



Matrix 300™

QUICK REFERENCE GUIDE

- ① Device Class Label
- ② Bracket Mounting Holes (4)
- ③ Good Read LED (green)
- ④ Lens Cover
- ⑤ HMI X-PRESS™ Interface
- ⑥ Lens
- ⑦ Internal Illuminator
- ⑧ Power - Serial Interfaces - I/O Connector
- ⑨ Ethernet Connector
- ⑩ No Read LED (red)
- ⑪ Aiming System Laser Pointers
- ⑫ Ethernet Connection LED
- ⑬ Power On LED



Connector block rotates
to 90° position

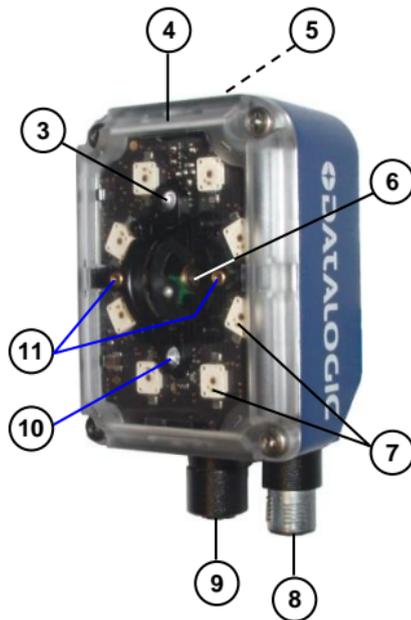


Figure A



This manual illustrates a Stand Alone application. For other types of installations, such as ID-NET™, Fieldbus, Pass-Through, etc. and for complete reader configuration using the VisiSet™ configuration program, refer to the Matrix 300™ Reference Manual available on the mini-DVD and also downloadable at www.datalogic.com.

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- **Products - Industrial Automation - Identification**

Select your product from the links on the **Identification** page. The product page describes specific Info, Features, Applications, Models, Accessories, and Downloads including documentation, software drivers, and the [VisiSet™](#) utility program, which allows device configuration using a PC through Serial and Ethernet interfaces.

- **Support & Services - Industrial Automation**

Several links from the **Industrial Automation** list take you to additional services such as: [Service Program](#) which contains Maintenance Agreements and Warranty Extensions; [Repair Centers](#); [On-Line RMA](#) Return Material Authorizations; [Technical Support](#) through email or phone, [Partner Program](#); [Downloads](#) for additional downloads.

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STEP 1 – CONNECT THE SYSTEM

To connect the system in a Stand Alone configuration, you need the hardware indicated in Figure 1. In this layout the data is transmitted to the Host on the main serial interface. Data can also be transmitted on the RS232 auxiliary interface independently from the main interface selection. When One Shot or Phase Mode Operating mode is used, the reader is activated by an External Trigger (photoelectric sensor) when the object enters its reading zone.

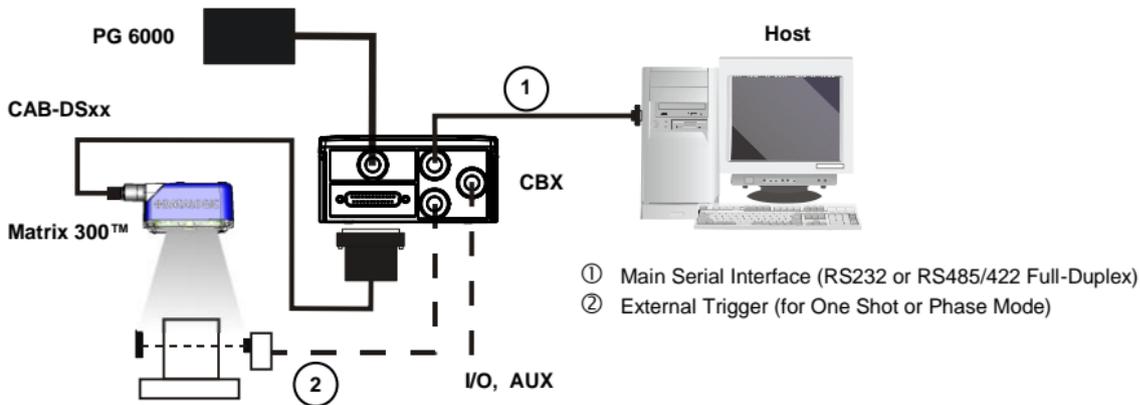


Figure 1 – Matrix 300™ in Stand Alone Layout

CBX100/CBX500 Pinout for Matrix 300™

The table below gives the pinout of the CBX100/CBX500 terminal block connectors. Use this pinout when the Matrix 300™ reader is connected by means of the CBX100/CBX500:

STEP 2 – MOUNT AND POSITION THE READER

1. To mount the Matrix 300™, use the mounting bracket to obtain the most suitable position for the reader. The most common mounting configuration is shown in the figure below.



Figure 2 –Positioning with Mounting Bracket

- When mounting the Matrix 300™ take into consideration these three **ideal** label position angles: **Pitch or Skew 10° to 20° and Tilt 0°**, although the reader can read a code at any tilt angle provided the code fits into the Field Of View (FOV).

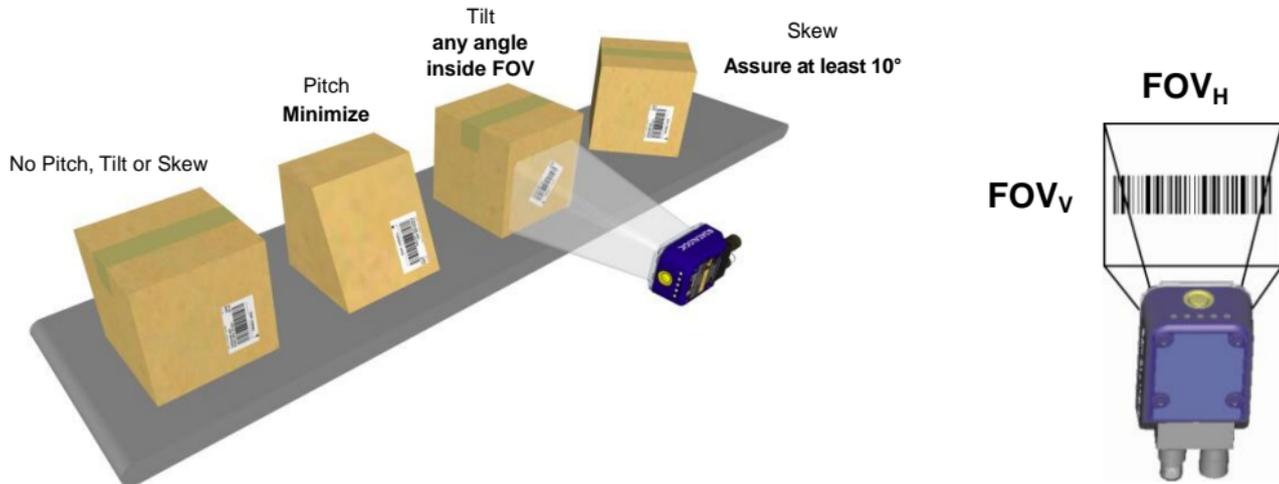


Figure 3 – Pitch, Tilt and Skew Angles

- Refer to the Reading Diagrams in the Appendix of this Quick Reference Guide to determine the distance your reader should be positioned at. Further diagrams are provided in the Matrix 300™ Reference Manual.



NOTE

Rapid Configuration of the Matrix 300™ reader can be made **either** through the X-PRESS™ interface (steps 3-4) which requires no PC connection, **or** by using the VisiSet™ Setup Wizard (steps 5-6). Select the procedure according to your needs.

STEP 3 – AIM AND AUTOFOCUS THE READER

(Liquid Lens Models only)

Matrix 300™ provides a built-in laser pointer aiming system to aid reader positioning. For Liquid Lens models the autofocus feature is also incorporated into this function. The aiming system is accessed through the X-PRESS™ Interface.

1. Power the reader on. During the reader startup (reset or restart phase), all the LEDs blink for one second. On the reverse side of the reader near the bracket, the “POWER ON” LED (blue) indicates the reader is correctly powered.
2. Place the **Grade A Barcode Test Chart** in front of the reader at the correct reading distance for your application. See the Reading Diagrams in the Appendix of this Quick Reference Guide or in the Reference Manual.
3. Enter the Aim/Autofocus function by pressing and holding the X-PRESS™ push button until the Aim LED is on.
4. Release the button to enter the Aim function. The laser pointers turn on, and the Autofocus procedure begins, see Figure 4. The Aim LED will blink until the procedure is completed.

Within 3 seconds (before the reader flashes), center one of the larger codes on the aiming system pointers (the code must not move during this procedure).

The Autofocus procedure ends when the Reading Distance and PPI values are successfully saved in the reader memory, the Aim LED will stop blinking and Matrix 300™ emits 3 high pitched beeps.

If the Autofocus cannot be reached after a timeout of about 3 (three) minutes Matrix 300™ will exit without saving the parameters to memory, the Aim LED will stop blinking and in this case Matrix 300™ emits a long low pitched beep.

You can exit the Aim/Autofocus function at any time by pressing the X-PRESS™ push button once. After a short delay the autofocus procedure is cancelled and the laser pointers turn off.



**Figure 4 – X-PRESS™ Interface:
Aim/Autofocus Function**



STEP 4 – X-PRESS™ CONFIGURATION

Once Matrix 300™ has focused at the correct reading distance, you must configure it for optimal code reading relative to your application. This configuration can be performed either through the X-PRESS™ Interface or the VisiSet™ configuration program.

AIM

1. Enter the Aim function by pressing and holding the X-PRESS™ push button until the Aim LED is on.
2. Release the button to enter the Aim function. The laser pointers turn on.
3. **Select a single code from your application.** Position the code at the center of the FOV (equidistant from the laser pointers).

The reader may start flashing and try to perform autofocus however this will have no effect on the application specific code; it can be ignored.

Exit the Aim function by pressing the X-PRESS™ push button once. After a short delay the Aim function is cancelled and the laser pointers turn off.



Figure 5 – X-PRESS™ Interface:
Aim Function

SETUP

4. Enter the Setup function by pressing and holding the X-PRESS™ push button until the Setup LED is on.
5. Release the button to enter the Setup function. The Setup LED will blink until the procedure is completed.

The Setup procedure ends when the Image Acquisition parameters are successfully saved in the reader memory, the Setup LED will stop blinking and Matrix 300™ emits 3 high pitched beeps.

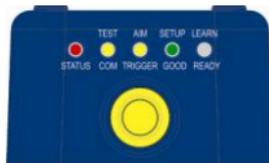


Figure 6 – X-PRESS™ Interface:
Setup Function

If the calibration cannot be reached after a timeout of about 5 (five) seconds Matrix 300™ will exit without saving the parameters to memory, the Setup LED will stop blinking and in this case Matrix 300™ emits a long low pitched beep.

LEARN

- Enter the Learn function by pressing and holding the X-PRESS™ push button until the Learn LED is on.
- Release the button to enter the Learn function. The Learn LED will blink until the procedure is completed.

The Learn procedure ends when the Image Processing and Decoding parameters are successfully saved in the reader memory, the Green Spot is activated, the Learn LED will stop blinking and Matrix 300™ emits 3 high pitched beeps¹.

If the autolearning cannot be reached after a timeout of about 3 (three) minutes Matrix 300™ will exit without saving the parameters to memory, the Learn LED will stop blinking and in this case Matrix 300™ emits a long low pitched beep.

You can exit the Learn function at any time by pressing the X-PRESS™ push button once. After a short delay the Learn procedure is cancelled.

The Grade A Barcode Test Chart cannot be used to set the Code 128 symbology (even though the reader successfully reads the code). Use the application specific code if you need to set this symbology.

If you have used this procedure to configure Matrix 300™ go to step 7.



**Figure 7 – X-PRESS™ Interface:
Learn Function**

RESET READER TO FACTORY DEFAULT (OPTIONAL)

If it ever becomes necessary to reset the reader to the factory default values, you can perform this procedure by holding the X-PRESS™ push button pressed while powering up the reader. **You must keep the X-PRESS™ push button pressed until the power up sequence is completed** (several seconds) and all LEDs blink simultaneously 3 times.

All LEDs remain on for about 1 second, then off for one second, the Configuration and Environmental parameters are reset, and the status LED remains on. If connected through a CBX500 with display module, the message "Default Set" is shown on the display.

¹ *The Learn procedure will not recognize Pharmacode symbologies.*

STEP 5 – INSTALLING VISISET™ CONFIGURATION PROGRAM

VisiSet™ is a Datalogic reader configuration tool providing several important advantages:

- Setup Wizard for rapid configuration and new users;
- Defined configuration directly stored in the reader;
- Communication protocol independent from the physical interface allowing the reader to be considered as a remote object to be configured and monitored.

To install VisiSet™, turn on the PC that will be used for the configuration, running Windows 98, 2000/NT, XP, Vista, 7 or 8; then insert the VisiSet™ Mini-DVD, wait for the DVD to autorun and follow the installation procedure.

This configuration procedure assumes a laptop computer, running VisiSet™, is connected to the reader's auxiliary port. The reader can also be connected to VisiSet™ through the on-board Ethernet by following the procedure in the Reference Manual.

After installing and running the VisiSet™ software program the following window appears:

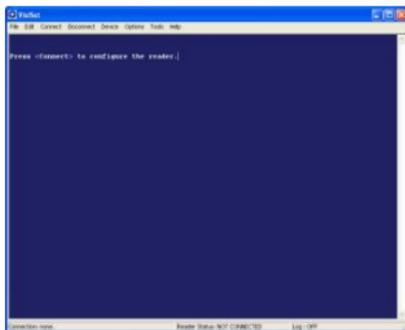


Figure 8 - VisiSet™ Opening Window

Set the communication parameters from the "Options" menu. Then select "Connect", the following window appears:

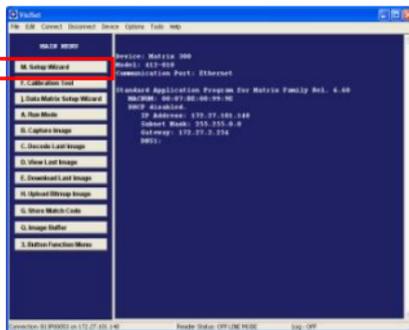
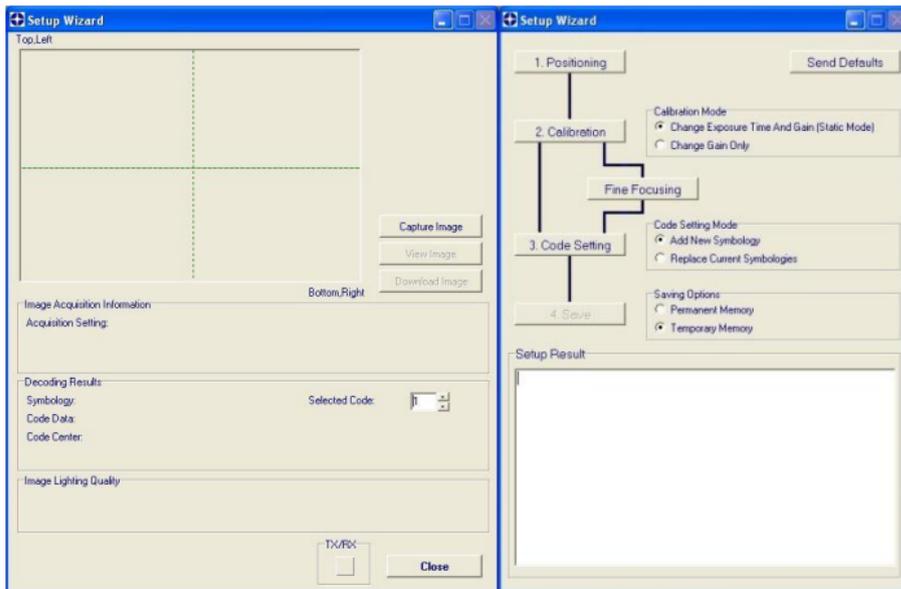


Figure 9 - VisiSet™ Main Window After Connection

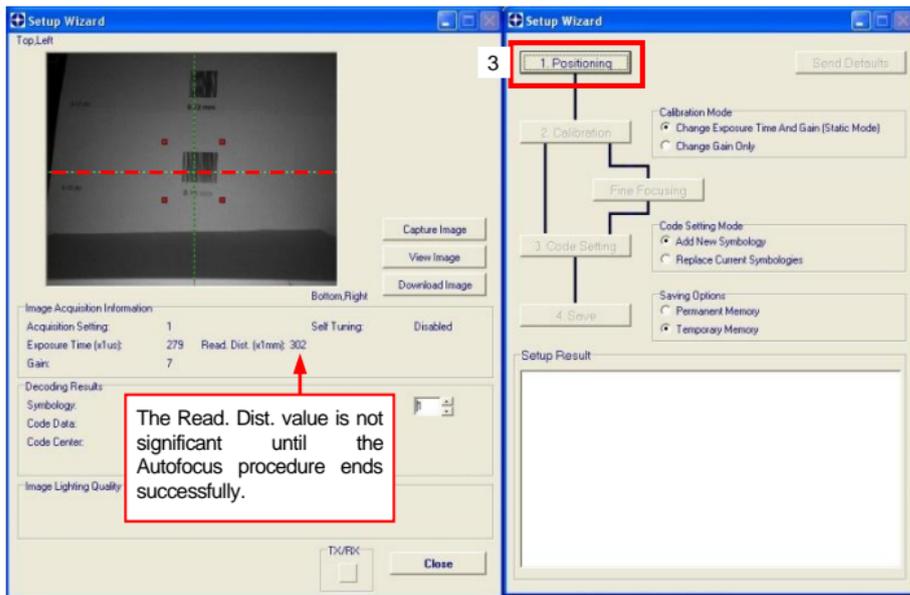
STEP 6 – CONFIGURATION USING SETUP WIZARD

The Setup Wizard option is advised for rapid configuration or for new users. It allows reader configuration in a few easy steps.

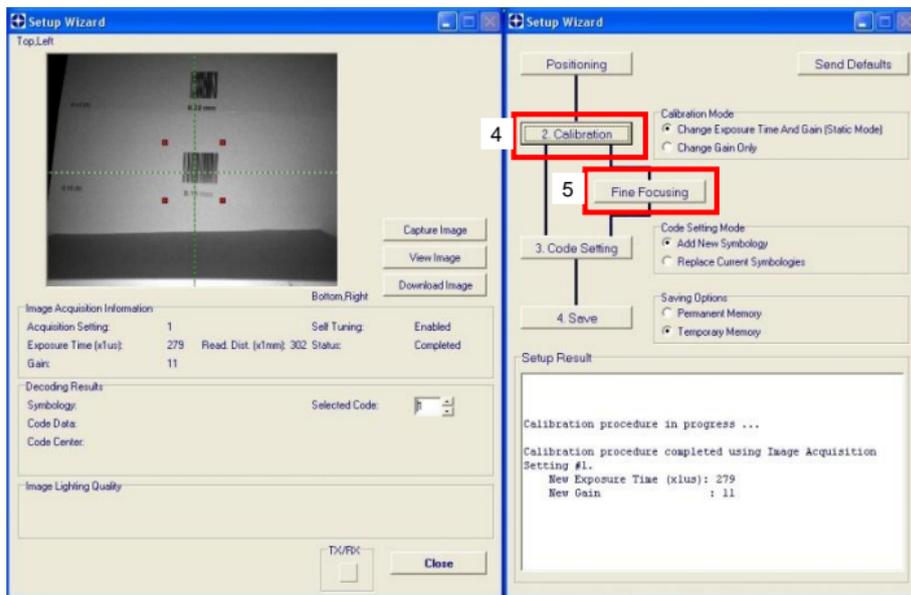
1. Select the Setup Wizard button from the Main menu.



- Place the **Grade A Barcode Test Chart** in front of the reader at the correct reading distance for your application. See “STEP 2 - Mount and Position the Reader” and the Reading Diagrams in the Appendix of this Quick Reference Guide or in the Reference Manual.
- Press the "Positioning" button. The reader continuously acquires images and gives visual feedback in the view image window. The Setup Wizard now shows four delimiters (red points) in the acquired images which indicate the region in which the calibration algorithm is active. Choose one of the larger codes and move either the reader or code to center it. The code must be aligned across the X-axis reference line at the center of the FOV. See figure below. Press the Positioning button again to stop positioning.



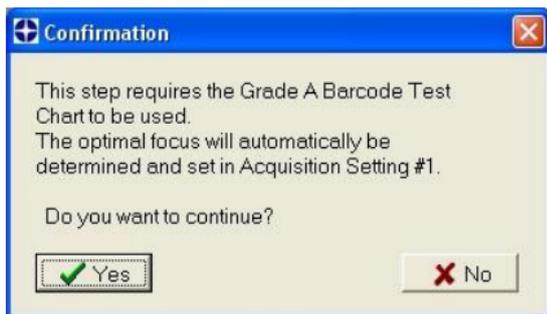
4. Select a Calibration Mode choice and press the "Calibrate" button. The reader flashes once acquiring the image and auto determines the best exposure and gain settings.



5. Press the "Fine Focusing" button to activate the Focus procedure.

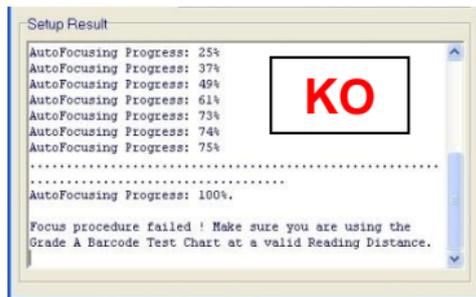
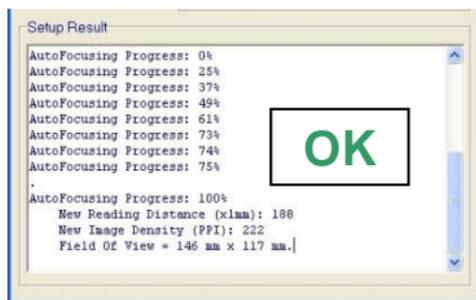


*For Liquid Lens models, the Fine Focusing procedure requires the **Grade A Barcode Test Chart** to be used; otherwise the procedure will fail.*



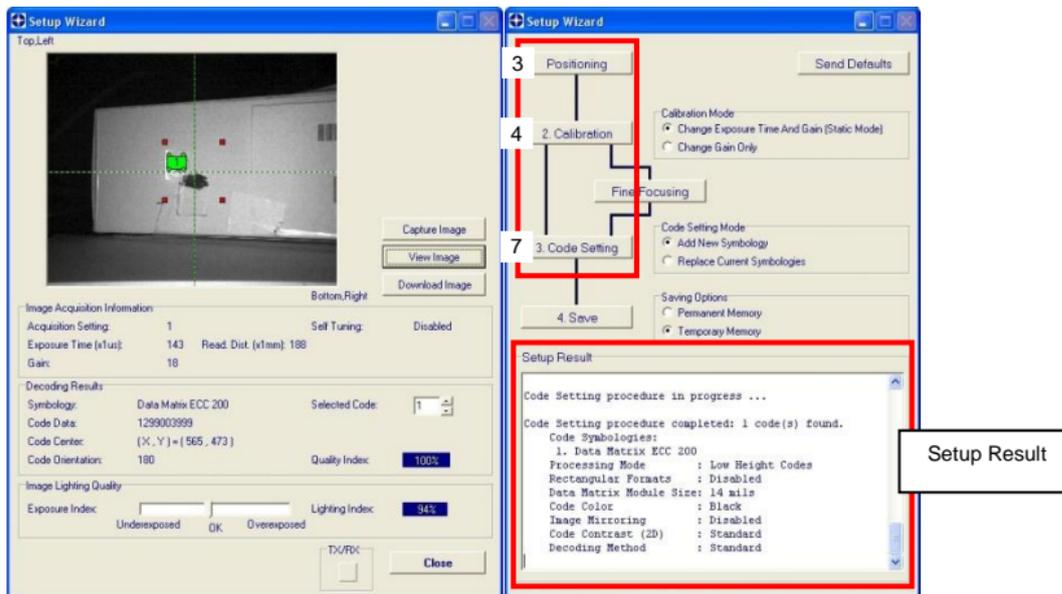
The reader starts the focus procedure and gives visual feedback in the Setup Wizard window. The Setup Result section of the Setup Wizard window reports the procedure progress (in percentage).

At the end of the procedure the Reading Distance, PPI and FOV data are reported.



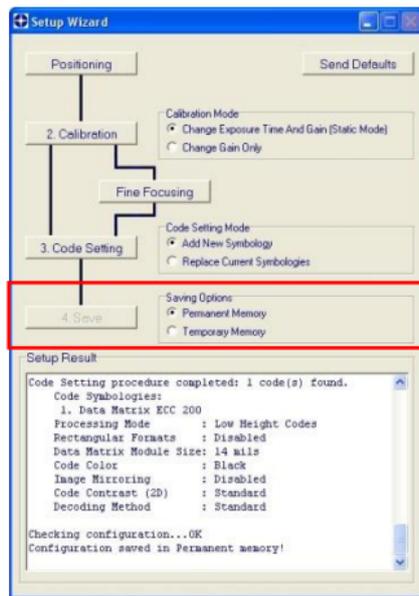
6. Now place a **single application specific code** in front of the reader (at the same reading distance) and repeat steps 3, and 4. Do not perform step 5 "Fine Focusing".
7. Select a Code Setting Mode choice and press the "Code Setting" button.

The Setup Result section of the Setup Wizard window shows the code type results.



The Grade A Barcode Test Chart cannot be used to set the Code 128 symbology (even though the reader successfully reads the code). Use the application specific code if you need to set this symbology.

8. Select a Saving Options choice and press the "Save" button.
9. Close the Setup Wizard.



NOTE

If your application has been configured using the VisiSet™ Setup Wizard, your reader is ready. If necessary you can use VisiSet™ for advanced reader configuration.

STEP 7 – TEST MODE

Use a code suitable to your application to test the reading performance of the system.

1. Enter the *Test* function by pressing and holding the X-PRESS™ push button until the Test LED is on.
2. Release the button to enter the *Test* function.

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

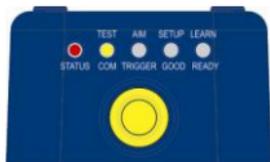


Figure 10 - X-PRESS™ Interface: Test Function

The Bar Graph has the following meaning:

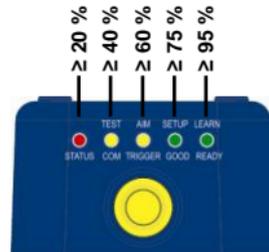


Figure 11 – Test Bar Graph

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



NOTE

By default, the Test exits automatically after three minutes.

ADVANCED READER CONFIGURATION

For further details on advanced product configuration, refer to the complete Reference Manual on the installation Mini-DVD or downloadable at www.datalogic.com.

The following are alternative or advanced reader configuration methods.

ADVANCED CONFIGURATION USING VISISET™

Advanced configuration can be performed through the VisiSet™ program by selecting *Device> Get Configuration From Temporary Memory* to open the Parameter Setup window in off-line mode. Advanced configuration is addressed to expert users being able to complete a detailed reader configuration. The desired parameters can be defined in the various folders of the Parameter Setup window and then sent to the reader memory (either Temporary or Permanent):

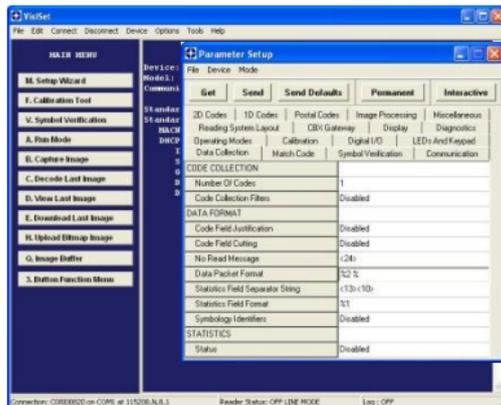


Figure 12 - VisiSet™ Parameter Setup Window

HOST MODE PROGRAMMING

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

ALTERNATIVE LAYOUTS

If you need to install an Ethernet network, ID-NET™ network, or Fieldbus network, refer to the Matrix 300™ Reference Manual.

The reader can also be setup for alternative layouts by reading programming barcodes. See the "Setup Procedure Using Programming Barcodes" printable from the Mini-DVD.

APPENDIX

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

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

- *Learn* to self-detect and auto-configure for reading unknown codes
- *Setup* to perform Exposure Time and Gain calibration.
- *Aim/Autofocus* to turn on the laser pointers to aid positioning.
- *Test* with bar graph visualization to check static reading performance



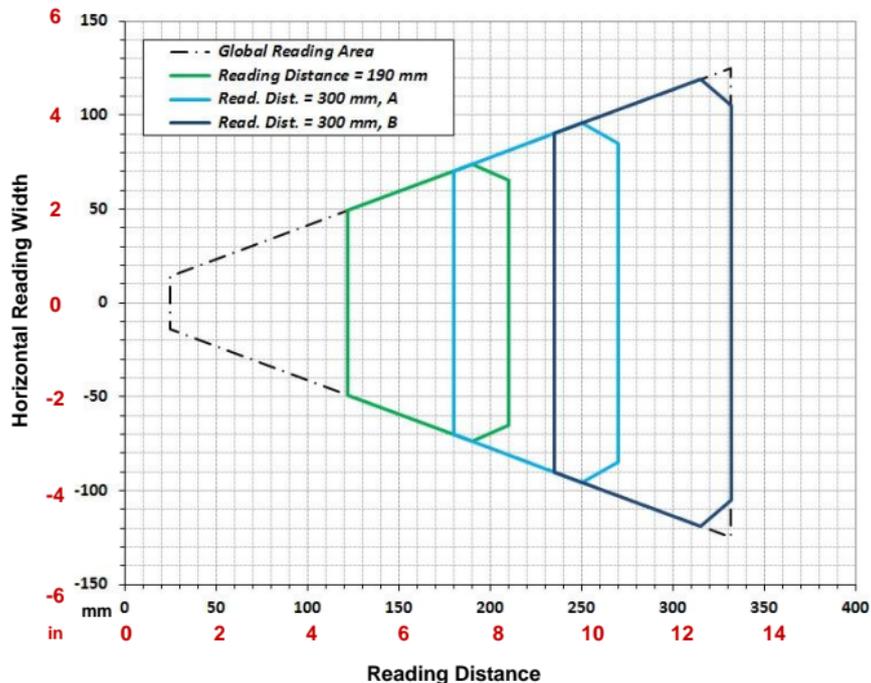
In normal operating mode the colors and meaning of the five LEDs are illustrated in the following table:

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

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

READING FEATURES

Code 128 0.25 mm (10 mils)



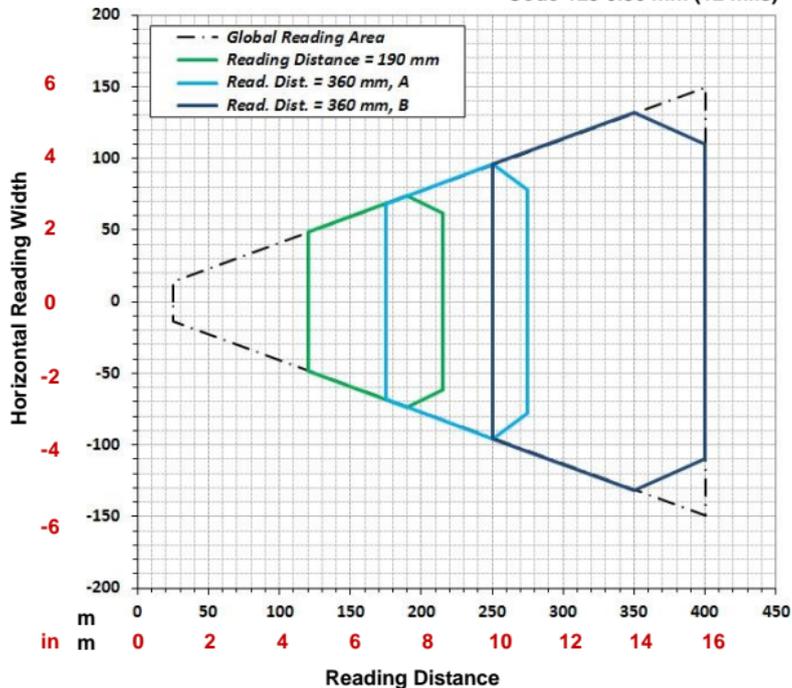
Measurement Conditions:

- Tilt Angle: 45°
- Skew Angle: 15°

See the Matrix 300™ Reference Manual for a complete list of conditions.

For applications where DOF is important, pre-configured .ini files are provided which correspond to these reading diagrams. See the Matrix 300™ Reference Manual for details.

Code 128 0.30 mm (12 mils)

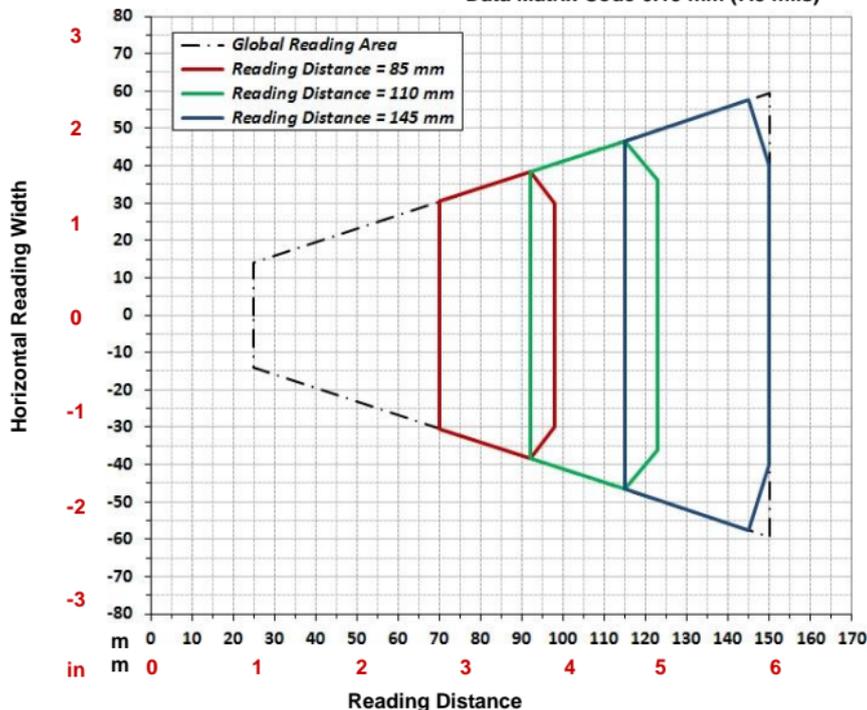
Measurement Conditions:

- Tilt Angle: 45°
- Skew Angle: 15°

See the Matrix 300™ Reference Manual for a complete list of conditions.

For applications where DOF is important, pre-configured .ini files are provided which correspond to these reading diagrams. See the Matrix 300™ Reference Manual for details.

Data Matrix Code 0.19 mm (7.5 mils)

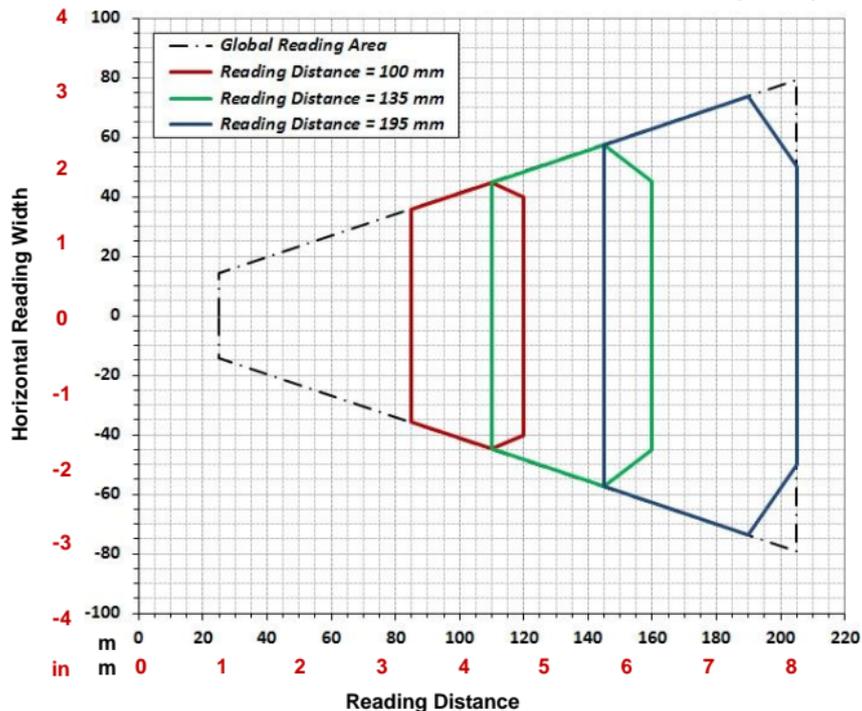
Measurement Conditions:

- Tilt Angle: 45°
- Skew Angle: 15°

See the Matrix 300™ Reference Manual for a complete list of conditions.

For applications where DOF is important, pre-configured .ini files are provided which correspond to these reading diagrams. See the Matrix 300™ Reference Manual for details.

Data Matrix Code 0.25 mm (10 mils)

Measurement Conditions:

- Tilt Angle: 45°
- Skew Angle: 15°

See the Matrix 300™ Reference Manual for a complete list of conditions.

For applications where DOF is important, pre-configured .ini files are provided which correspond to these reading diagrams. See the Matrix 300™ Reference Manual for details.

TECHNICAL FEATURES

ELECTRICAL FEATURES		
Power Supply Voltage Consumption	4x2-01x models 10 to 30 Vdc 0.7 to 0.2 A max	4x2-04x models PoE Device 48 Vdc 13 W max.
Communication Interfaces Main - RS232 - RS485/422 full-duplex	2400 to 115200 bit/s 2400 to 115200 bit/s	
Auxiliary - RS232	2400 to 115200 bit/s	
ID-NET™	Up to 1MBaud	
Ethernet	10/100 Mbit/s	
Inputs: Input 1(External Trigger) and Input 2	Opto-coupled and polarity insensitive; (see Reference Manual for details)	
Outputs: Output 1, 2 and 3	NPN or PNP short circuit protected; (see Reference Manual for details)	
OPTICAL FEATURES		
Image Sensor	CMOS sensor with Global Shutter	
Image Format	SXGA (1280x1024) pixels	
Frame Rate	60 frames/sec	
Pitch	± 35°	
Tilt	0° - 360°	
Lens	Focal Length = 9 mm; Focus Control via software	
Lighting System	Internal Illuminator	
Aiming System	Laser Pointers	
LED Safety/Laser Safety (pointers)	to EN 62471 / IEC 60825-1 2007	
PHYSICAL FEATURES	Connector position 0°	Connector position 90°
Dimensions	95x54x43 mm (3.7x2.1x1.7 in.)	75x54x62 mm (3.0x2.1x2.4 in.)
Weight	about 238 g. (8.4 oz.)	
Material	Aluminium	

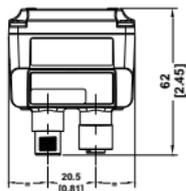
ENVIRONMENTAL FEATURES		
Operating Temperature	0 to 50 °C (32 to 122 °F)	
Storage Temperature	-20 to 70 °C (-4 to 158 °F)	
Max. Humidity	90% non condensing	
Vibration Resistance EN 60068-2-6	14 mm @ 2 to 10 Hz; 1.5 mm @ 13 to 55 Hz; 2 g @ 70 to 200 Hz; 2 hours on each axis	
Bump Resistance EN 60068-2-29	30g; 6 ms; 5000 shocks on each axis	
Shock Resistance EN 60068-2-27	30g; 11 ms; 3 shocks on each axis	
Protection Class	EN 60529	IP65/IP67 *
SOFTWARE FEATURES		
Readable Code Symbolologies		
1-D and stacked	2-D	POSTAL
<ul style="list-style-type: none"> • PDF417 Standard and Micro PDF417 • Code 128 (GS1-128) • Code 39 (Standard and Full ASCII) • Code 32 • MSI • Standard 2 of 5 • Matrix 2 of 5 • Interleaved 2 of 5 	<ul style="list-style-type: none"> • Codabar • Code 93 • Pharmacode • EAN-8/13 - UPC-A/E (including Addon 2 and Addon 5) • GS1 DataBar Family • Composite Symbolologies 	<ul style="list-style-type: none"> • Data Matrix ECC 200 (Standard, GS1 and Direct Marking) • QR Code (Standard and Direct Marking) • Micro QR Code • MAXICODE • Aztec Code
		<ul style="list-style-type: none"> • Australia Post • Royal Mail 4 State Customer • Kix Code • Japan Post • PLANET • POSTNET • POSTNET (+BB) • Intelligent Mail • Swedish Post
Operating Mode	ONE SHOT, CONTINUOUS, PHASE MODE	
Configuration Methods	X-PRESS™ Human Machine Interface Windows-based SW (VisiSet™) via serial or Ethernet link Serial Host Mode Programming sequences	
Parameter Storage	Permanent memory (Flash)	

* when correctly connected to IP67 cables with seals.

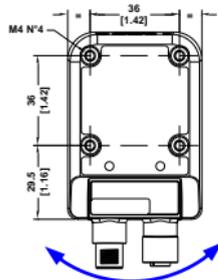
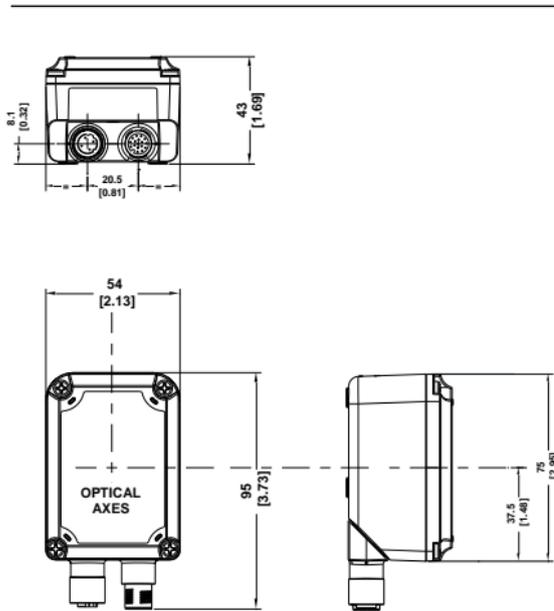
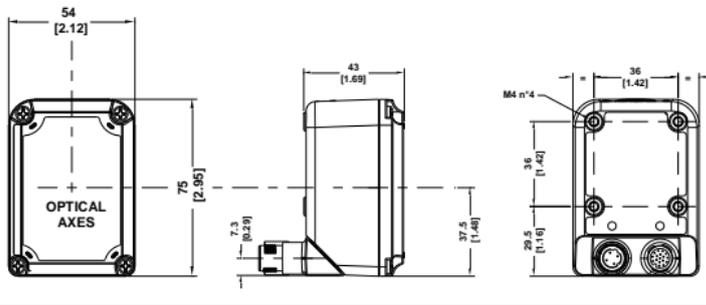
CODE QUALITY METRICS	
Standard	Supported Symbologies
ISO/IEC 16022	Data Matrix ECC 200
ISO/IEC 18004	QR Code
ISO/IEC 15415	Data Matrix ECC 200, QR Code
ISO/IEC 15416	Code 128, Code 39, Interleaved 2 of 5, Codabar, Code 93, EAN-8/13, UPC-A/E
AS9132A	Data Matrix ECC 200
AIM DPM	Data Matrix ECC 200, QR Code
USER INTERFACE	
LED Indicators	Power, Ready, Good, Trigger, Com, Status, (Ethernet Network), Good Read (Green Spot), No Read (Red Spot)
Keypad Button	configurable via VisiSet™
Beeper	configurable via VisiSet™

MECHANICAL DIMENSIONS

mm
[in]



Matrix 300™ Overall Dimensions
0° and 90° Solutions



Connector block rotates
to 90° position

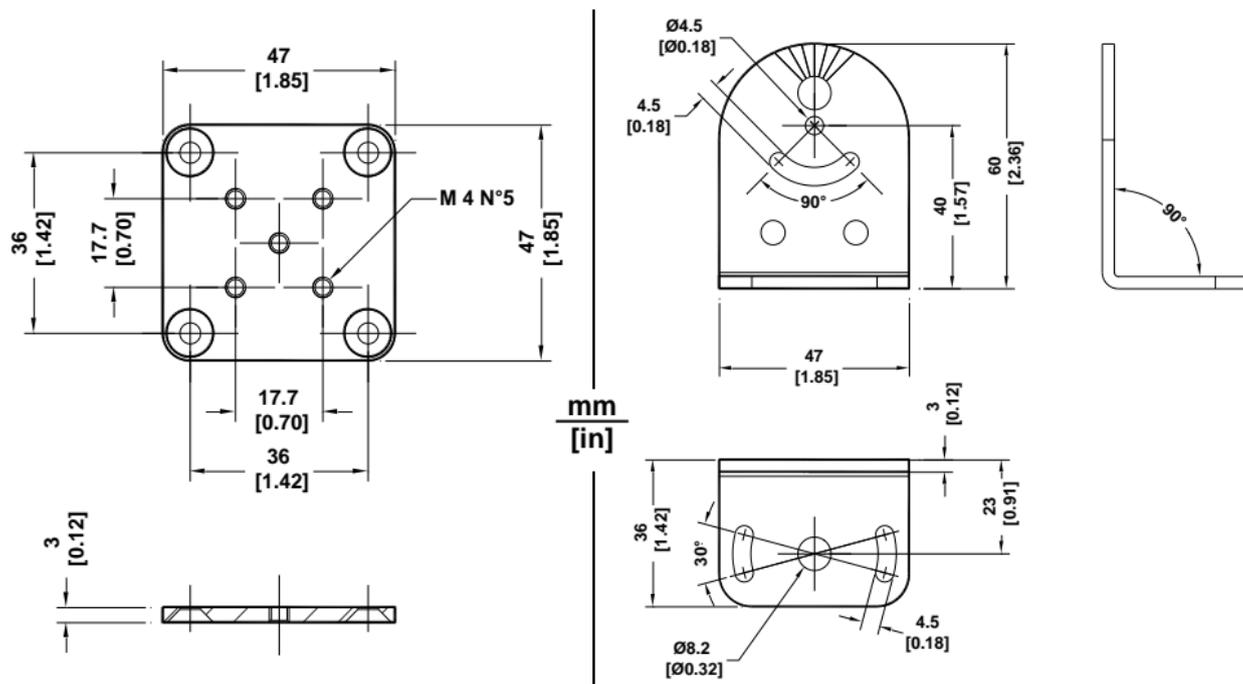


Figure 13 – Mounting Brackets Overall Dimensions

PATENTS

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

Utility patents: US6,512,218 B1; US6,616,039 B1; US6,808,114 B1; US6,997,385 B2; US7,053,954 B1; US7,387,246 B2; US8,058,600 B2; EP996,284 B1; EP999,514 B1; EP1,014,292 B1; EP1,128,315 B1; EP1,396,811 B1; EP1,413,971 B1; JP4,435,343 B2; JP4,571,258 B2.

Additional patents pending.

COMPLIANCE

See the Matrix 300™ Reference Manual for the Declaration of Conformity.

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

Only connect Ethernet and dataport connections to a network which has routing only within the plant or building and no routing outside the plant or building.

EMC COMPLIANCE

In order to meet the EMC requirements:

- connect reader chassis to the plant earth ground by means of a flat copper braid shorter than 100 mm;
- connect pin "Earth" of the CBX connection box to a good Earth Ground;
- for direct connections, connect your cable shield to the locking ring nut of the connector

POWER SUPPLY

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

This product is intended to be connected to a UL Listed Computer (LPS or “Class 2”) which supplies power directly to the reader, or a UL Listed Direct Plug-in Power Unit (rated 10 to 30 V, minimum 1 A) marked LPS or “Class 2”, or Power over Ethernet source Device supplied by UL Listed Direct Plug-in Power Unit marked LPS or “Class 2”.

CE COMPLIANCE

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

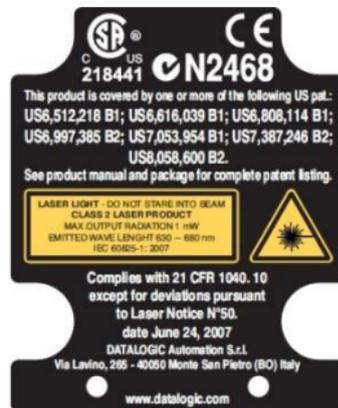
LASER SAFETY

The Matrix 300™ internal illuminators contain two aiming Laser LEDs used to position the reader.

Therefore the product is classified as a Class 2 laser product according to IEC 60825-1 regulations and as a Class II laser product according to CDRH regulations. Disconnect the power supply when opening the device during maintenance or installation to avoid exposure to hazardous laser light. The laser beam can be switched on or off through a software command.

LED SAFETY

LED emission according to EN 62471.



FCC COMPLIANCE

Modifications or changes to this equipment without the expressed written approval of Datalogic could void the authority to use the equipment.

This device complies with PART 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference which may cause undesired operation.

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.