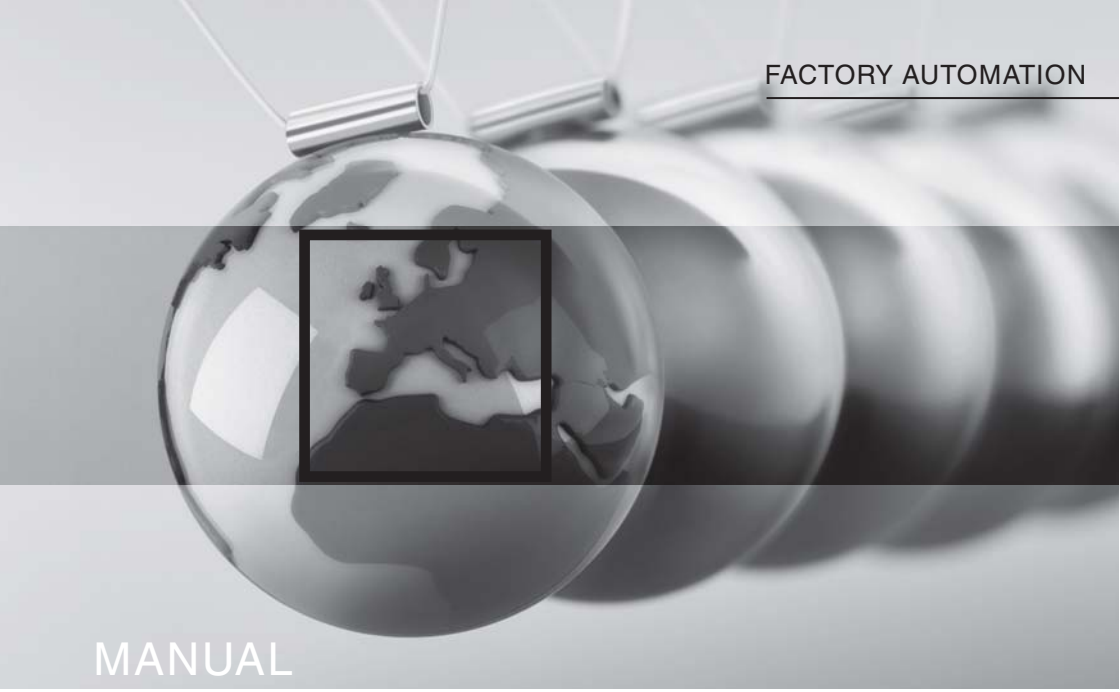

MANUAL

Barcodescanner VB14A (N-Housing)

CE

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With regard to the supply of products, the current issue of the following document is applicable:

The General Terms of Delivery for Products and Services of the Electrical Industry, published by the Central Association of the Electrical Industry (Zentralverband Elektrotechnik und Elektroindustrie (ZVEI) e.V.)

in its most recent version as well as the supplementary clause: "Expanded reservation of proprietorship"

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1 REFERENCES

1.1 Conventions

This manual uses the following conventions:

- "User" or "Operator" refers to anyone using a VB14A.
- "Device" refers to the VB14A.
- "You" refers to the System Administrator or Technical Support person using this manual to install, mount, operate, maintain or troubleshoot a VB14A.

1.2 Reference Documentation

The documentation related to the VB14A is listed below:

- C-BOX 100 Installation Manual
- C-BOX 300 Installation Manual
- VisoSetup Help On Line
- CBX100 Manual

1.3 Service, Support and Warranty

Pepperl+Fuchs provides several services as well as technical support through its website. Log on to www.pepperl-fuchs.com ' Factory automation for further information.

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2 SAFETY REGULATIONS

2.1 Laser Safety

The following information is provided to comply with the rules imposed by international authorities and refers to the correct use of the VB14A scanner.

2.2 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 VisoSetup 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 3.1 (7)).

General notes

Warning labels indicating exposure to laser light and the device classification are applied onto the body of the scanner (figure 3.1).

Warning and device class labels

Disconnect the power supply

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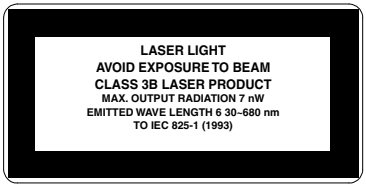
when opening the device during maintenance or installation to avoid exposure to hazardous laser light.

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 product according to CDRH regulations. As it is not possible to apply a classification label on the laser diode used in this device, the following label is reproduced on the right.

Any violation of the optic parts in particular can cause radiation up to the maximum level of the laser diode (7 mW at 630 to 680 nm).

Laser diode class label



2.3 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.

3 GENERAL VIEW

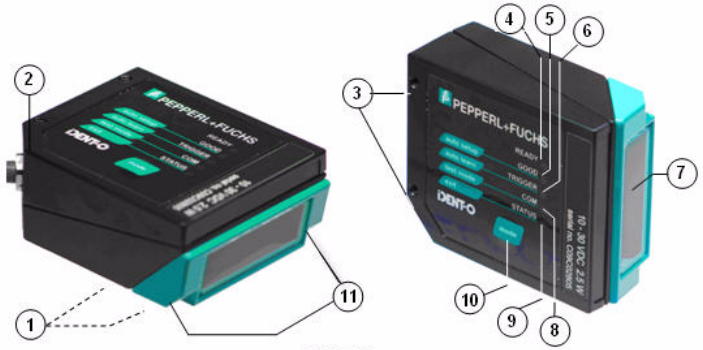


Figure A

1. Warning and Device Class Labels
2. "POWER ON" LED
3. Mounting Holes
4. "READY" LED
5. "GOOD" LED
6. "TRIGGER" LED
7. Laser Beam Output Window
8. "COM" LED
9. "STATUS" LED
10. Push Button (without function)
11. Accessory Mounting Holes

Figure 3.1 VB14A General view

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4 GUIDE TO INSTALLATION

The following can be used as a checklist to verify all of the steps necessary for complete installation of the VB14A scanner.

1. Read all information in the section "Safety Precautions" at the beginning of this manual.
2. Correctly mount the reader using the bracket provided according to the information see Section 6.1.2
3. Position the reader at the correct reading distance according to your model as shown see Section 6.4
4. Make electrical connections to your VB14A scanner by either:

   a) Connecting the test cable to the VB14A scanner as described in figure 6.17

   b) Providing correct and complete system cabling according to the signals necessary for the layout of your application.

- Layout: Point-to-point, RS485 Master/Slave, RS232 Master/Slave, See sub-paragraphs under see section 6.5 for reference.
- "Cabling: Power, Main Serial Interface, Auxiliary Interface (RS232), Inputs, Outputs, etc. For further details, see all sub-paragraphs under section 6.2

5. Configure the VB14A scanner by installing and running the VisoSetup configuration program from the CD- ROM provided. The main steps are:

   •"Select the codes to be read

   •"Set-up the communication parameters

   •"Define data formatting parameters

   •"Fine tune your VB14A scanner using the Test Mode as described in VisoSetup.

Specific parameter details are available in the Help On Line. See also the Guide To Rapid Configuration link.

6. Exit the configuration program and run your application.

The installation is now complete.

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5 INTRODUCTION

5.1 Product description

The VB14A 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 VB14A. 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 VisoSetup utility program provided on CD-ROM with the scanner, or through ESC sequences via the serial interface.
Custom Application Programs	If the Standard Application Program doesn't meet your requirements, please contact your local P+F distributor.

Some of the main features of VB14A are listed below:

- ACB (Advanced Code Builder)
- small dimensions and light weight
- software programmable scanning speed (500 to 1000 scans/sec)
- linear and raster versions
- completely configurable via serial interface (VisoSetup)
- 2 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 VB14A 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.

5.1.1 Indicators

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

READY	LED (red) (figure 3.1 (1)) indicates the reader is connected to the power supply.
GOOD	LED (green) (figure 3.1 (3)) is used to signal the possibility of a successful barcode reading.
TRIGGER	LED (yellow) (figure 3.1 (2)) indicates external trigger activity. Refer to see section 6.2.4.

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COM	LED (yellow) Indicator data transmission
STATUS	LED (red) (figure 3.1 (4)) indicates laser ON state.

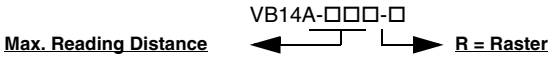
The screw holes on the body of the reader are for mechanical fixture (see section 3.1 (5)).

5.2 Model Description

The VB14A scanner is available in versions that differ in regard to the following parameters:

- Resolution
- Linear or raster models
- Performance

The following models are therefore available:



The following tables display each version's reading performance.

Version Pin	Max Code Resolution mm (mils)	Speed scans/s
VB14A-600 / VB14A-600-R	0.35 (14)	600 to 1000
VB14A-300 / VB14A-300-R	0.20 (8)	500 to 800

Version	Reading Distance
VB14A-600 / VB14A-600-R	190 mm (7.5 in) - 600 mm (23.6 in) on 0.50 mm (20 mils) codes
VB14A-300 / VB14A-300-R	40 mm (1.6 in) - 300 mm (11.8 in) on 0.50mm (20 mils) codes

See reading diagrams see section 7.3 for further details.

5.3 Accessory Installation

The following accessories are available on request for the VB14A:

Name	Description
C-BOX 100	Connection Box
C-BOX 300	Connection Box Profibus
Deflection mirror VB14	Deflection mirror 90°
OM14A	Oscillating mirror
CBX100	Connection Box

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6 INSTALLATION

6.1 Package Contents

Verify that the VB14A reader and all the parts supplied with the equipment are present and intact when opening the packaging; the list of parts includes:

1. VB14 reader with cable
2. Mounting kit: - bracket
   - screws

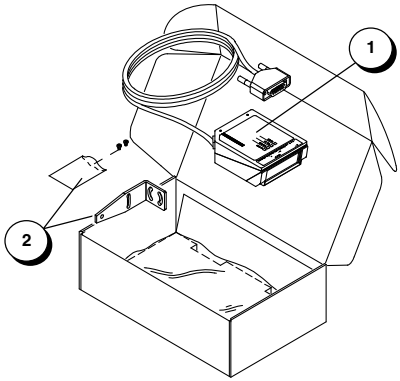

Figure 6.1 VB14A package contents

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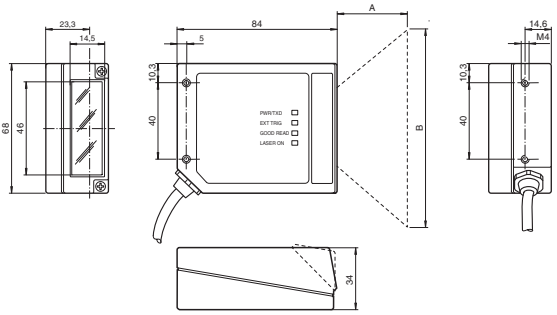
6.1.1 Mechanical Installation

VB14A 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 3.1 (5)). The diagrams below give the overall dimensions of the scanner and mounting bracket and may be used for installation.

see section 6.4 for correct positioning.

VB14A



Mounting bracket

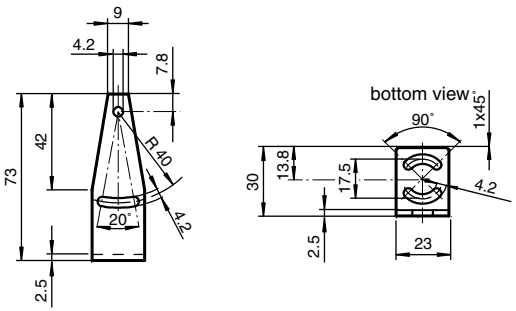


Figure 6.2 Overall dimensions

6.1.2 Mounting VB14A

Using the VB14A mounting bracket you can obtain the most suitable position for the reader as shown in the figure below:

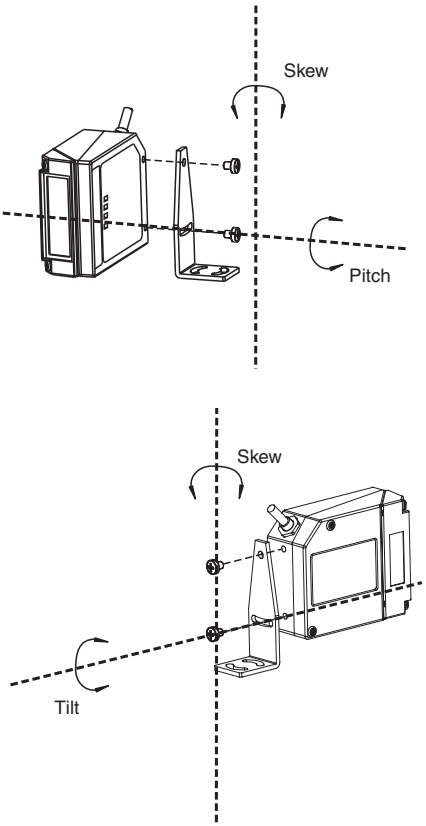


Figure 6.3 Positioning with Mounting Bracket

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6.1.3 Mounting the Scanner with Deflection Mirror

- "The is a 90° deflection mirror

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

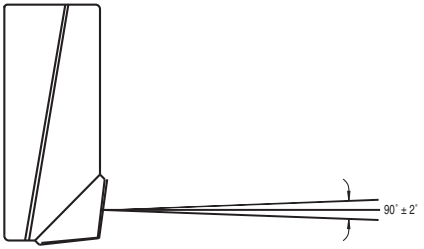

Figure 6.4 Laser Beam Output Position

The installation of the deflection mirror is very easy

Warning

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 VB14A 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 VB14A body.

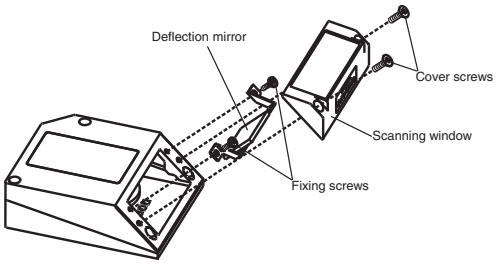

Figure 6.5 Installation of the Deflection Mirror

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6.2 Electrical Connections

The VB14A models are equipped with a cable terminated by a 25-pin male D-sub connector for connection to the power supply and input/output signals.

Warning

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 V DC.

The details of the connector pins are indicated in the following table:

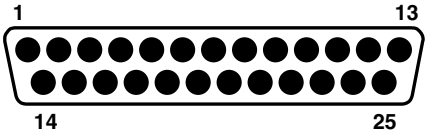

Figure 6.6 25-pin male D-sub connector

25-pin D-sub connector pinout				
Pin	**Name**	**Function**		
13	10 ... 30 V DC	Power supply input voltage +		
25	GND	Power supply input voltage -		
1	CHASSIS	Chassis Ground		
9	10 … 30V DC	External Trigger supply voltage +		
18	EXT. TRIG.+	External Trigger +		
19	EXT. TRIG.-	External Trigger -		
10	IN 2-	Verifier Input		
8	OUT1 +	Output 1 +		
11	OUT2 +	Output 2 +		
12	OUT REF.	Output reference		
22	OUT REF.	Output reference		
20	RX232	Auxiliary RX RS232		
21	TX232	Auxiliary TX RS232		
6, 10, 14, 15, 16, 17, 23, 24	NC	Not connected		
Pin		RS232	RS485 full-duplex	RS485 half-duplex
2	Main interface signals, see par. 8.	TX232	TX485+	RTX485+
3		RX232	RX485+	
4		RTS232	TX485-	RTX485-
5		CTS232	RX485-	
7		SGND	SGND	SGND

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6.2.1 Power supply

Power is supplied to the scanner through the pins provided on the 25- pin connector used for communication with the host:

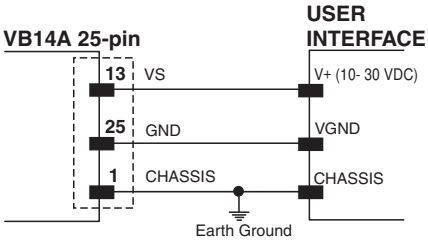

Figure 6.7 Power supply connections

The power must be between 10 and 30 V DC only.

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

6.2.2 Main Serial Interface

The signals relative to the following serial interface types are available on the input/output connector of VB14A.

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 relative parameters (baud rate, data bits, etc.) can be set using the VisoSetup utility program or "Host Mode Programming" procedure through ESC sequences.

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:

Connector 25-Pin	Name	Function
2	TX232	transmit data
3	RX232	receive data
4	RTS232	request to send
5	CTS232	clear to send
7	GND/SGND	signal ground

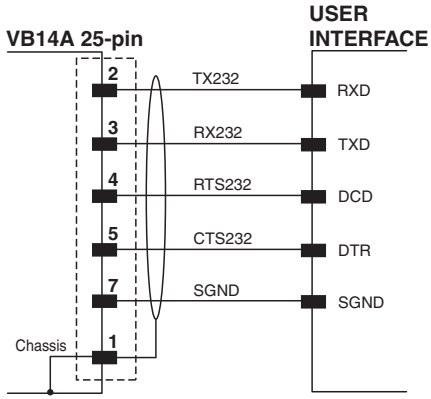

Figure 6.8 RS232 main interface connections using hardware handshaking

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

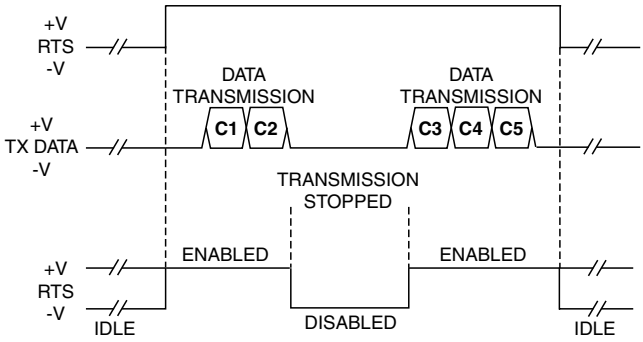

Figure 6.9 RS232 control signals

If the RTS/CTS handshaking protocol is enabled, the VB14A activates the RTS232 output to indicate a message is to be transmitted. The receiving unit activates the CTS232 input to enable the transmission.

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RS485 full-duplex interface

The RS485 full-duplex interface (5 wires + shield) is used for non-polled 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:

Connector 25-pin	Name	Function
2	TX485+	RX485 transmit data +
4	TX485-	RX485 transmit data -
3	RX485+	RX485 receive data +
5	RX485-	RX485 receive data -
7	SGND	Signal ground

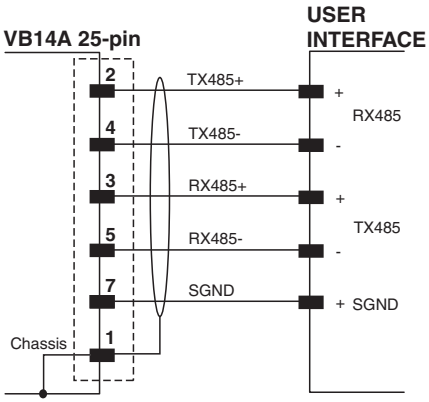

Figure 6.10 RS485 full-duplex connections

RS485 Half-Duplex Interface

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

It can be used in a master/slave layout, (see Section 6.24) exploiting a proprietary protocol based on polled mode called MUX32 protocol, where a master device polls slave devices to collect data.

The connector pinout follows:

Connector 25-pin	Name	Function
2	RTX485+	RX485 transmit/receive data +
4	RTX485-	RX485 transmit/receive data -
7	SGND	signal ground

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6.2.3 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 communication modes such as LOCAL ECHO can be defined using the VisoSetup utility program or "Host Mode Programming", installed from the CD-Rom.

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

Connector 25-pin	Name	Function
20	RXAUX	receive data
21	TXAUX	transmit data
23	CTSAUX	clear to send
24	RTSAUX	request to send
7	SGND	signal ground

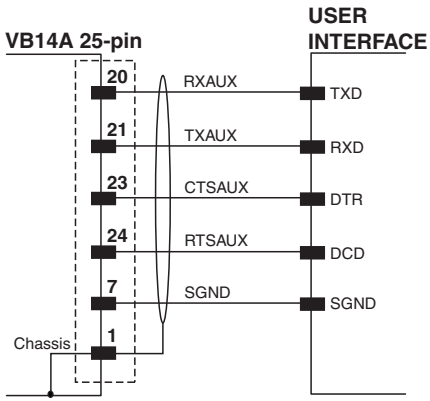

Figure 6.11 RS232 auxiliary interface connections using hardware handshaking

The RTSAUX and CTSAUX signals control data transmission and synchronize the connected devices. If the RTS/CTS handshaking protocol is enabled, the VB14A activates the RTSAUX output to indicate a message is to be transmitted. The receiving unit activates the CTSAUX input to enable the transmission.

Code Verifier

If the VB14A 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.

To activate the input, connect together pins 23 and 24 (CTSAUX and RTSAUX) of the 25-pin connector (for example with a push-button), before the active edge of the External Trigger input (or before the code passes under the laser beam for the Automatic operating

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mode.

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

Then the two pins must be disconnected.

Since it uses part of the RS232 auxiliary serial interface, this interface is limited when using this option and the Handshake selection must not be set to RTS/CTS.

6.2.4 Inputs

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

Connector 25-Pin	Name	Function
18	EXT TRIG+	external trigger +
19	EXT TRIG-	external trigger -

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 VisoSetup Help On Line.

The yellow LED (figure 3.1 (2)) is on when the External Trigger forces a current flow through the EXT TRIG+ and EXT TRIG- pins.

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

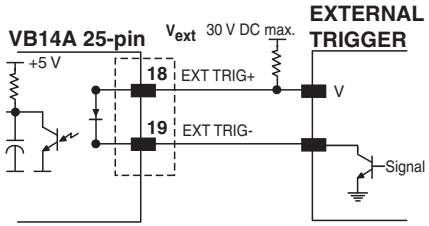

Figure 6.12 Input NPN command using external power

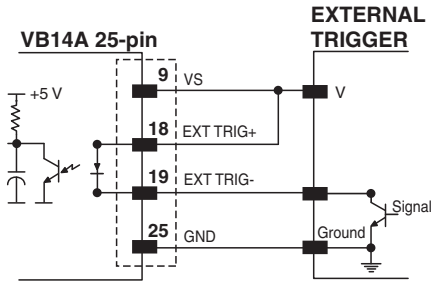

Figure 6.13 Input NPN command using VB14A power

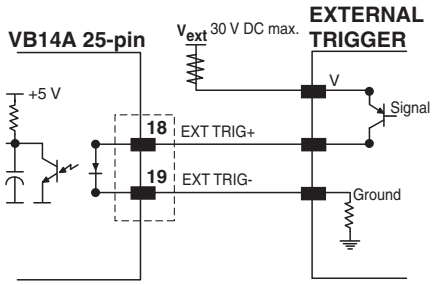

Figure 6.14 Input PNP command using external power

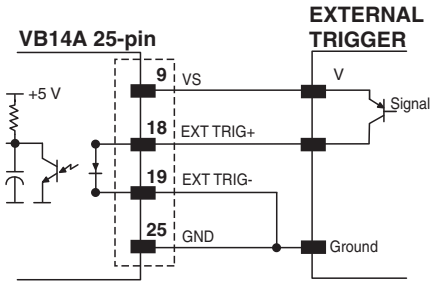

Figure 6.15 Input PNP command using VB14A power

Electrical features: Maximum voltage:30 V DC

Maximum current:25 mA

An anti-disturbance hardware filter is implemented on the External Trigger input

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

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6.2.5 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:

Connector 25-pin	Name	Function
8	OUT1+	output 1 +
11	OUT2+	output 2 +
12, 22	OUT REF	output reference

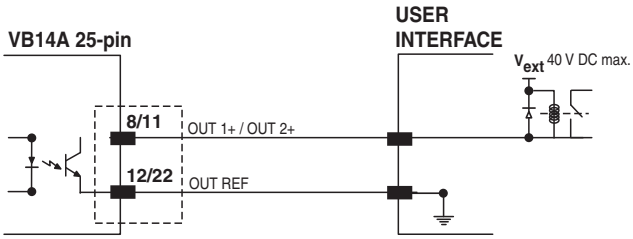

Figure 6.16 Output connections

Electrical features: Maximum voltage:40 V DC
Maximum current:40 mA continuous

The meaning of the two outputs OUT1 and OUT2 can be defined by the user. Refer to the VisoSetup 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 or pulse configurable.

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6.3 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			
9 pin male connector		25 pin male connector	
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.

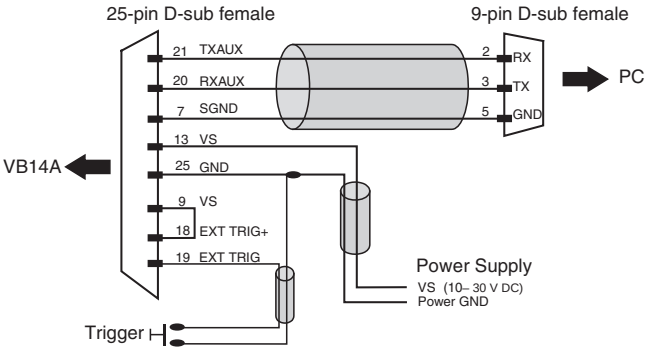

Figure 6.17 Test Cable for VB14A

6.4 Positioning

The VB14A scanner is able to decode barcode labels at a variety of angles, however significant angular distortion may degrade reading performance.

When mounting the VB14A 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 6.21. Position the reader in order to **minimize** the **Pitch** angle.

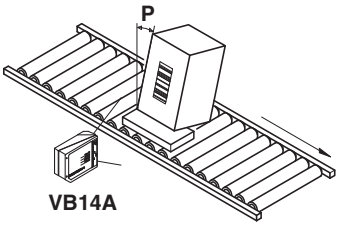

Figure 6.18 Pitch angle

The **Skew** angle is represented by the value **S** in figure 6.22. Position the reader to **assure at least 10°** for the **Skew** angle. This avoids the direct reflection of the laser light emitted by the VB14A.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.

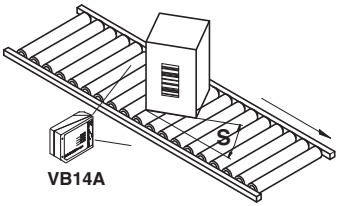

Figure 6.19 Skew angle

The **Tilt** angle is represented by the value **T** in figure 6.24. Position the reader in order to **minimize** the **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 see section 6.18 or the Help On Line for details.

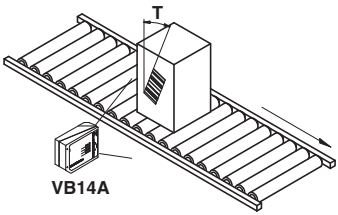

Figure 6.20 Tilt Angle

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6.5 Typical Layouts

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

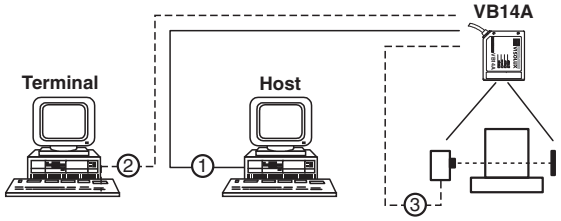
*These layouts also require the correct setup of the software configuration parameters. Complete software configuration procedures can be found in the **Guide To Rapid Configuration** in the VisoSetup Help On Line.*

6.5.1 Point-to-Point

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



① Main serial interface
② Auxiliary serial interface (Local Echo)
③ External Trigger (for On-Line mode)

Figure 6.21 Point to Point layout

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6.5.2 Pass-Through

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

Each VB14A 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 following figure:

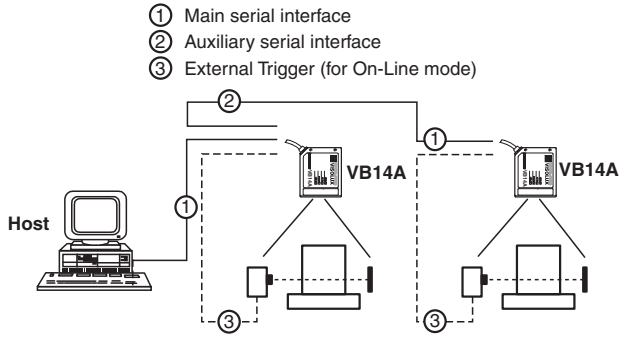

Figure 6.22 Pass-through layout

6.5.3 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 VB14A 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.

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.

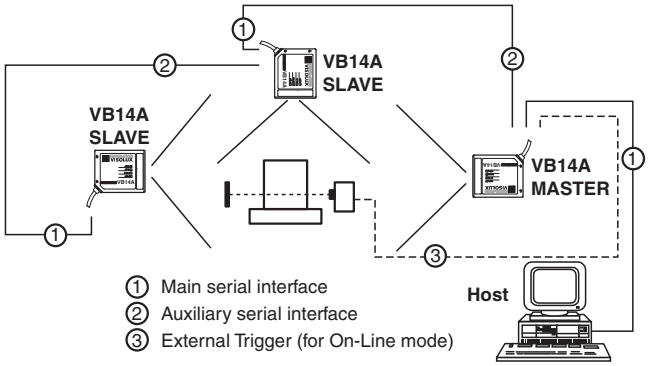

Figure 6.23 RS232 Master/slave layout

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6.5.4 RS485 Master/Slave

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

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

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

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

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

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

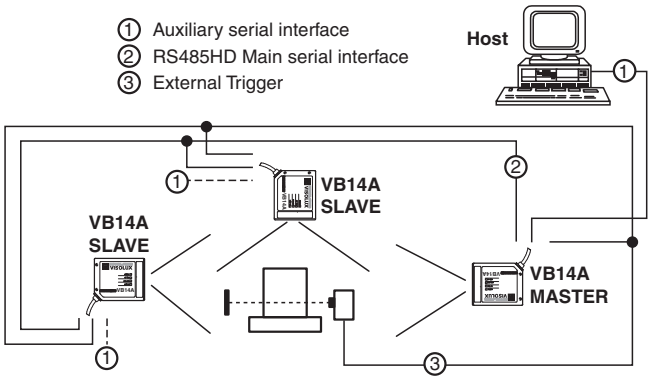

Figure 6.24 RS485 Master/slave layout

Information

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 VisoSetup utility or Host Mode programming procedure.

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

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

7 READING FEATURES

7.1 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 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).

Linear Reading

Linear Reading

ACB Reading

ACB Reading

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 Readable

Not ACB Readable

ACB Readable

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

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

7.1.1 Important ACB Reading Conditions

- "Do not use ACB for omni-directional reading stations.
- "ACB can be activated for each symbologies 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.

7.1.2 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°

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7.2 Linear Code Reading

For linear code reading, the number of scans performed on the code by the VB14A 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.

7.2.1 Step-Ladder mode

If scanning is perpendicular to the code motion direction (figure 7.1 - "step-ladder" mode), 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

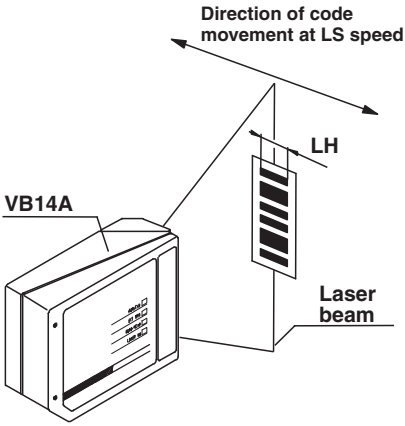

Figure 7.1 "Step-Ladder" scanning mode

For example, the VB14-440 (800 scans/sec.) for a 25 mm high code moving at 1250 mm/s performs:

[(25/1250) ∗ 800] - 2 = 14 effective scans

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7.2.2 Picket-Fence mode

If scanning is parallel to the code motion, (figure 7.2 - "picket-fence" mode), the number of effective scans is given by the following formula:

SN = [((FW-LW)/LS) ∗ SS] - 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

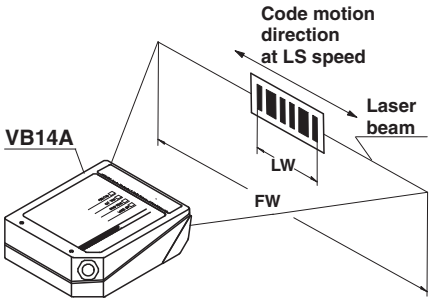

Figure 7.2 "Picket-Fence" scanning mode

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 VB14-440 (800 scans per sec.), performs:

[((200-100)/2000 ∗ 800] - 2 = 38 scans

7.3 Performance

The VB14A scanner is available in different versions according to the reading performance.

Version	Max Code Resolution mm (mils)	Speed scans/s
VB14A-600 / VB14A-600-R	0.35 (14)	600 to 1000
VB14A-300 / VB14A-300-R	0.20 (8)	500 to 800

Version	Reading Distance
VB14A-600 / VB14A-600-R	190 mm (7.5 in) - 600 mm (23.6 in) on 0.50 mm (20 mils) codes
VB14A-300 / VB14A-300-R	40 mm (1.6 in) - 300 mm (11.8 in) on 0.50mm (20 mils) codes

Refer to the diagrams given in see section 7.3.1 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.

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7.3.1 Raster

Raster versions are available. If standard devices do not satisfy specific requirements, contact your nearest P+F 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)
Raster Capture	18 mm (0.7 in)	35 mm (1.4 in)

The max. capture of the Raster version is 18 mm (0.7 in) at 300 mm (11.8 in).

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7.4 Reading Diagrams

VB14A-600 and VB14A-600-R

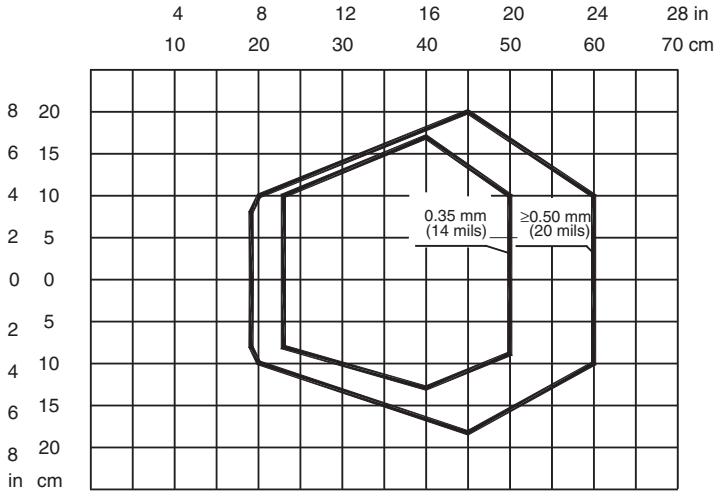

Figure 7.3 Raster VB14A-600 and VB14A-600-R

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 VisoSetup.*

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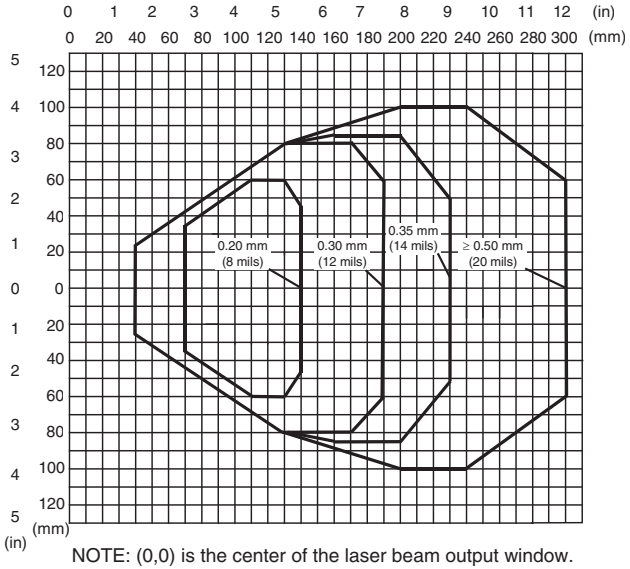
VB14A-300 and VB14A-300-R



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	=	15°
"Tilt" angle	=	0°
*Code Reading Condition		Standard
*Scanning Speed		500 scans/s

** Parameters selectable in VisoSetup*

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VB14A-300-R

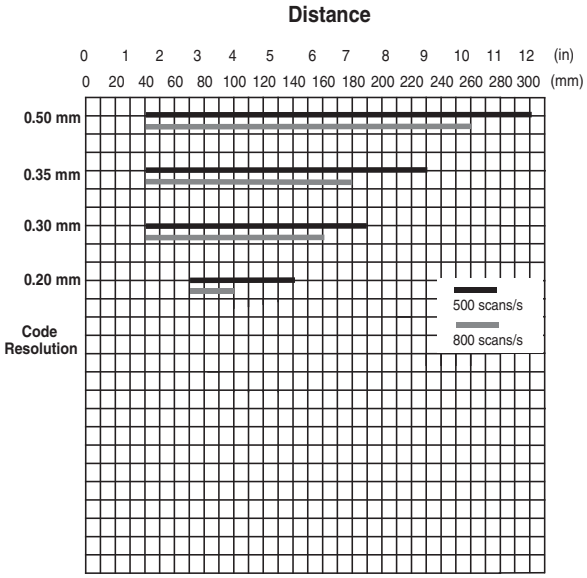

Figure 7.4 Reading Distance vs Scanning Speed

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8 MAINTENANCE

8.1 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 VB14A when the scanner is turned off or, at least, when the laser beam is deactivated.

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9 TROUBLESHOOTING

9.1 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 spring clamp connectors.
- "If you need information about a certain reader parameter you can refer to the VisoSetup? program help files. Either connect the device and select the parameter you're interested in by pressing the F1 key, or select Help/Contents/VB14A Configuration from the command menu.
- "If you're unable to fix the problem and you're going to contact your local Pepperl+Fuchs distributor, we suggest providing (if possible) the Device Configuration files (*.cfg). Connect through VisoSetup? and click the Save icon from the edit configuration window. Also note the exact Model, Serial Number and Order Number of the device.

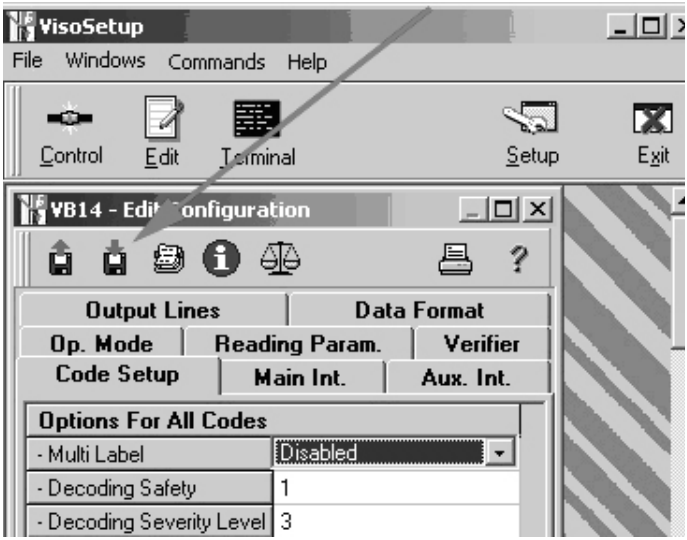

Figure 9.1 Safe Icon Software

TROUBLESHOOTING GUIDE	
Problem	Suggestions
Power On: the "Power On"/ "Ready" LED is not lit	• "Is power connected? • "If using a power adapter, 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).
On line Mode: 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 VisoSetup program select the OPERATING MODE tab and check for related parameters
Serial On line Mode: the reader is not triggered (no reading results)	• "In the VisoSetup 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?
On line Mode and Serial On Line: Reader doesn't respond correctly to the expected external signals end	• "In the VisoSetup program select the OPERATING MODE tab and check the TIMEOUT parameterization

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Reading: Not possible to read the target barcode (always returns No Read)	• "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 VisoSetup as an Operating Mode). • If you still have trouble, check the following: • "Is the reading distance within that allowed (see reading diagrams)? • "Is the Tilt angle too large? • "Is the Skew angle less than 10° (direct reflection)? • "Choose the CODE tab and enable different code types (except Pharmacode). LENGTH = Variable • "Is the Bar Code quality sufficient? • "If you had no success, try to perform the test using the BARCODE TEST CHART included with the product.
Communication: Device is not transmitting anything to the host	• "Is the serial cable connected? • "Is the correct wiring respected? • "Are serial host settings equivalent to the serial device setting? • "If using C-BOX 100, be sure the RS485 termination switch is positioned to OFF.
Communication: Data transferred to the host are incorrect, corrupted or incomplete	• "In the VisoSetup program select the DATA FORMAT tab and check for values of HEADER, TERMINATOR, SEPARATOR, FILL CHARACTERS • "Also check the CODE FIELD LENGTH value • "Are the COM port parameters correctly assigned?
Communication: Always returns the Reader Failure Character (<BEL>char as default)	• "Contact your local Pepperl+Fuchs distributor , because either a Motor or Laser failure has occurred. • "Note the exact model and Serial Number of the device
How do I obtain my units' serial numbers?	• "The device's serial number is printed on a label that is affixed to the body of the reader. • "Serial numbers consist of 9 characters: one letter, 2 numbers, and another letter followed by 5 numbers.

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10 TECHNICAL FEATURES

	VB14A	
	-600 -600R	-300 -300R
ELECTRICAL FEATURES		
INPUT POWER Supply voltage	10 to 30 V DC	
Power consumption max.	5 W	3 W
SERIAL INTERFACE (depends on model)		
Main	RS232; RS485 Full-duplex/Half-duplex	
Auxiliary	RS232	
Baud Rates	150 to 115200	
INPUTS External Trigger	(optocoupled NPN or PNP)	
Voltage max.	30 V DC	
INPUT current max.	25 mA	
OUTPUTS OUT1, OUT2	(optocoupled)	
V_{CE} max.	40 V DC	
Collector current max.	40 mA continuous; 130 mA pulsed	
V_{CE} saturation	0 V at 10 mA max.	
Power dissipation max.	90 mW at 40 °C (Ambient temp.)	
OPTICAL FEATURES		
Light source	Semiconductor laser diode	
Wave lenght (note 1)	630 to 680 nm	
Ambient light immunity	Complete immunity	
Safety class	Class 2 - IEC 825-1; Class II - CDRH	
READING FEATURES (Note 2)		
Scan rate (Note 3)	600 to 1000 scans/sec.	500 to 800 scans/sec.
Aperture angle	50°	
Maximum Reading Distance mm (inch)	600 (23.6)	300 (11.8)
Maximum resolution mm (mils)	0.35 (14)	0.20 (8)
USER INTERFACE		
LED indicators	Ready, Good, Trigger, COM, STATUS	

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	VB14A	
	-600 -600R	-300 -300R
SOFTWARE FEATURES		
Readable Code Symbologies	• EAN/UPC • EAN/UPC (with Add-on 2 and Add-on 5) • 2/5 Interleaved • Code 39 (Standard and Full ASCII) • Codabar • Code 93 • Code 128 • EAN 128 • ISBT 128 • Pharmacode * = ACB Readable. Other symbologies available on request	
Code Selection	up to six different codes during one reading phase	
Decoding Safety	can enable multiple good reads of same code	
Headers and Terminators	up to four headers and four terminators	
Operating Modes	On-Line, Automatic, Serial-On-Line, Test	
Configuration Modes	• through menus using VisoSetup utility • receiving commands from one of the serial ports (HOST MODE)	
Special Functions	ACB (Advanced Code Builder) Motor Off	
Parameter Storage	Non-volatile internal EEPROM	
ENVIRONMENTAL FEATURES		
Operating temperature (Note 4)	0 to 40 °C (32 to 104 °F)	
Storage temperature	-20 to 70 °C (-4 to 158 °F)	
Humidity max.	90% non condensing	
Vibration resistance	IEC 68-2-6 test FC 1.5 mm; 10 to 55 Hz; 2 hours on each axis	
Shock resistance	IEC 68-2-27 test EA 30G; 11 ms; 3 shocks on each axis	
Protection class	IP65	
PHYSICAL FEATURES		
Mechanical demensions	68 x 84 x 34 mm	
Weight	330g. (11.64 oz.)	300 g. (10.6 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. 3.3.
Note 3: software programmable
Note 4: If the reader is used in high temperature environments (over 35 °C), use of the Beam-shutter is advised (see the VisoSetup configuration program).

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11 Glossary

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 section 7.1

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. VISOLUX 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 section 6.4. and Fehler! Verweisquelle konnte nicht gefunden werden..Kapitel 2 / 1.5 oder Kapitel 3 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.

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EEPROM

Electrically Erasable Programmable Read-Only Memory. 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 section 7.2.2

Pitch

Rotation of a code pattern about the X-axis. The normal distance between center line or adjacent characters. see section 6.4

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.

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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 section 6.4

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 section 6.4

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 section 6.4

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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