



# Matrix 410™

## QUICK REFERENCE GUIDE

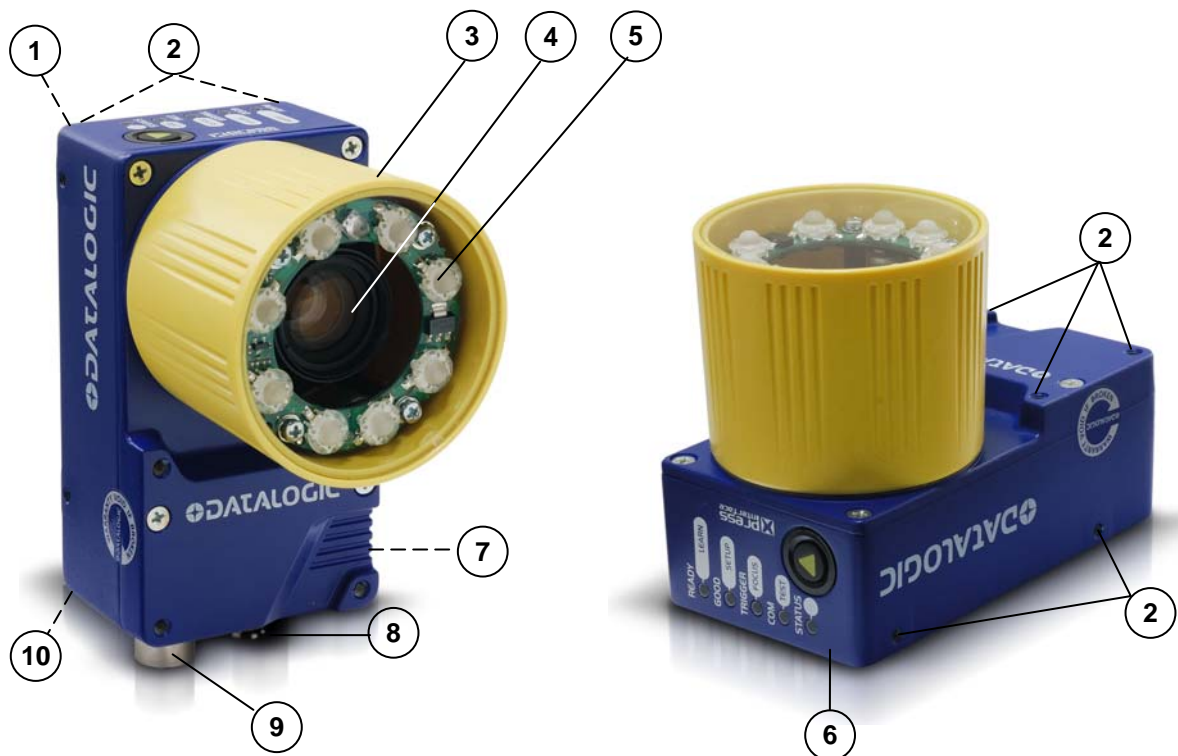


Figure A

- |   |  |
|---|--|
| ① Device Class Label                        | ⑥ HMI X-PRESS™ Interface                         |
| ② Mounting Holes (12)                       | ⑦ "POWER ON" LED                                 |
| ③ Lens Cover                                | ⑧ Power - Serial Interfaces - I/O Connector      |
| ④ Lens (separate accessory)                 | ⑨ Ethernet Connector (Ethernet Models Only)      |
| ⑤ Internal Illuminator (separate accessory) | ⑩ Ethernet Connection LED (Ethernet Models Only) |



### NOTE

*This manual illustrates a Stand Alone application. For other types of installations, such as ID-NET™, Pass-Through, Multiplexer Layout, etc. and for a complete reader configuration using the VisiSet™ configuration program, refer to the Matrix 410™ Reference Manual available on the CD and also downloadable from the Web at [www.automation.datalogic.com](http://www.automation.datalogic.com).*

## UPDATES AVAILABILITY

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- UK/US** The latest drivers and documentation updates for this product are available on Internet.  
Log on to: [www.automation.datalogic.com](http://www.automation.datalogic.com)
- I** Su Internet sono disponibili le versioni aggiornate di driver e documentazione di questo prodotto.  
Collegarsi a: [www.automation.datalogic.com](http://www.automation.datalogic.com)
- F** Les versions mises à jour de drivers et documentation de ce produit sont disponibles sur Internet.  
Cliquez sur : [www.automation.datalogic.com](http://www.automation.datalogic.com)
- D** Im Internet finden Sie die aktuellsten Versionen der Treiber und Dokumentation von diesem Produkt.  
Adresse : [www.automation.datalogic.com](http://www.automation.datalogic.com)
- E** En Internet están disponibles las versiones actualizadas de los drivers y documentación de este producto.  
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- **PRODUCTS**

Search through the links to arrive at your product page which describes specific Info, Features, Applications, Models, Accessories, and Downloads including the [VisiSet™](#) utility program, which allows device configuration using a PC. It provides RS232 and Ethernet interface configuration.

- **SERVICE**

- **Overview** - Warranty Extensions and Maintenance Agreements
- **Sales Network**- Listing of Subsidiaries, Repair Centers, Partners
- **Helpdesk**
- **Material Return Authorization**

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## STEP 1 – ASSEMBLE THE READER

The first step to perform is to assemble the accessories that make up the Matrix 410™ reader. The lens and either an internal or an external illuminator must be used. This procedure shows an internal illuminator.



**CAUTION**

*Matrix 410™ must be disconnected from the power supply during this procedure.*

1. In a dust-free environment, remove the Matrix 410™ Lens Cover by unscrewing it.



**CAUTION**

*Do not touch the sensor aperture, lens glass or lens cover glass. These areas must be kept clean. Avoid any abrasive substances that might damage these surfaces during cleaning.*

2. Remove the sensor protection label by pulling it off of the base.
3. Mount the lens by screwing it tightly onto the base.

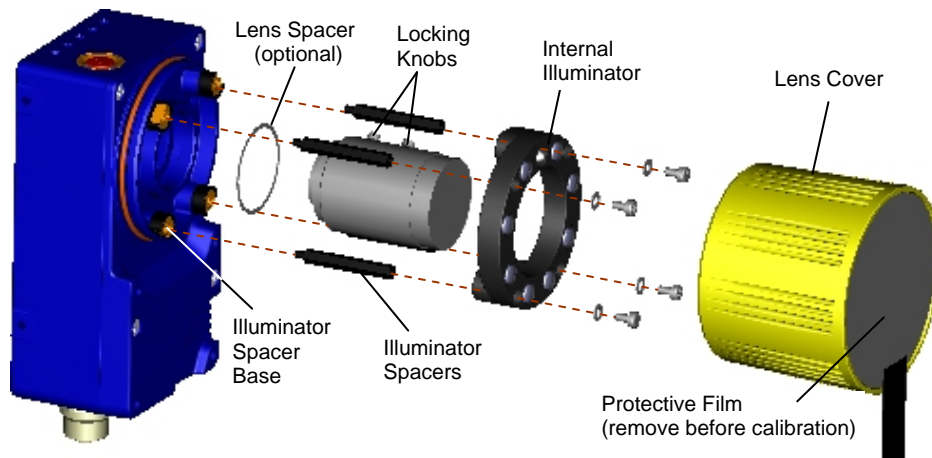
If the Locking Knobs on the lens are obstructed because they are aligned behind an illuminator spacer base and illuminator spacer, insert the Lens Spacer between the Matrix 410™ body and the C-Mount lens so that the Locking Knobs will be unobstructed.



**NOTE**

*It is strongly recommended to apply a lens locking sticker (provided with the lens), for applications where Matrix 410™ is subjected to vibration.*

4. If using an internal illuminator:
  - a. Mount the four internal illuminator spacers onto the illuminator spacer bases provided on the Matrix 410™ body.
  - b. Align and mount the Illuminator tightly onto the spacers using the four screws and washers provided in the illuminator package. The spacers are positioned asymmetrically to avoid incorrect alignment.
5. To keep dust and dirt off of the lens during mounting, temporarily replace the lens cover.



**Figure 1 – Assembling Matrix 410™ Accessories**

## REQUIRED ACCESSORIES

The following table shows the correct lens/illuminator combinations to be used for Matrix 410™ imager assembly.

Lenses			Internal Illuminators		
93ACC1793	LNS-1006	6 mm C-Mount Lens (only for Matrix 410 600-0x0 models)	93A401020 93A401022	LT-002 LT-004	Red Wide Angle White Wide Angle
93ACC1794	LNS-1109	9 mm C-Mount Lens	93A401020 93A401022	LT-002 LT-004	Red Wide Angle White Wide Angle
93ACC1795	LNS-1112	12.5 mm C-Mount Lens	93A401020 93A401022	LT-002 LT-004	Red Wide Angle White Wide Angle
93ACC1796	LNS-1116	16 mm C-Mount Lens	93A401019 93A401021	LT-001 LT-003	Red Narrow Angle White Narrow Angle
93ACC1797	LNS-1125	25 mm C-Mount Lens	93A401019 93A401021	LT-001 LT-003	Red Narrow Angle White Narrow Angle
93ACC1798	LNS-1135	35 mm C-Mount Lens	93A401024	LT-006	Red Super Narrow Angle
93ACC1799	LNS-1150	50 mm C-Mount Lens	93A401024	LT-006	Red Super Narrow Angle

## STEP 2 – CONNECT THE SYSTEM

To connect the system in a Stand Alone configuration, you need the hardware indicated in Figure 2. 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.

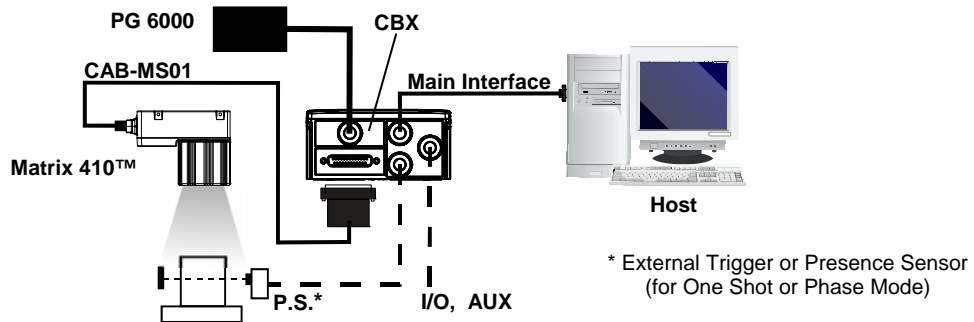


Figure 2 – Matrix 410™ in Stand Alone Layout


### CBX100/CBX500 Pinout for Matrix 410™

The table below gives the pinout of the CBX100/CBX500 terminal block connectors. Use this pinout when the Matrix 410™ reader is connected by means of the CBX100/CBX500:

CBX100/500 Terminal Block Connectors			
<b>Power</b>		<b>Outputs</b>	
Vdc	Power Supply Input Voltage +	+V	Power Source - Outputs
GND	Power Supply Input Voltage -	-V	Power Reference - Outputs
Earth	Protection Earth Ground	O1+	Output 1 +
		O1-	Output 1 -
		O2+	Output 2 +
		O2-	Output 2 -
<b>Inputs</b>		<b>Auxiliary Interface</b>	
+V	Power Source – External Trigger	TX	Auxiliary Interface TX
I1A	External Trigger A (polarity insensitive)	RX	Auxiliary Interface RX
I1B	External Trigger B (polarity insensitive)	SGND	Auxiliary Interface Reference
-V	Power Reference – External Trigger		
+V	Power Source – Inputs		
I2A	Input 2 A (polarity insensitive)	<b>ID-NET™</b>	
I2B	Input 2 B (polarity insensitive)	REF	Network Reference
-V	Power Reference – Inputs	ID+	ID-NET™ network +
		ID-	ID-NET™ network -
<b>Shield</b>			
Shield	Network Cable Shield		

CBX100/500 Terminal Block Connectors			
Main Interface			
	RS232	RS485 Full-Duplex	RS485 Half-Duplex
	TX	TX+	RTX+
	RTS	TX-	RTX-
	RX	*RX+	
	CTS	*RX-	
	SGND	SGND	SGND

\* Do not leave floating, see Reference Manual for connection details.



**CAUTION**

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

### 19-pin Connector Pinout for Matrix 410™

The table below gives the pinout of the 19-pin M16 male connector for connection to the power supply and input/output signals. Use this pinout when the Matrix 410™ reader is connected by means of the 19-pin connector:

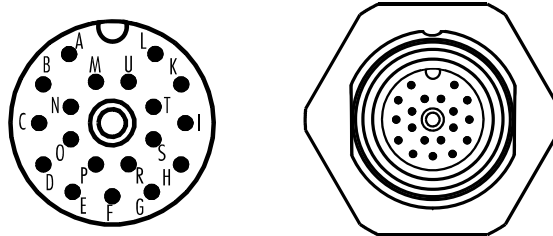


Figure 3 - 19-pin M16 Male Connector

19-pin M16 male connector pinout				
Pin	Name	Function		
A	Vdc	Power supply input voltage +		
L	GND	Power supply input voltage -		
K	CHASSIS	Cable shield internally connected by capacitor to the chassis		
B	I1A	External Trigger A (polarity insensitive)		
C	I1B	External Trigger B (polarity insensitive)		
D	I2A	Input 2 A (polarity insensitive)		
E	I2B	Input 2 B (polarity insensitive)		
H	O1+	Output 1 +		
F	O1-	Output 1 -		
G	O2+	Output 2 +		
I	O2-	Output 2 -		
S	RX	Auxiliary RS232 RX		
O	TX	Auxiliary RS232 TX		
R	ID+	ID-NET™ network +		
P	ID-	ID-NET™ network -		
Pin	Name	RS232	RS485 Full-Duplex	RS485 Half-Duplex
M	MAIN INTERFACE (SW SELECTABLE)	TX	TX+	RTX+
U		RX	*RX+	
N		RTS	TX-	RTX-
T		CTS	*RX-	

\* Do not leave floating, see Reference Manual for connection details.

## STEP 3 – MOUNT AND POSITION THE READER

1. To mount the Matrix 410™, use the mounting brackets to obtain the most suitable position for the reader. Two of the most common mounting configurations are shown in the figures below. Other mounting solutions are provided in the Matrix 410™ Reference Manual.

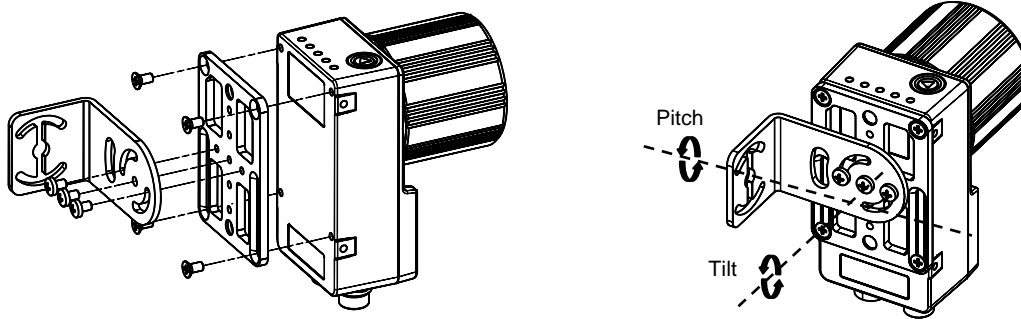


Figure 4 –Positioning with Mounting Bracket (Back)

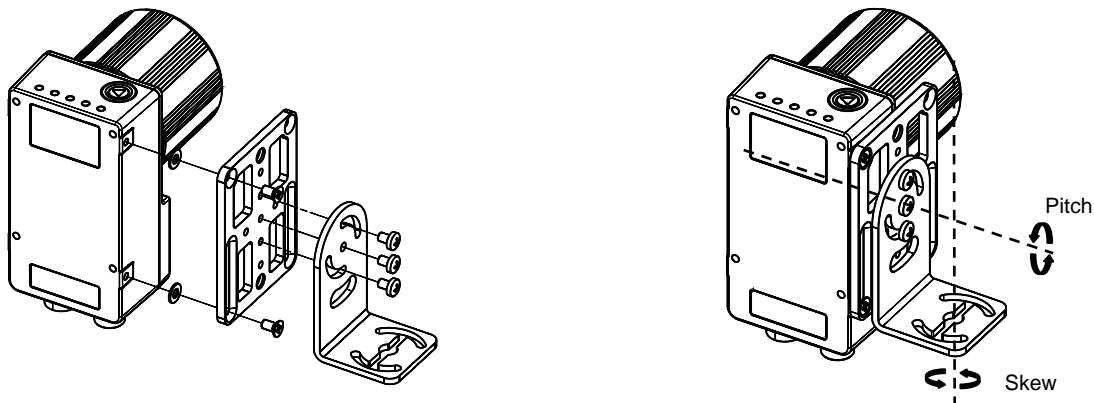


Figure 5 –Positioning with Mounting Bracket (Side)

2. When mounting the Matrix 410™ 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.

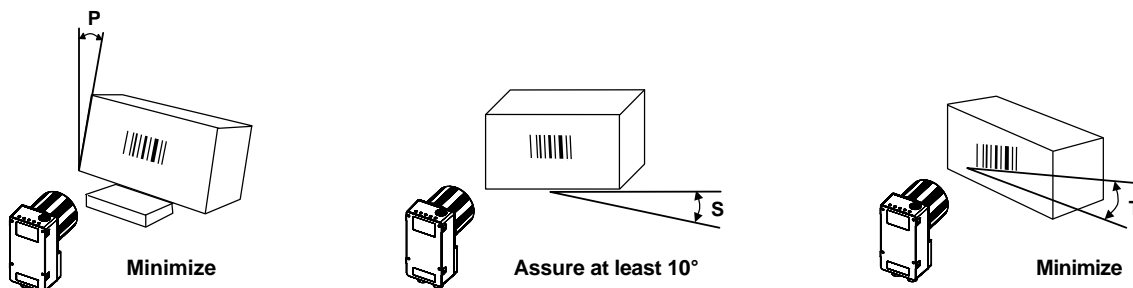


Figure 6 – Pitch, Skew and Tilt Angles

3. Refer to the Optical Accessory Selection table in the Appendix of this Quick Reference Guide for **FOV calculation** and **minimum distance requirements** according to the base/lens combination used for your application.



**NOTE**

Rapid Configuration of the Matrix 410™ reader can be made **either** through the X-PRESS™ interface (steps 4-6) which requires no PC connection, **or** by using the VisiSet™ Setup Wizard (steps 7-8). Select the procedure according to your needs.

## STEP 4 – FOCUS THE READER

Matrix 410™ provides a built-in tool called Blue Diamonds™ to aid focusing the reader. The Blue Diamonds™ are accessed through the X-PRESS™ Interface.

1. Remove the lens cover in order to focus the reader.
2. Prepare the correct accessory lens for your application:
  - a. Loosen the two Locking Knobs on the lens.
  - b. Adjust the Focus ring to the "**Far position**" and the Diaphragm ring to the "**F4**"<sup>1</sup> number setting which is the preferred setting for installation.
3. Power the reader on. During the reader startup (reset or restart phase), all the LEDs blink for one second. On the connector side of the reader near the cable, the "POWER ON" LED (blue) indicates the reader is correctly powered.
4. Enter the Focus function by pressing and holding the X-PRESS™ push button until the Focus LED is on.
5. Release the button to enter the Focus function. The Blue Diamonds™ turn on.

The procedure is as follows:

- a. Adjust the Focus ring towards the "Near position" until the Blue Diamonds™ are perfectly in focus, see Figure 8.

At long focal distances a "skew" angle may cause a noticeable difference in focus between the two diamonds, in this case select the best possible focus (both diamonds slightly out of focus). Tighten the Focus Locking Knob.

- b. Tighten the Diaphragm Locking Knob.

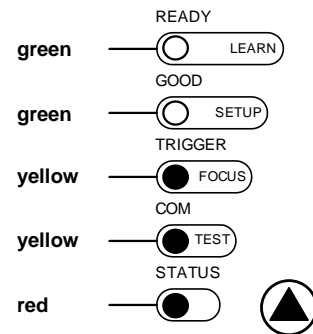



Figure 7 – X-PRESS™ Interface: Focus Function



**NOTE** If necessary you can use the Fine Focusing Tool in the VisiSet™ Setup Wizard for fine focusing. See Step 8.

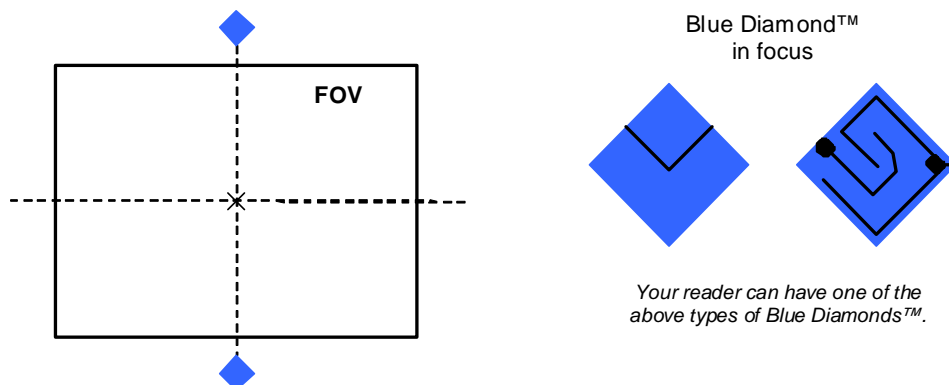


Figure 8 – Focus Function Using Blue Diamonds™

6. Exit the Focus function by pressing the X-PRESS™ push button once. The Blue Diamonds™ turn off.
7. Replace the lens cover, screwing it tightly to the base.

<sup>1</sup> For far reading distances, the Diaphragm ring can be set to values between F2 and F4 to increase image lighting and Blue Diamond™ visibility.

## STEP 5 – CALIBRATE IMAGE DENSITY

In order to function correctly to the fullest extent of its capabilities, Matrix 410™ must acquire information regarding image density or PPI (pixels per inch). This calibration takes place through the X-PRESS™ Interface and the **Grade A Barcode Test Chart** included in the package. This procedure is necessary for the first time installation, if the lens type is changed or if the focal distance is changed.

### LOCATE

1. Enter the Focus function by pressing and holding the X-PRESS™ push button until the Focus LED is on.
2. Release the button to enter the Focus function. The Blue Diamonds™ turn on.
3. From the **Grade A Barcode Test Chart**, select the longest code whose length fits between the two Blue Diamonds™. Rotate the code 90 degrees and position the code at the center of the FOV (equidistant from the Blue Diamonds™).



4. Exit the Focus function by pressing the X-PRESS™ push button once. The Blue Diamonds™ turn off.

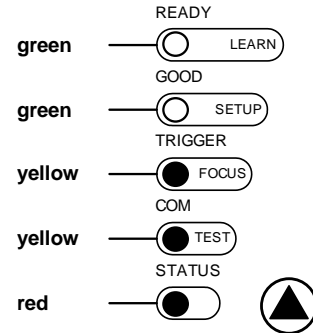


Figure 9 – X-PRESS™ Interface: Locate Function

### SETUP

5. Enter the Setup function by pressing and holding the X-PRESS™ push button until the Setup LED is on.
6. 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 remain on continuously and Matrix 410™ emits 3 high pitched beeps.

If the calibration cannot be reached after a timeout of about 5 (five) seconds Matrix 410™ will exit without saving the parameters to memory, the Setup LED will not remain on continuously but it will just stop blinking. In this case Matrix 410™ emits a long low pitched beep.

7. Exit the Setup function by pressing the X-PRESS™ push button once.

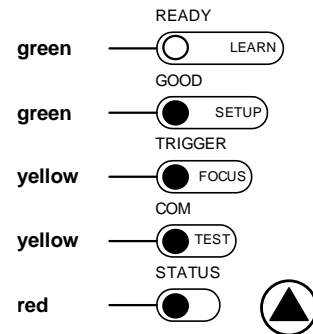


Figure 10 – X-PRESS™ Interface: Setup Function

### LEARN

8. Enter the Learn function by pressing and holding the X-PRESS™ push button until the Learn LED is on.
9. 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 Density value is successfully saved in the reader memory, the Learn LED will remain on continuously, the Green Spot is activated and Matrix 410™ emits 3 high pitched beeps.

If the calibration cannot be reached after a timeout of about 3 (three) minutes Matrix 410™ will exit without saving the parameters to memory, the Learn LED will not remain on continuously but it will just stop blinking. In this case Matrix 410™ emits a long low pitched beep.

10. Exit the Learn function by pressing the X-PRESS™ push button once.

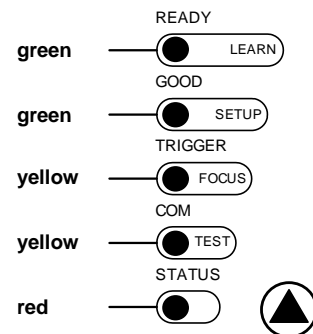


Figure 11 – X-PRESS™ Interface: Learn Function



## STEP 6 – X-PRESS™ CONFIGURATION

Once Matrix 410™ has calibrated image density, you can 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.

### LOCATE

1. Enter the Focus function by pressing and holding the X-PRESS™ push button until the Focus LED is on.
2. Release the button to enter the Focus function. The Blue Diamonds™ turn on.
3. **Select a code from your application.** Position the code at the center of the FOV (equidistant from the Blue Diamonds™).
4. Exit the Focus function by pressing the X-PRESS™ push button once. The Blue Diamonds™ turn off.

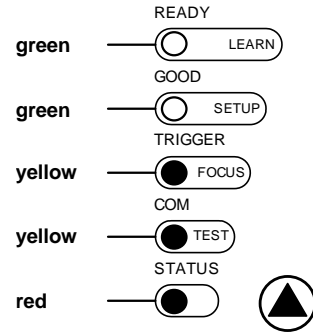


Figure 12 – X-PRESS™ Interface: Locate Function

### SETUP

5. Enter the Setup function by pressing and holding the X-PRESS™ push button until the Setup LED is on.
6. 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 remain on continuously and Matrix 410™ emits 3 high pitched beeps.

If the calibration cannot be reached after a timeout of about 5 (five) seconds Matrix 410™ will exit without saving the parameters to memory, the Setup LED will not remain on continuously but it will just stop blinking. In this case Matrix 410™ emits a long low pitched beep.

7. Exit the Setup function by pressing the X-PRESS™ push button once.

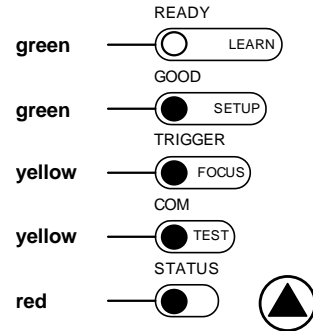


Figure 13 – X-PRESS™ Interface: Setup Function

### LEARN

8. Enter the Learn function by pressing and holding the X-PRESS™ push button until the Learn LED is on.
9. 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 Learn LED will remain on continuously, the Green Spot is activated and Matrix 410™ emits 3 high pitched beeps<sup>1</sup>.

If the autolearning cannot be reached after a timeout of about 3 (three) minutes Matrix 410™ will exit without saving the parameters to memory, the Learn LED will not remain on continuously but it will just stop blinking. In this case Matrix 410™ emits a long low pitched beep.

10. Exit the Learn function by pressing the X-PRESS™ push button once.

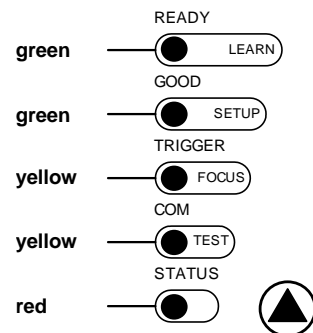


Figure 14 – X-PRESS™ Interface: Learn Function



**NOTE**

*If you have used this procedure to configure Matrix 410™ go to step 9.*

<sup>1</sup> The Learn procedure will not recognize Pharmacode symbolologies.

## 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.

## STEP 7 – INSTALLING VISISET™ CONFIGURATION PROGRAM

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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 to consider the reader 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 4.0, XP, Vista or 7, then insert the VisiSet™ CD-ROM, wait for the CD to autorun and follow the installation procedure.**

This configuration procedure assumes a laptop computer, running VisiSet™, is connected to the reader's auxiliary port.

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

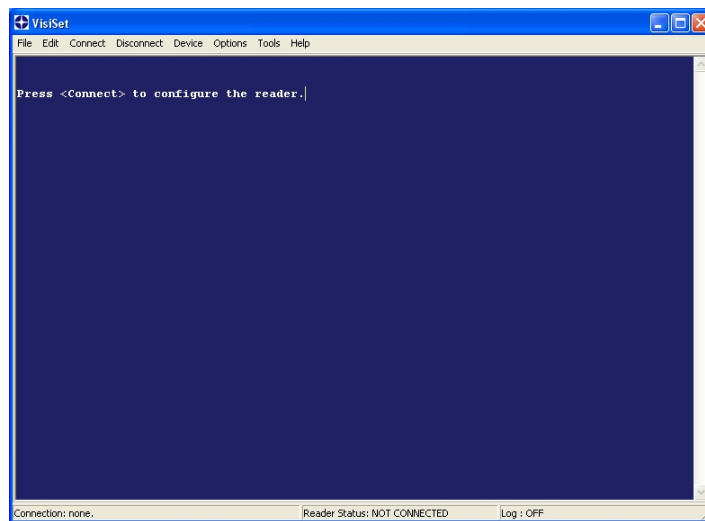


Figure 15 - VisiSet™ Opening Window

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

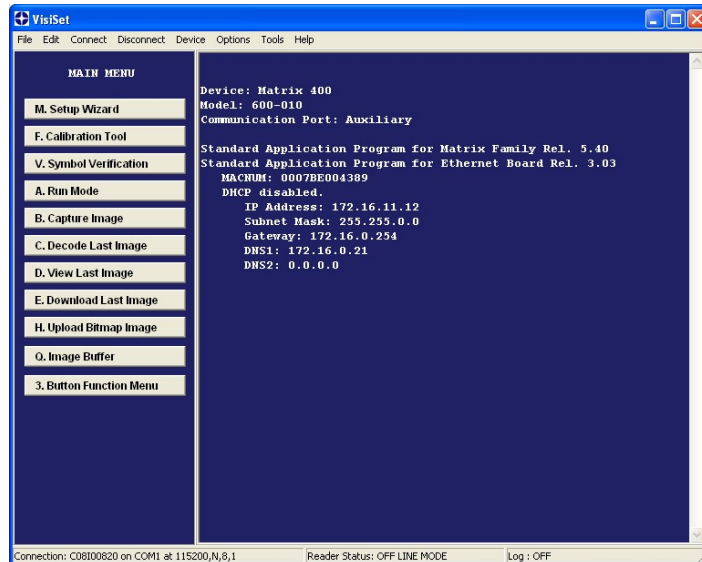
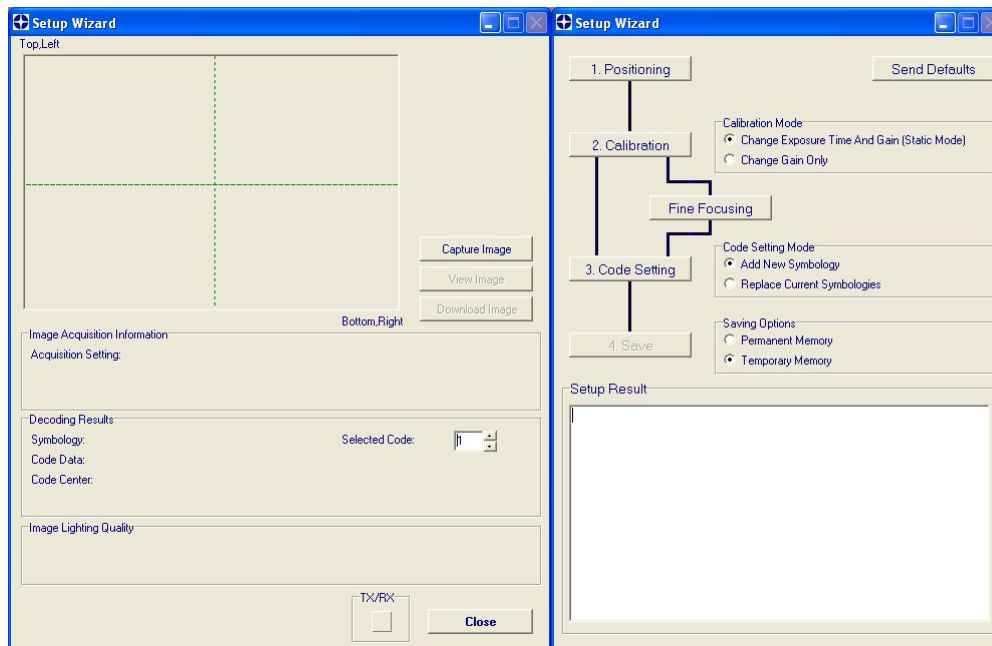


Figure 16 - VisiSet™ Main Window After Connection

## STEP 8 – 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.



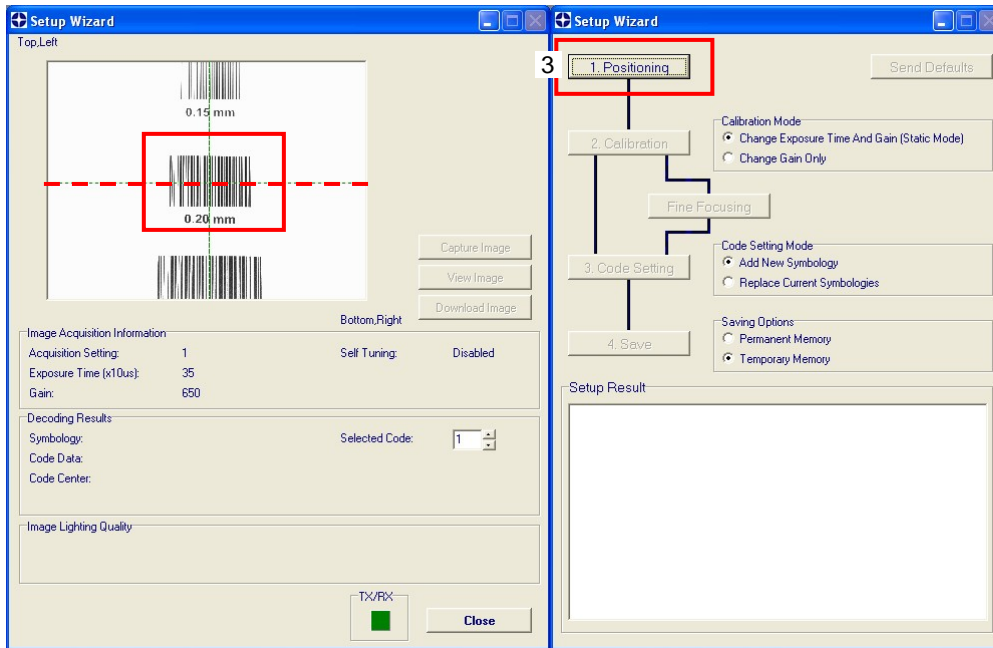
2. Remove the lens cover in order to focus the reader and loosen the two Locking Knobs on the lens.

Adjust the Focus ring to the **"Far position"** and the Diaphragm ring to the **"F4"**<sup>1</sup> number setting which is the preferred setting for installation.

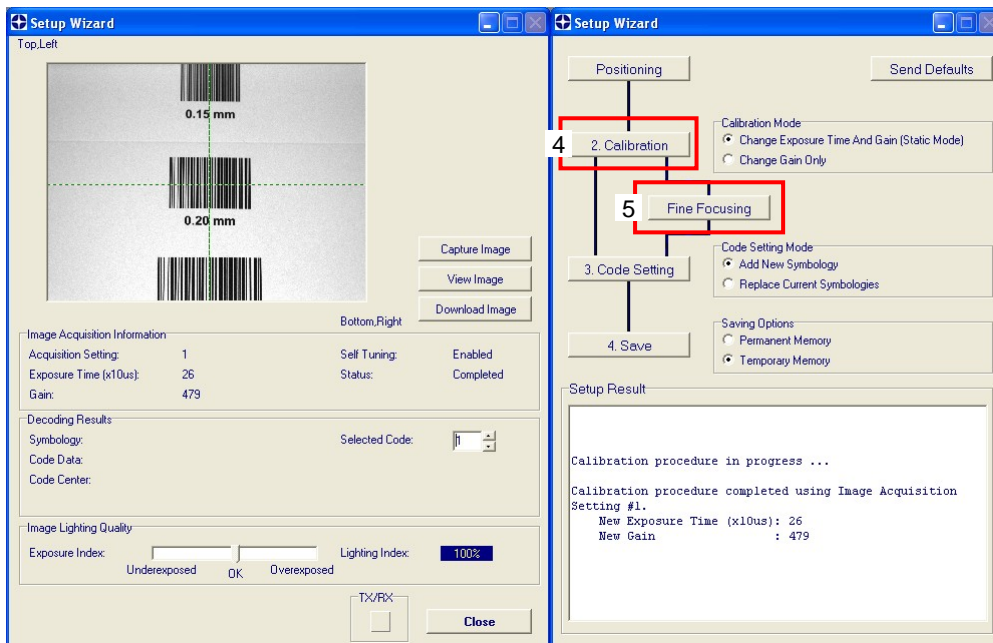
Place the **Grade A Barcode Test Chart** in front of the reader at the correct reading distance (see step 3 and the Optical Accessory Selection table in the Appendix of this Quick Reference Guide).

<sup>1</sup> For far reading distances, the Diaphragm ring can be set to values between **F2** and **F4** to increase image lighting.

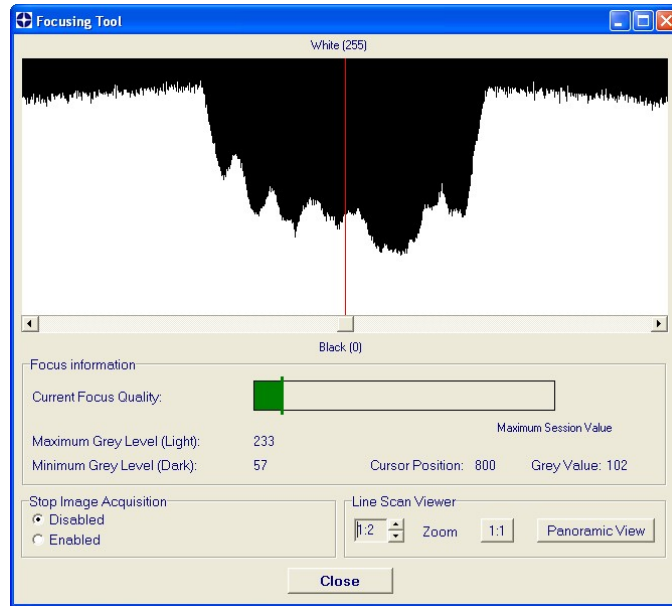
- Press the "Positioning" button. The reader continuously acquires images and gives visual feedback in the view image window. Select the largest code from the chart that completely fits into the view image window. Move the reader (or code) to center it. The code must be aligned across the X-axis reference line at the center of the FOV. See figure below. Press the Positioning button again to stop positioning.



- 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. If the code symbology is enabled by default, the code will also be decoded.

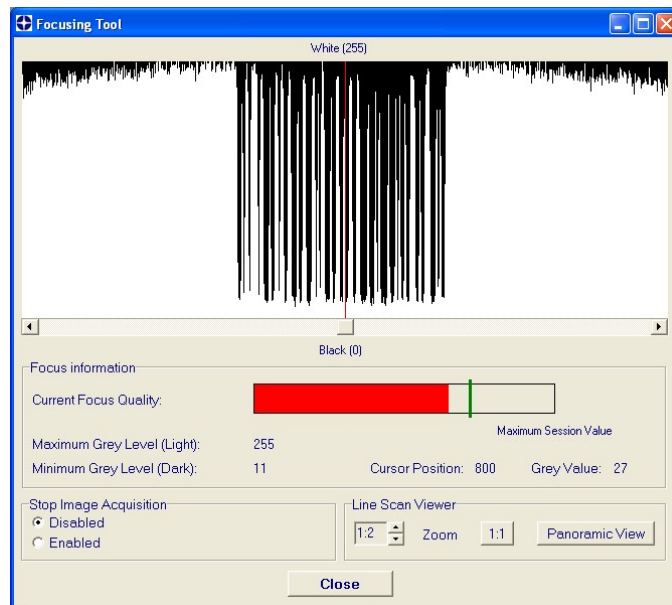


- Press the "Fine Focusing" button to activate the Fine Focusing Tool. The reader continuously acquires images and gives visual feedback on the focusing quality in the Focusing Tool window.

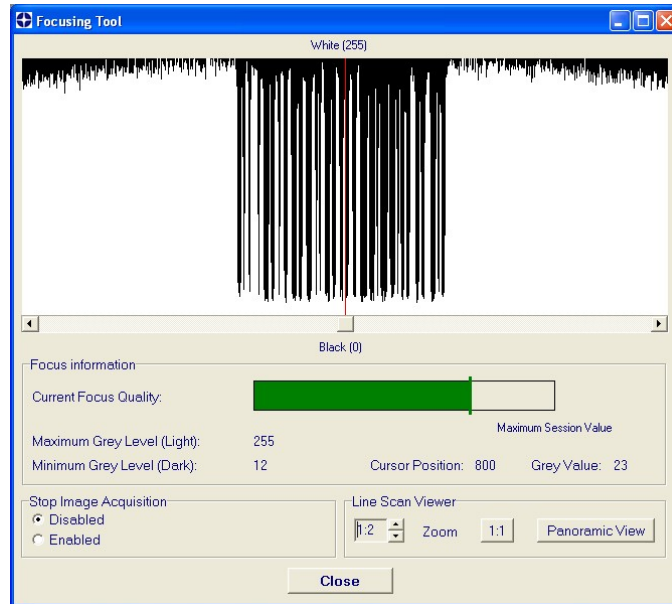


Rotate the Focusing ring on the lens. The Current Focus Quality Bar (green) together with the vertical optimal focus line (green) **increase together** until the optimal focus is reached; the vertical optimal focus line stops.

Continue rotating the Focusing ring on the lens a little farther; **the Current Focus Quality Bar decreases** (red) see below.



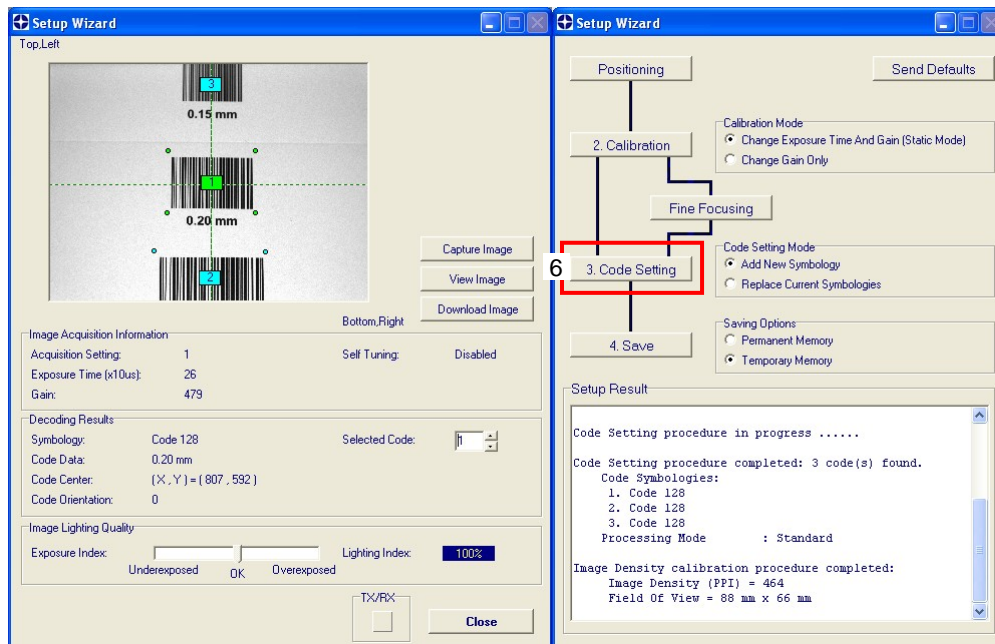
Rotate the Focusing ring in the opposite direction. The Current Focus Quality Bar (green) increases towards the vertical optimal focus line (green) until the optimal focus is reached; **the Current Focus Quality Bar touches the vertical optimal focus line** (indicating the best focus).



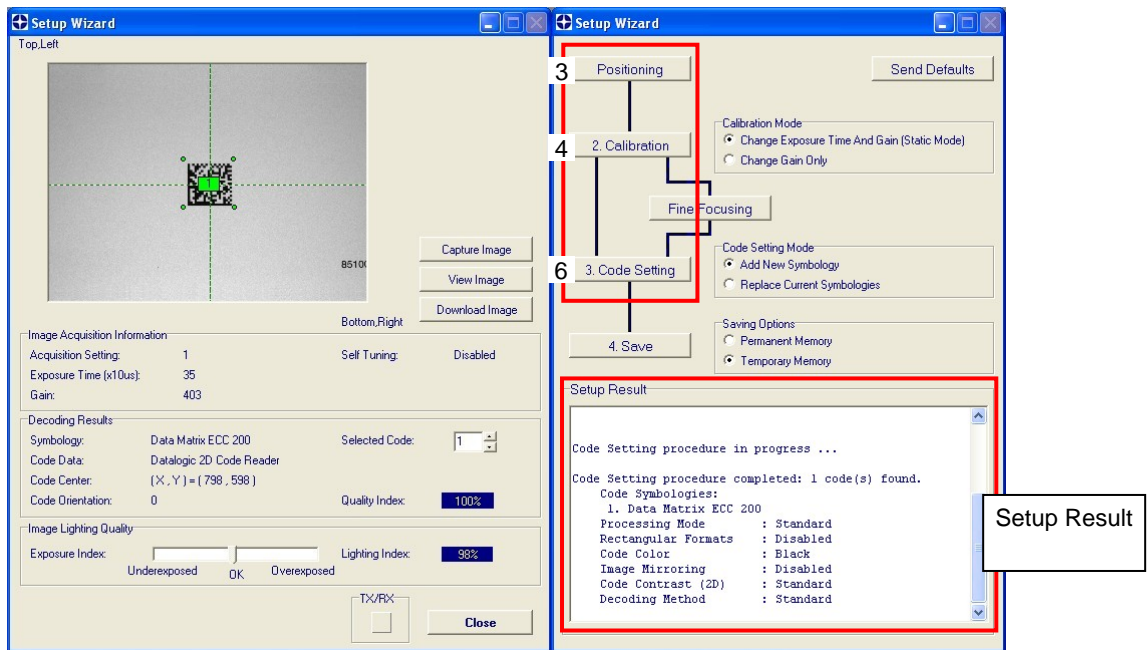
Tighten the Locking Knobs on the lens and press the "Close" button to return to the Setup Wizard.

6. Select a Code Setting Mode choice and press the "Code Setting" button. Using the **Grade A Barcode Test Chart**, this step performs image density calibration in order for Matrix 410™ to function correctly and to the fullest extent of its capabilities.

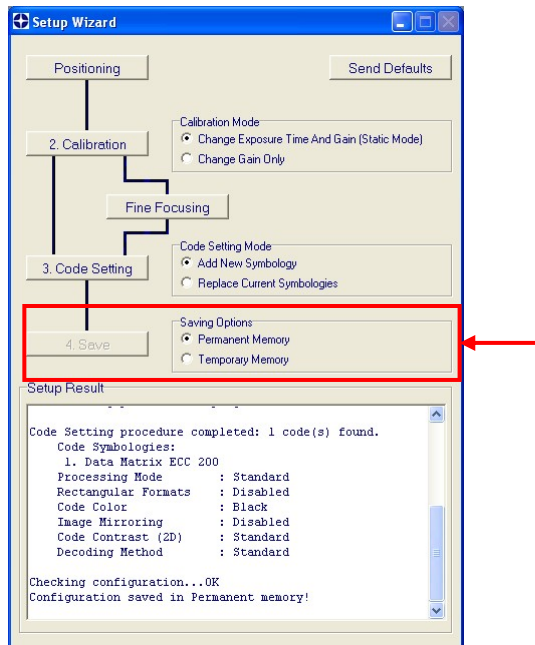
The Setup Result section of the Setup Wizard window shows the code type results and the image density calibration settings.




- Place the **application specific code** in front of the reader at the same reading distance and repeat steps 3, 4, and 6.



- Select a Saving Options choice and press the "Save" button.



- 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 9 – 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.

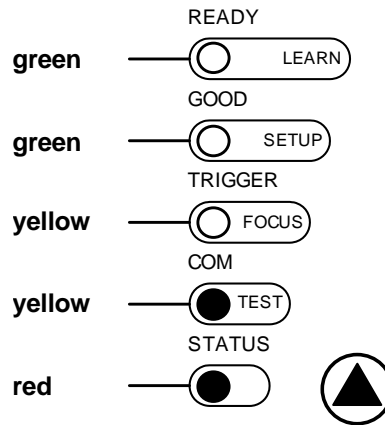



Figure 17 – X-PRESS™ Interface: Test Function

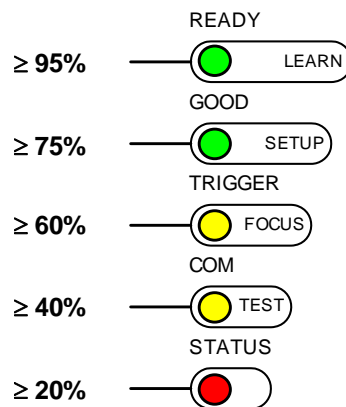
3. To exit the Test, press the X-PRESS™ push button once.



*By default, the Test exits automatically after three minutes.*

**NOTE**

The Bar Graph has the following meaning:





## ADVANCED READER CONFIGURATION

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

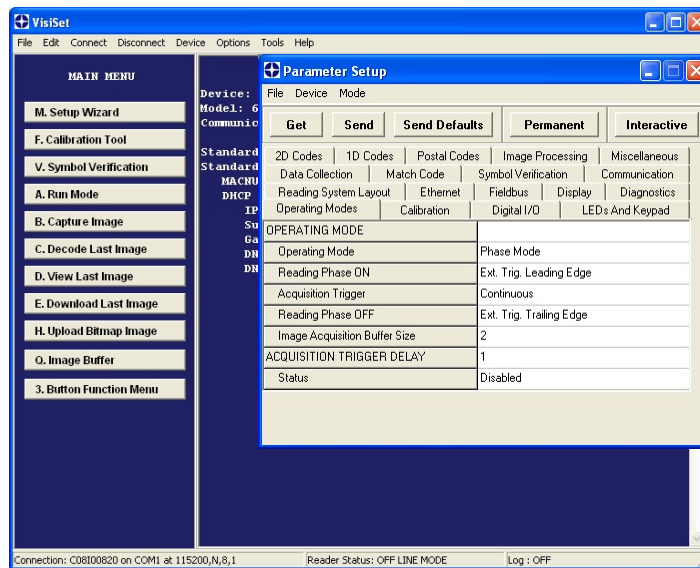


Figure 18 - VisiSet™ Parameter Setup Window

### 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 CD-ROM.

### ALTERNATIVE LAYOUTS

If you need to install an Ethernet network, ID-NET™ network, Fieldbus network, Pass-Through network, Multiplexer network or an RS232 Master/Slave refer to the Matrix 410™ 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 CD-ROM.

### CODE QUALITY VERIFICATION

Matrix 410™ can be used as a Code Quality Verifier according to the ISO/IEC 15415, ISO/IEC 15416, AS9132, and AIM DPM Standards. For more details see the Matrix 410™ Code Quality Verifier Solution manual on the CD-ROM.

## 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.
- *Focus/Locate* to turn on the Blue Diamonds™ to aid focusing and 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.

On the connector side of the reader near the cable, the blue POWER ON LED indicates the reader is correctly powered.

For Ethernet models, on the connector side of the reader near the Ethernet connector, the orange ETHERNET NETWORK PRESENCE LED indicates the on-board Ethernet network connection.



Figure 19 – Power and On-Board Ethernet Network LEDs

## OPTICAL ACCESSORY SELECTION

Referring to Figure 20 and the formula below, use the data in the following table to calculate the FOV for your application.

Model	Lens	Viewing Angle Horizontal	Viewing Angle Vertical	Viewing Angle Diagonal	Min Focus Distance mm
410 400-0x0 (SXGA)	LNS-1109 9 mm	48.5°	39.5°	60°	85
	LNS-1112 12.5 mm	37°	30°	46.5°	85
	LNS-1116 16 mm	28.5°	23°	36°	85
	LNS-1125 25 mm	18.5°	15°	23.5°	135
	LNS-1135 35 mm	13°	10.5°	16.5°	235
	LNS-1150 50 mm	9°	7°	11.5°	500
410 600-0x0 (UXGA)	LNS-1006 6 mm	59.5°	46.5°	71°	85
	LNS-1109 9 mm	40.5°	31°	49.5°	85
	LNS-1112 12.5 mm	31°	23.5°	38°	85
	LNS-1116 16 mm	24°	18°	30°	85
	LNS-1125 25 mm	15°	11.5°	19°	135
	LNS-1135 35 mm	11°	8.5°	13.5°	235
	LNS-1150 50 mm	7.5°	5.5°	9.5°	500

The viewing angle has a tolerance of ± 1° depending on the focus distance.

$$FOV_x = 2 \left[ (d + 35 \text{ mm}) \tan (\alpha_x/2) \right]$$

where:

**FOV<sub>x</sub>** = horizontal, vertical or diagonal FOV

**α<sub>x</sub>** = horizontal, vertical or diagonal viewing angles.

**d** = focus distance (from window surface to code surface)

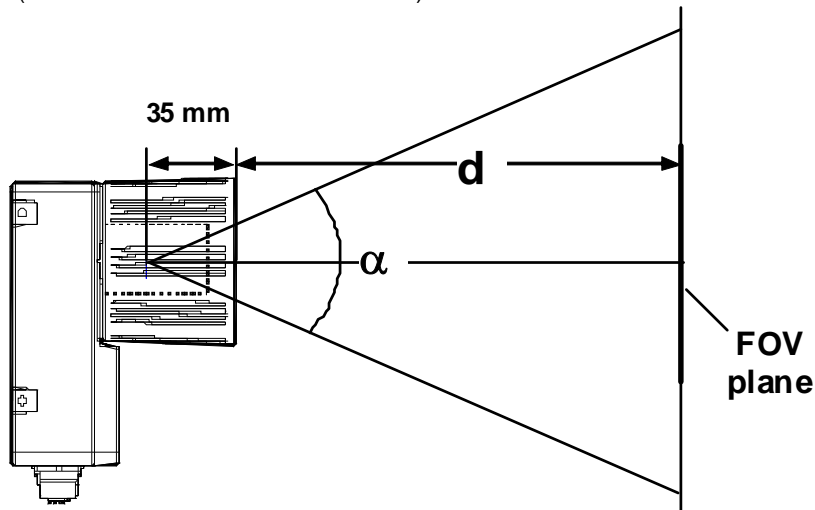


Figure 20 – Reading Distance References

### Example:

The FOV for a **Matrix 410 600-0x0 base** using the **16 mm lens** at a **focus distance of 200 mm** is:

$$FOV_H = 2 [(200 \text{ mm} + 35 \text{ mm}) \tan (24^\circ/2)] = 100 \text{ mm}$$

$$FOV_V = 2 [(200 \text{ mm} + 35 \text{ mm}) \tan (18^\circ/2)] = 74 \text{ mm}$$

## TECHNICAL FEATURES

<b>ELECTRICAL FEATURES</b>		
<b>Power</b>		
Supply Voltage	10 to 30 Vdc	
Consumption	0.8 to 0.27 A, 8 W max.; 0.5 to 0.17 A, 5 W typical	
<b>Communication Interfaces</b>		
Main		
- RS232	2400 to 115200 bit/s	
- RS485 full-duplex	2400 to 115200 bit/s	
- RS485 half-duplex	2400 to 115200 bit/s	
Auxiliary - RS232	2400 to 115200 bit/s	
ID-NET™	Up to 1MBaud	
Ethernet (Ethernet Models only)	10/100 Mbit/s	
<b>Inputs</b>		
Input 1(External Trigger) and Input 2	Opto-coupled and polarity insensitive	
Max. Voltage	30 Vdc	
Max. Input Current	10 mA	
<b>Outputs</b>		
Output 1 and Output 2	Opto-coupled	
V <sub>Out</sub> (I <sub>Load</sub> = 0 mA) Max.	30 Vdc	
V <sub>Out</sub> (I <sub>Load</sub> = 10 mA) Max.	1.8 Vdc	
P <sub>D</sub> = V <sub>Out</sub> × I <sub>Load</sub> Max.	170 mW	
<b>OPTICAL FEATURES</b>		
	<b>4xx-xxx models</b>	<b>6xx-xxx models</b>
Image Sensor	CMOS	CCD
Image Format	SXGA (1280x1024)	UXGA (1600x1200)
Frame Rate	27 frames/sec.	15 frames/sec.
Pitch	± 35°	
Tilt	0° - 360°	
Lighting System	Internal or External Illuminator (accessories)	
LED Safety Class	Class 1 to EN60825-1	
<b>ENVIRONMENTAL FEATURES</b>		
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	IP67 **	
<b>PHYSICAL FEATURES</b>		
Dimensions	125 x 65 x 86 mm (4.92 x 2.56 x 3.39 in.) with lens cover	
Weight	482 g. (17 oz.) with lens and internal illuminator	
Material	Aluminium	

\* high ambient temperature applications should use metal mounting bracket for heat dissipation

\*\* when correctly connected to IP67 cables with seals and the Lens Cover is correctly mounted.

<b>SOFTWARE FEATURES</b>		
<b>Readable Code Symbologies</b>		
<b>1-D and stacked</b>	<b>2-D</b>	<b>POSTAL</b>
<ul style="list-style-type: none"> <li>• PDF417 Standard and Micro PDF417</li> <li>• Code 128 (EAN 128)</li> <li>• Code 39 (Standard and Full ASCII)</li> <li>• Code 32</li> <li>• MSI</li> <li>• Standard 2 of 5</li> <li>• Matrix 2 of 5</li> <li>• Interleaved 2 of 5</li> <li>• Codabar</li> <li>• Code 93</li> <li>• Pharmacode</li> <li>• EAN-8/13 - UPC-A/E (including Addon 2 and Addon 5)</li> <li>• GS1 DataBar Family</li> <li>• Composite Symbologies</li> </ul>	<ul style="list-style-type: none"> <li>• Data Matrix ECC 200 (Standard, GS1 and Direct Marking)</li> <li>• QR Code (Standard and Direct Marking)</li> <li>• MicroQR Code</li> <li>• MAXICODE</li> <li>• Aztec Code</li> </ul>	<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> <li>• PLANET</li> <li>• POSTNET</li> <li>• POSTNET (+BB)</li> <li>• Intelligent Mail</li> <li>• Swedish Post</li> </ul>
<b>Operating Mode</b>	ONE SHOT, CONTINUOUS, PHASE MODE	
<b>Configuration Methods</b>	X-PRESS™ Human Machine Interface Windows™ based SW (VisiSet™) via serial or Ethernet link Serial Host Mode Programming sequences	
<b>Parameter Storage</b>	Permanent memory (Flash)	
<b>CODE QUALITY VERIFICATION</b>		
<b>Standard</b>	<b>Supported Symbologies</b>	
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	
<b>USER INTERFACE</b>		
LED Indicators	Power, Ready, Good; Trigger; Com, Status, (Ethernet Network); (Green Spot)	
Keypad Button	Configurable via VisiSet™	



## PATENTS

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

U.S. patents: 6,512,218 B1; 6,616,039 B1; 6,808,114 B1; 6,997,385 B2; 7,102,116 B2; 7,282,688 B2  
European patents: 999,514 B1; 1,014,292 B1; 1,128,315 B1.

Additional patents pending.

## COMPLIANCE

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See the Matrix 410™ Reference Manual for the Declaration of Conformity.

### 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;

### 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 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.

### 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.

### 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.


## SERIAL NUMBER REFERENCES

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Place the replicate, lens, illuminator and filter serial number labels here for reference. Some of this information can also be written in the Reader Information configuration parameters in the Miscellaneous folder in VisiSet™.

**Serial Numbers**

**Matrix 410™**



**Lens**



**Illuminator**



**Filter**

