure times can be set if the power strobe level is lowered.***

*High gain settings may produce a grainy image that may affect the decoding process.*

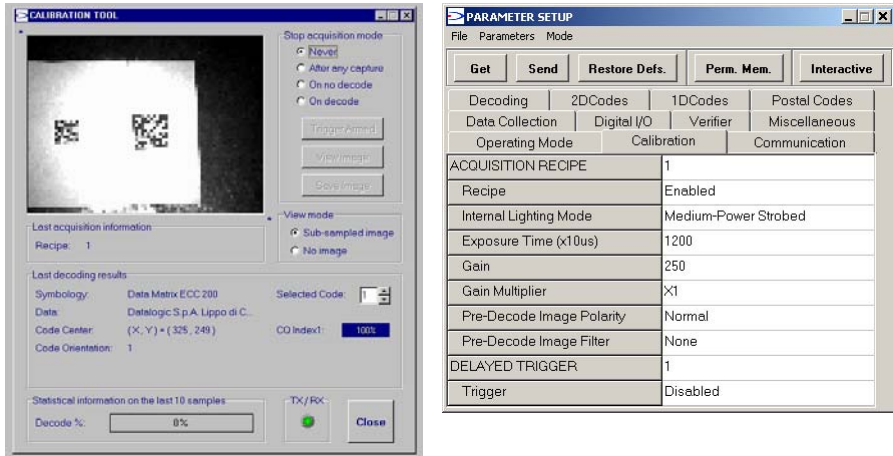


Figure 35 - Example Over Exposure: Too Light

### Over-exposure:

To correct this result it is recommended to change the following parameters in their order of appearance:

1. decrease the **Gain**
2. decrease the **Exposure Time (x 10  $\mu$ s)**

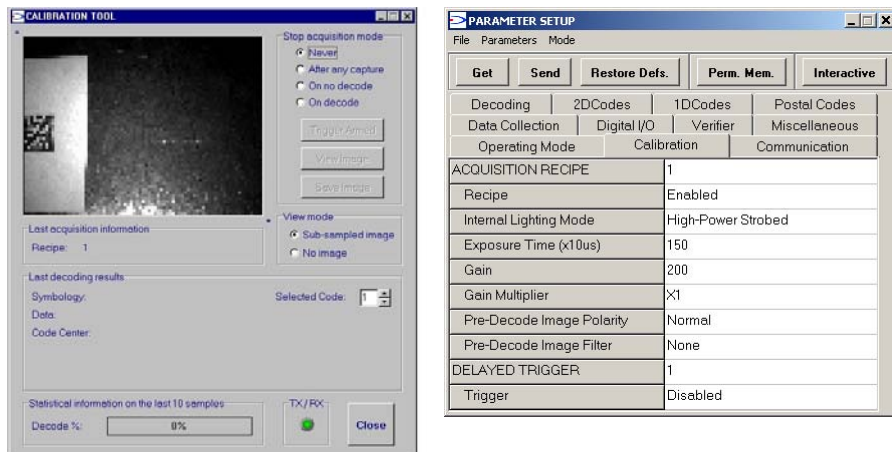


Figure 36 - Example out of FOV

### Moving code out of the Field of View:

To correct this result and have the code completely visible in the F.O.V., it is possible to follow one or both the procedures listed below:

- reposition the reader
- use the **Delayed Trigger** by tuning the **Delay Time (x 100  $\mu$ s)**

### 3.5 IMAGE CAPTURE AND DECODING

By using the **Capture image** and **Decode last image** functions from the VisiSet™ Main menu, you can get information about the image decodable codes in terms of Symbology, encoded Data, Position and Orientation, Decode Time and AIM Quality Indicators.

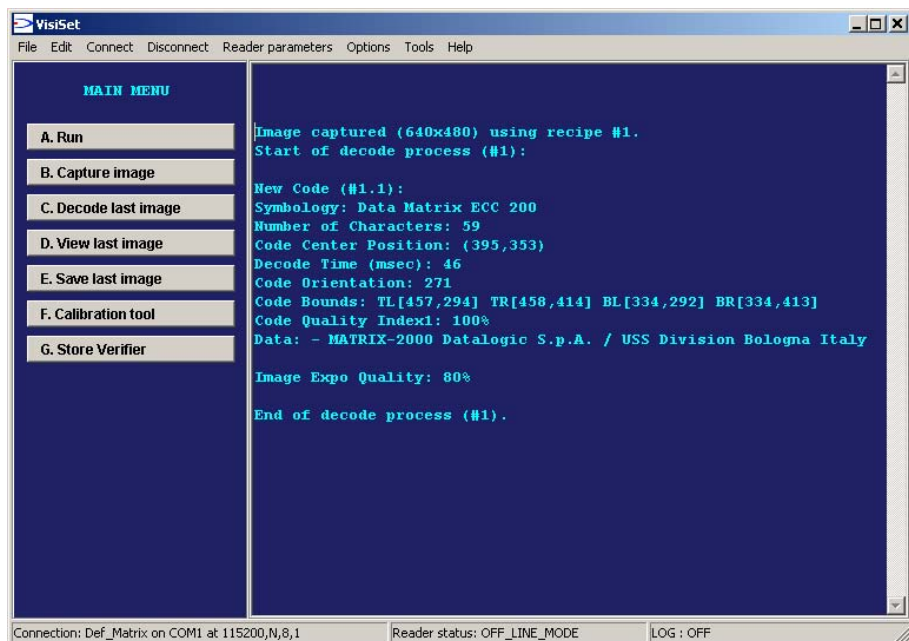


Figure 37 - Capture and Decoding Functions

## 3.6 STATISTICS

Statistics on the reading performance can be viewed by enabling the Statistics parameter and selecting the **View stats** item in the **File** menu. One of three different windows appears depending on the operating mode.

*Refer to the VisiSet™ Help On Line for more details.*

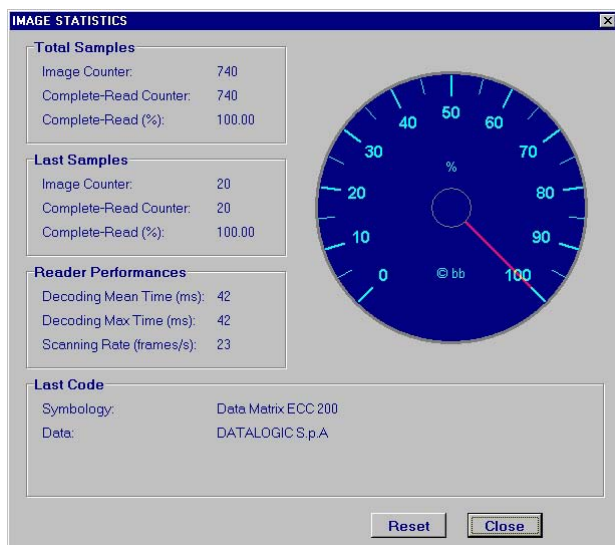


Figure 38 - Code Statistics

## **4 MAINTENANCE**

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### **4.1 CLEANING**

Clean the reading window (see Figure A, 1) 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.

## 5 TROUBLESHOOTING

### 5.1 GENERAL GUIDELINES

- When wiring the device, pay careful attention to the pin number of the signals and whether you are referring to the 25-pin connector or to the C-BOX 100 spring clamp connectors.
- If you need information about a certain reader parameter you can refer to the VisiSet™ program help files. Either connect the device and select the parameter you're interested in by pressing the F1 key, or select **Help/Contents/Matrix Configuration** 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): Application Program version, Parameter Configuration file, Serial Number and Order Number of your reader. You can get this information while VisiSet™ is connected to the reader: the Application Program version is shown in the Terminal Window; the Parameter Configuration can be saved on a .ini file applying the **File/Save pars to file** command in the Parameter Setup window; Serial Number and Order Number can be get applying the respective command in the **Tools** menu.

TROUBLESHOOTING GUIDE	
Problem	Suggestion
<b>Power ON:</b> the "PWR" LED is not lit.	<ul style="list-style-type: none"> <li>• Is power connected?</li> <li>• If using a power adapter (like PG6000), is it connected to wall outlet?</li> <li>• If using rail power, does rail have power?</li> <li>• If using C-BOX 100, does it have power (check switch and LED)?</li> <li>• Check if you are referring to the 25-pin connector or to the C-BOX 100 spring clamp connectors.</li> <li>• Measure Voltage either at pin 13 and pin 25 (for 25-pin connector) or at spring clamp 1 and 2 (for C-BOX 100).</li> </ul>
<b>After Power ON:</b> the "READ" LED is lit or blinking without any code in front of the reader and the connection to VisiSet™ fails.	<ul style="list-style-type: none"> <li>• Contact your local Datalogic office or Datalogic Partner or ARC.</li> </ul>

TROUBLESHOOTING GUIDE	
Problem	Suggestion
<p><b>One Shot or Phase Mode:</b> no image is displayed in VisiSet™ Calibration Tool window while your trigger source is working.</p>	<ul style="list-style-type: none"> <li>• In the Operating Mode folder check the settings of <b>Phase-ON</b>, <b>Acquisition Trigger</b> and <b>Phase-OFF</b> parameters.</li> <li>• In Digital I/O folder set the echo of Phase or Acquisition Trigger on a reader output (if it is available) and in Run Mode check if the reader correctly receives your trigger and repeats it on the output. If this doesn't happen, check the Trigger source cabling.</li> <li>• In the Digital I/O folder check the EXTERNAL TRIGGER\<b>Debouncing</b> parameter setting.</li> <li>• Is the Phase frequency lower than the maximum frame rate?</li> </ul>
<p><b>One Shot or Phase Mode using the External Trigger input:</b> the "TRIG" LED is not blinking while the External Trigger is switching.</p>	<ul style="list-style-type: none"> <li>• Check if you are referring to the 25-pin connector or to the C-BOX 100 spring clamp connectors.</li> <li>• Is the sensor connected to the EXT TRIG input?</li> <li>• Is power supplied to the photo sensor?</li> <li>• For NPN configuration, is power supplied to one of the two EXT TRIG signals (A or B)?</li> <li>• For PNP configuration, is one of the two EXT TRIG signals grounded (A or B)?</li> <li>• Are the photo sensor LEDS (if any) working correctly?</li> <li>• Is the sensor/reflector system aligned (if present)?</li> </ul>
<p><b>One Shot mode using the External Trigger input:</b> the "TRIG" LED is correctly blinking but no image is displayed in VisiSet™ Calibration Tool window.</p>	<ul style="list-style-type: none"> <li>• In the Operating Mode folder check the <b>Acquisition Trigger</b> parameter setting.</li> <li>• In the Digital I/O folder check the EXTERNAL TRIGGER\<b>Debouncing</b> parameter setting.</li> </ul>
<p><b>Phase Mode using the External Trigger input:</b> the "TRIG" LED is correctly blinking but no image is displayed in VisiSet™ Calibration Tool window.</p>	<ul style="list-style-type: none"> <li>• In the Operating Mode folder check the settings of <b>Phase-ON</b>, <b>Acquisition Trigger</b> and <b>Phase-OFF</b> parameters.</li> <li>• In the Digital I/O folder check the EXTERNAL TRIGGER\<b>Debouncing</b> parameter setting.</li> <li>• Is the Phase frequency lower than the maximum frame rate?</li> </ul>

TROUBLESHOOTING GUIDE	
Problem	Suggestion
<b>One Shot or Phase Mode using serial trigger source:</b> no image is displayed in VisiSet™ Calibration Tool window while your trigger source is transmitted on the reader serial port.	<ul style="list-style-type: none"> <li>• In the Operating Mode folder check the settings for <b>Phase-ON</b>, <b>Acquisition Trigger</b> and <b>Phase-OFF</b> parameters.</li> <li>• Are the COM port parameters (<b>Baud Rate</b>, <b>Parity</b>, <b>Data Bits</b>, <b>Stop Bits</b>, <b>Handshake</b>) correctly assigned?</li> <li>• In the communication folder, check the settings of <b>Phase-ON String</b>, <b>Acquisition Trigger String</b> and <b>Phase-OFF String</b> parameters.</li> <li>• Is the serial trigger source correctly connected?</li> </ul>
<b>Phase Mode:</b> no result is transmitted by the reader at the end of the phase collection.	<ul style="list-style-type: none"> <li>• In the Operating Mode folder check the <b>Phase-OFF</b> parameter setting.</li> <li>• In the Data Collection folder check the settings for the COLLECTION, DATA FORMAT and STATISTICS parameter groups.</li> </ul>
<b>Reading:</b> the reader always transmits the <b>No-Read Message</b>	<ul style="list-style-type: none"> <li>• Position the reader as described in par. 2.5 and through the VisiSet™ Calibration Tool:               <ul style="list-style-type: none"> <li>- Tune the DELAYED TRIGGERS, if the moving code is out of the reader field of view;</li> <li>- Set the Continuous Operating Mode if no external trigger source is available;</li> <li>- Tune the ACQUISITION RECIPE to improve the code image quality;</li> <li>- Check the parameter setting in Decoding, 2DCodes, 1DCodes, and Postal Codes folders;</li> <li>- View the full resolution code image to check the printing or marking quality.</li> </ul> </li> </ul>
<b>Communication:</b> reader is not transmitting anything to the host.	<ul style="list-style-type: none"> <li>• Is the serial cable wiring correct?</li> <li>• Are the host serial port settings the same as the reader serial port settings?</li> </ul>
<b>Communication:</b> data transferred to the host are incorrect, corrupted or incomplete.	<ul style="list-style-type: none"> <li>• Are the host serial port settings the same as the reader serial port settings?</li> <li>• In VisiSet™ Communication folder check the settings of <b>Header</b> and <b>Terminator</b> parameters.</li> <li>• In VisiSet™ Data Collection folder, check the settings of DATA FORMAT parameter group.</li> </ul>

TROUBLESHOOTING GUIDE	
Problem	Suggestion
How do I obtain my reader Serial Number?	<ul style="list-style-type: none"><li>• The reader Serial Number consists of 9 characters: one letter, 2 numbers, another letter followed by 5 numbers.</li><li>• The reader Serial Number is printed on a label that is affixed on the bottom case near the reading window.</li><li>• The Serial Number can also be obtained by selecting <b>Tools/Get reader serial number</b> from the command menu in VisiSet™. A dedicated window will appear.</li></ul>
How do I obtain my reader Order Number?	<ul style="list-style-type: none"><li>• The reader Order Number consists of 9 numbers.</li><li>• The reader Order Number can be obtained by selecting the <b>Tools/Get reader order number</b> from the command menu in VisiSet™. A dedicated window will appear.</li></ul>

## 6 TECHNICAL FEATURES

<b>ELECTRICAL FEATURES</b>	
<b>Power</b>	
Supply voltage	10 to 30 Vdc
Power consumption	4 W max.; 2.5 W typical
<b>Communication Interfaces</b>	
Main Serial Interface RS485 half-duplex	2400 to 115200 bit /s
Auxiliary Serial Interface RS232	2400 to 115200 bit /s
<b>Input</b>	
External Trigger	Opto-coupled and polarity insensitive
Max. voltage	30 Vdc
Max. input current	10 mA
<b>Output</b>	
$V_{Out} (I_{Load} = 0 \text{ mA})$	30 Vdc Max.
$V_{Out} (I_{Load} = 10 \text{ mA})$	1.8 Vdc Max.
$P_D = V_{Out} \times I_{Load}$	170 mW Max.
<b>OPTICAL FEATURES</b>	
Image Sensor	Matrix CCD
Image format	VGA (640x480)
Lighting System	LED array
Wavelength	630 ~ 670 nm
Max LED Output Power	0.7 mW
LED Safety class	Class 1 to EN60825-1
<b>USER INTERFACE</b>	
LED indicators	PWR, TRIG, READ, COM

<b>SOFTWARE FEATURES</b>	
<b>READABLE CODE SYMBOLOGIES</b>	
<b>1-D and stacked</b>	
<ul style="list-style-type: none"> <li>PDF417 Standard</li> <li>Code 128 (EAN 128)</li> <li>Code 39 (Standard and Full ASCII)</li> <li>Interleaved 2 of 5</li> </ul>	<ul style="list-style-type: none"> <li>Codabar</li> <li>Code 93</li> <li>EAN-8/13 - UPC-A/E (including Addon 2 and Addon 5)</li> </ul>
<b>2D</b>	
<ul style="list-style-type: none"> <li>Data Matrix ECC 200</li> </ul>	
<b>POSTAL</b>	
<ul style="list-style-type: none"> <li>Australia Post</li> <li>Royal Mail 4 State Customer</li> <li>Kix Code</li> <li>Japan Post</li> </ul>	<ul style="list-style-type: none"> <li>PLANET</li> <li>POSTNET, POSTNET (+BB)</li> <li>POSTNET + PLANET, POSTNET (+BB) + PLANET</li> </ul>
<b>OPERATING MODE</b>	ONE-SHOT, CONTINUOUS, PHASE MODE
<b>CONFIGURATION MODE</b>	By means of VisiSet™ configuration software
<b>PARAMETER STORAGE</b>	Permanent memory (Flash)
<b>ENVIRONMENTAL FEATURES</b>	
Operating temperature	0 to 40 °C (32 to 104 °F)
Storage temperature	-20 to 70 °C (-4 to 158 °F)
Max. humidity	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 30 G; 11 ms; 3 shocks on each axis
Protection class	IP64
<b>MECHANICAL FEATURES</b>	
Dimensions	121 x 73 x 57 mm (4.76 x 2.87 x 2.24 in.)
Weight	330 g. (13.40 oz.)
Material	Magnesium alloy

READING FEATURES							
Frame rate				up to 30 frames / sec			
Pitch				10° - 35°			
Readable codes per frame				up to 100			
Tilt				0° - 360°			
MODELS	Focus Distance mm (in)	Field of View <sup>(1)</sup> mm (in)	ppi <sup>(2)</sup>	Typ. Linear and Stacked Code Resolution mm (mils)	Typ. 2D Code Resolution mm (mils)	Reading Distance <sup>(3)</sup> mm (in)	
						min.	max.
1021 HD	115 (4.52)	25 × 19 (0.98 × 0.75)	653	0.10 (4)	0.19 (7.5)	105 (4.13)	125 (4.92)
1031 SD	155 (6.10)	34 × 26 (1.34 × 1.02)	478	0.15 (6)	0.25 (10)	135 (5.31)	180 (7.08)
1041 LD	110 (4.33)	54 × 40 (2.13 × 1.57)	300	0.20 (8)	0.38 (15)	90 (3.45)	140 (5.51)
1051 MR	210 (8.26)	95 × 70 (3.74 × 2.75)	170	0.30 (12)	0.60 (24)	150 (5.90)	250 (9.84)

<sup>(1)</sup> @ focus distance

<sup>(2)</sup> Pixels per inch @ focus distance

<sup>(3)</sup> Measurement conditions:

- Test chart: provided with the reader
- Still code at the center of the FOV
- Code symbology: Data Matrix ECC 200
- Code resolution: Typ. 2D Code Resolution
- Tilt angle: 45°
- Pitch angle: 15°
- Decode mode: Predictable

# GLOSSARY

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## **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.

## **BIOS**

Basic Input Output System. A collection of ROM-based code with a standard API used to interface with standard PC hardware.

## **Bit**

Binary digit. One bit is the basic unit of binary information. Generally, eight consecutive bits compose one byte of data. The pattern of 0 and 1 values within the byte determines its meaning.

## **Bits per Second (bps)**

Number of bits transmitted or received per second.

## **Byte**

On an addressable boundary, eight adjacent binary digits (0 and 1) combined in a pattern to represent a specific character or numeric value. Bits are numbered from the right, 0 through 7, with bit 0 the low-order bit. One byte in memory can be used to store one ASCII character.

## **Decode**

To recognize a barcode symbology (e.g., Codabar, Code 128, Code 3 of 9, UPC/EAN, etc.) and analyze the content of the barcode scanned.

## **EEPROM**

Electrically Erasable Programmable Read-Only Memory. An on-board non-volatile memory chip.

## **Flash**

Non-volatile memory for storing application and configuration files.

## **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.

**Light Emitting Diode (LED)**

A low power electronic light source commonly used as an indicator light. It uses less power than an incandescent light bulb but more than a Liquid Crystal Display (LCD).

**RAM**

Random Access Memory. Data in RAM can be accessed in random order, and quickly written and read.

**IP Address**

The terminal's network address. Networks use IP addresses to determine where to send data that is being transmitted over a network. An IP address is a 32-bit number referred to as a series of 8-bit numbers in decimal dot notation (e.g., 130.24.34.03). The highest 8-bit number you can use is 254.

**Transmission Control Protocol/Internet Protocol (TCP/IP)**

A suite of standard network protocols that were originally used in UNIX environments but are now used in many others. The TCP governs sequenced data; the IP governs packet forwarding. TCP/IP is the primary protocol that defines the Internet.

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**MATRIX-1XXX**

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>	<b>e</b>	<b>92/31/EEC, 93/68/EEC</b>	emendamenti successivi
	and		further amendments
	et		ses successifs amendements
	und		späteren Abänderungen
	y		sucesivas 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 la siguientes normas:

**EN 55022, August 1994:**

LIMITS AND METHODS OF MEASUREMENTS OF RADIO DISTURBANCE  
CHARACTERISTICS OF INFORMATION TECHNOLOGY EQUIPMENT (ITE)

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

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

Lippo di Calderara, 14/09/2004

Ruggero Cacioppo  
Quality Assurance Supervisor