Matrix 210™
Software Configuration Parameter Guide for USB Models

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Matrix 210™ Standard Application Program

Matrix 210™ Configuration

This manual refers to Application software version 6.66 running on VisiSet™ 6.70 and later.

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Conventions

The following conventions have been adopted to make the help reading more user-friendly:

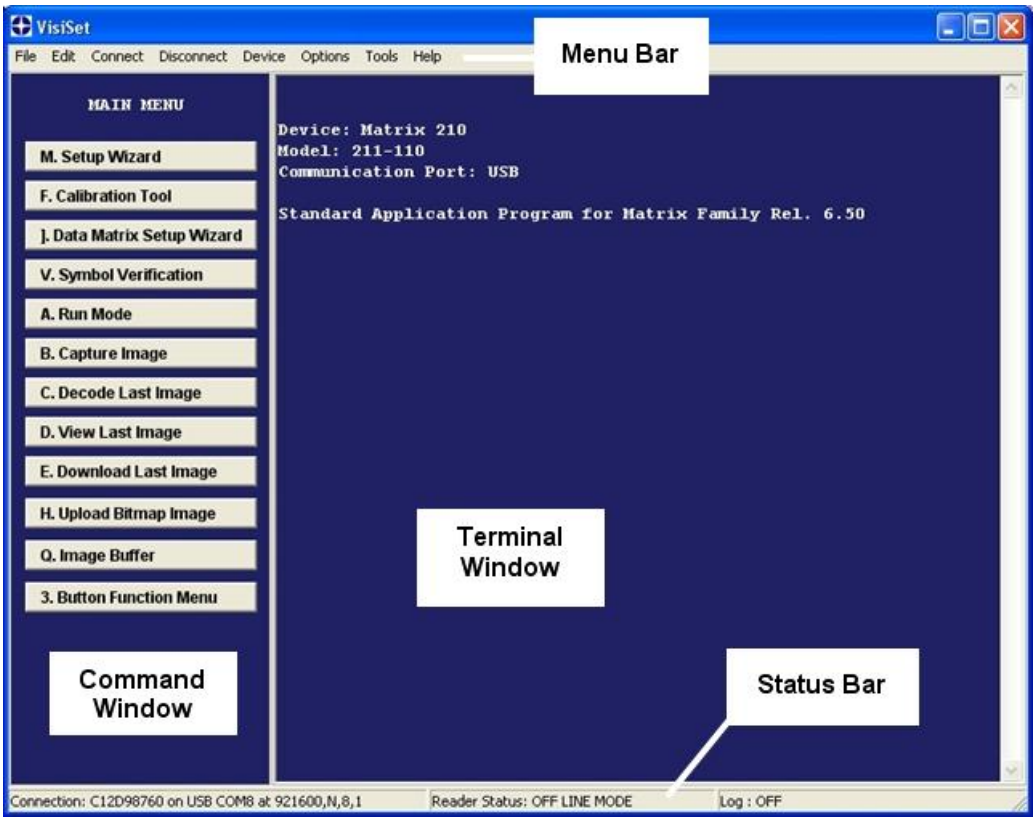
- **Bold** font and CAPITAL letters = name of a group of parameters (ex. **DATA FORMAT**)
- **Bold** and *Italic* font = parameter name (ex. ***Code Field Justification***)
- *Italic* font = parameter value/string (ex. *Disabled*)
- **Black** parameter names = User level parameters
- **Green** parameter names = Installer level parameters

If the words defined by these conventions are underlined, it means they have a link to another topic.

How To Use VisiSet™

VisiSet™ is a user-friendly Windows - based program for the configuration of Datalogic Matrix family readers.

Upon Connection between the Matrix 210™ reader and VisiSet™, the following screen is displayed:

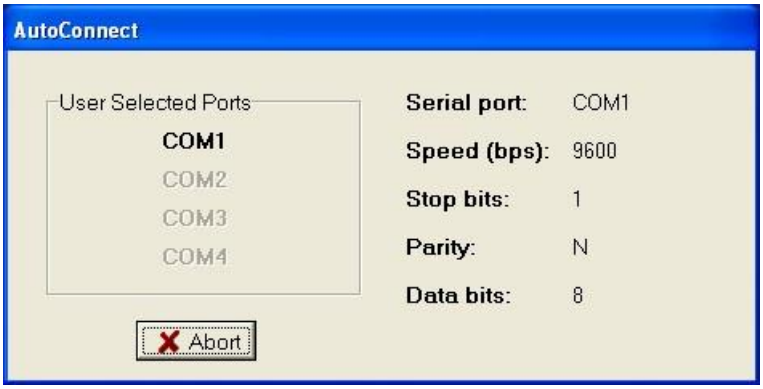


The program always displays the terminal screen on the right side and the VisiSet™ Main Menu on the left side.

From the VisiSet™ Menu Bar the following can be selected:

- The **File** menu provides LOG file and Statistics controls as well as program exit.
- The **Edit** menu allows clearing the screen.
- The **Connect** item automatically connects to the Matrix 210™ reader according to the communication parameters selected in the VisiSet™communication folder of the option menu.

  If *Serial Port* or *USB* has been selected as communication channel within the Communication folder of the Options menu, the program tries the possible communication parameter configurations on any one of the selected serial ports. If the starting attempt (using the last successful configuration) fails, the following dialog box will appear:



  It displays the communication parameters used for the current connection attempt. The port(s) to be explored by VisiSet™ can be selected in the communication folder of the option menu.

Selecting *USB* as communication channel within the Communication folder of the Options menu, allows connection to the virtual COM port with a baud rate up to 921600. This value must match the Baud Rate set for the reader.

Ethernet should not be selected as communication channel. If selected, press the ESC button to stop the connection attempts.

- The **Disconnect** item closes communication between Matrix 210™ and VisiSet™ and causes Matrix 210™ to enter Run Mode.
- The **Device** menu allows you to select:

  while connected:

  Get Configuration From Temporary Memory will download the Matrix 210™ configuration parameters to VisiSet™ and the Parameter Setup window will be displayed.

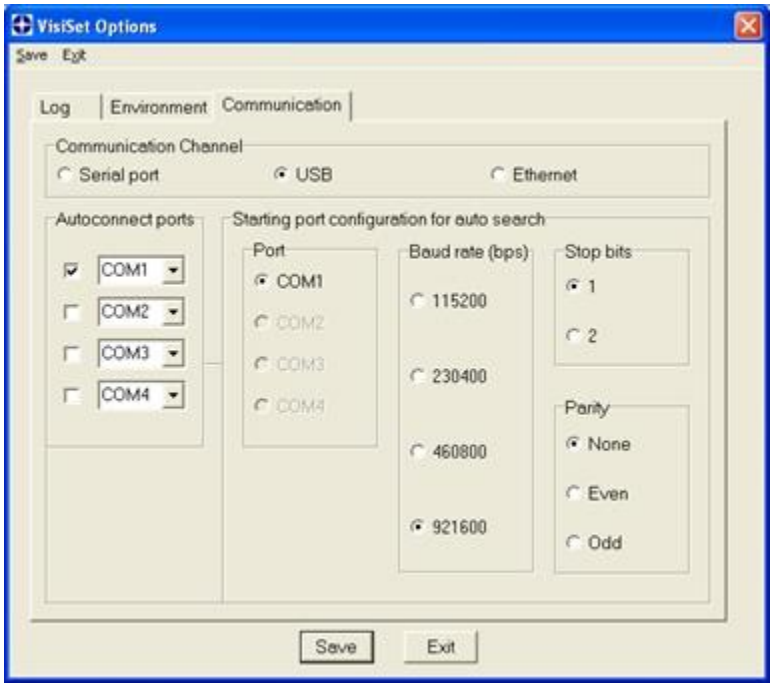
  Parameters Window In Foreground recalls Parameter Setup to be the active window, if open, otherwise it has no effect.

  while disconnected:

  Get Configuration From File opens the Parameter Setup window displaying the parameter values defined in the file. It is necessary to first open the template file (.cmp); then, a configuration file (.ini).

- The **Options** item opens a window where it is possible to select the **Log**, the **Environment** and the **Communication** folders.

  The **Log** folder shows the current Log file name and path which can be modified. The *Log Print Level* allows to select the type of information to insert in the log file. When the *Default open state* is off, VisiSet™ starts running while the logging function is disabled. The *Delete Old Log File* allows clearing the saved log file if it is older than the programmed time whenever logging is activated.
  You can customize the VisiSet™ screen through the **Environment** folder where a preview of the selected font and background are displayed.
  The **Communication** folder allows choosing between serial ports as communication channels. If selecting *Serial port* or *USB*, it is possible to define all the serial ports to explore and the starting port configuration for the Autoconnect procedure. *USB* is the preferred channel since it allows you to connect to the virtual COM port with a baud rate up to 921600. Do not select *Ethernet.*



- The **Tools** menu provides:

  The **Application Program Upgrade** option allows upgrading the Standard Application Program running on the reader.

Upon serial connection the upgrade is performed through the serial port whenever VisiSet™ is connected or disconnected. Then, a .bin file has to be loaded to complete the procedure.

The **Enter Loader** option resets the reader and automatically connects VisiSet™ to the reader's Loader program.

The **Get Reader Order Number** option shows the connected reader ordering code.

The **Get Reader Serial Number** option shows the connected reader serial number.

The **Get Flash Memory Type** option shows the connected reader Flash Memory size.

The **Get RAM Memory Type** option shows the connected reader RAM Memory size.

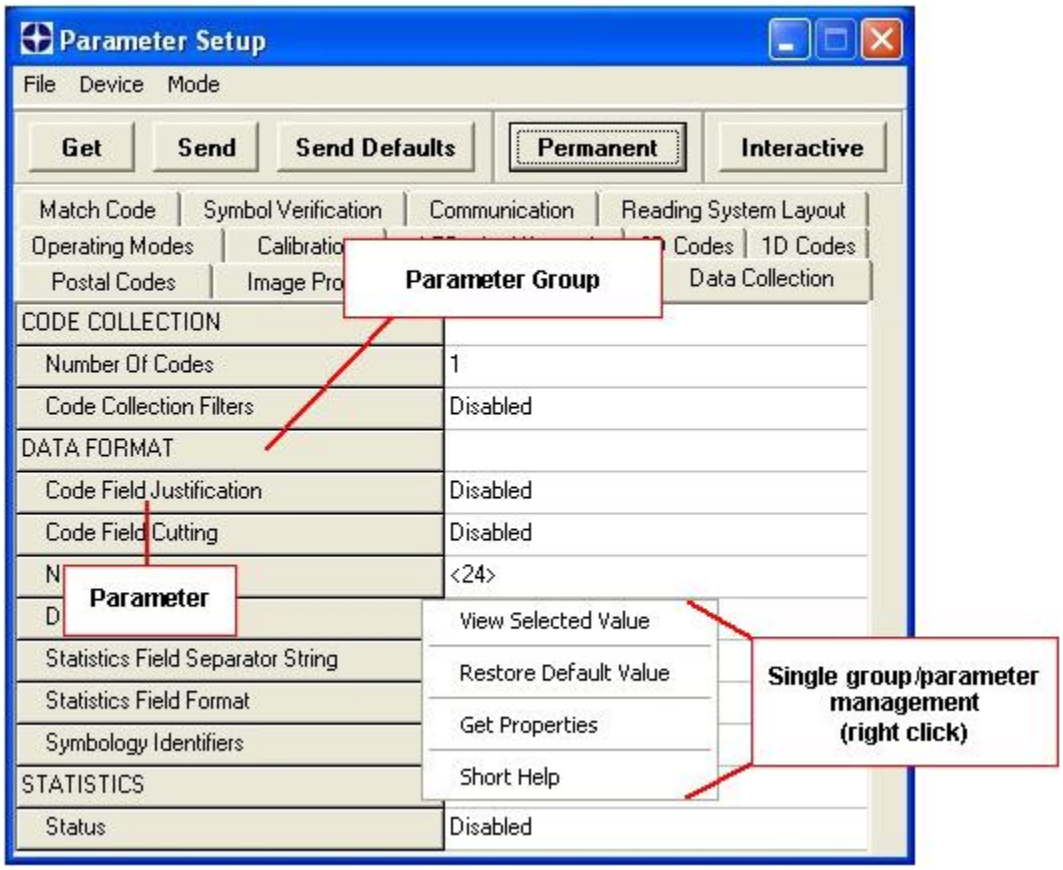
- The **Help** menu provides:

  The **Parameters Help** option opens Help with the active topic structure in outline form in order to make the topic search easier. Clicking on the topic titles directly opens the relative description page.

  The **About VisiSet** option shows information about VisiSet™.

Parameter Setup

By selecting **Get Configuration From Temporary Memory** from the **Device** menu in the VisiSet™ Menu Bar, the Parameter Setup window is displayed.



- The **File** menu provides the following options:

  Load Configuration File: opens a configuration file (.ini) previously saved.

  Save Configuration File: saves the selected parameter values to an .ini file.

  Save Configuration As Text File: saves the selected parameter values to a text file (human readable).

  Exit: exits the window.

- The **Device** menu provides the following options:

  Get Configuration: gets the current parameter configuration from the reader temporary memory. It is also possible to select this option by pressing the corresponding button.

  Send Configuration: saves the selected values to the reader temporary memory (RAM) or to its permanent memory (Flash). It is also possible to select these options by pressing the corresponding buttons. See also Send Configuration Options.

  Send Default Configuration: restores the default values in the reader temporary/permanent memory. It is also possible to select these options by pressing the corresponding buttons. See also Send Configuration Options.

  Select Next/Previous Parameter: scrolls the parameters in the selected folder.

- The **Mode** menu provides the following option:

  Interactive: sends a new parameter value as soon as it is changed by the user. While working in this mode the window font turns to red. It is also possible to select this option by pressing the corresponding button.

Each parameter can be modified by selecting a different item from the prescribed list in the box or by typing new values directly into the parameter box.

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

You can **View Selected Value** for that parameter (this option is not available for the groups).

Restore Default Value can be used to restore the factory default value. If this option is chosen for a parameter group, the default value of all its parameters will be restored.

Get Properties gives information about the default value and the range/list of possible settings for a parameter. On the other hand, for a parameter group this option gives the *group depth* indicating the number of sets of values that can be given to the parameters composing the group (see the **IMAGE ACQUISITION SETTING** group).

Short Help gives a brief description about the parameter function.

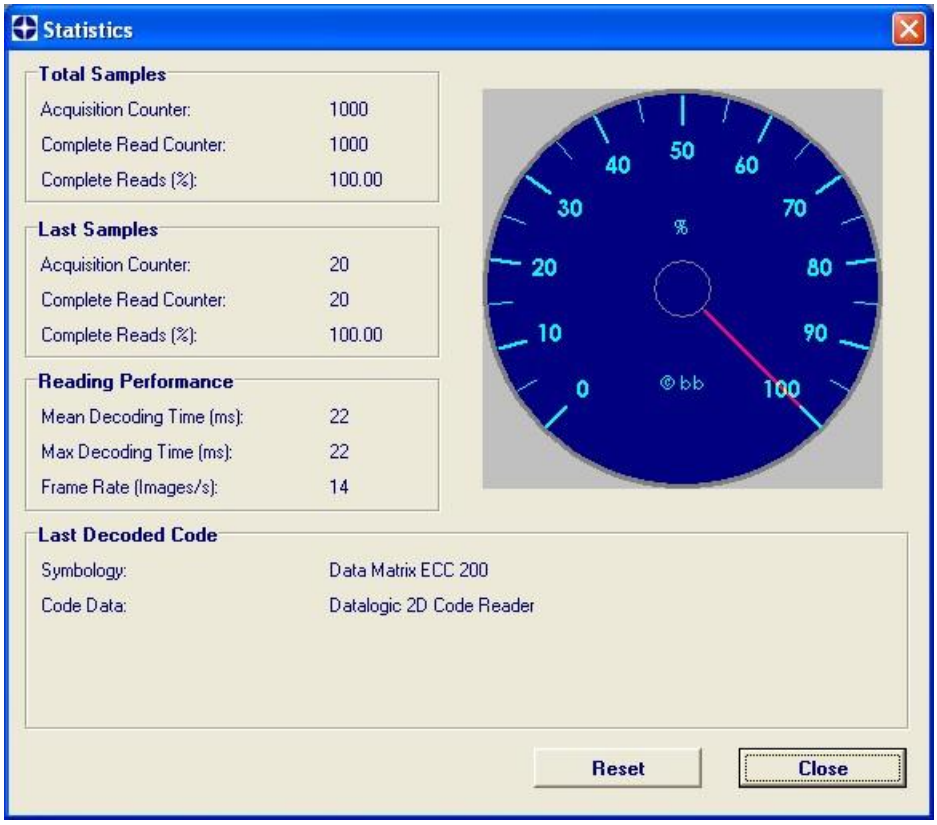
Statistics Window

The Statistics window can be opened from the File menu in the VisiSet™ Menu Bar. The window structure depends on the defined reader configuration.

- 1 -Image Statistics

Match Code = *disabled*
Operating Mode = *One Shot*; *Continuous*; *Phase Mode* (only when ***Code Collection Mode*** = *Within an Image*)

In this case the following window is displayed:



Each sample corresponds to the result of the data collection within an image.

The **Total Samples** area reports the statistical data referring to all the samples elaborated since the running mode has been started or the **Reset** button has been pressed.

The **Last Samples** area reports the statistical data referring to the last sampling.

The **Reading Performance** area reports the decoding performance and the reading rate calculated on the last sampling.

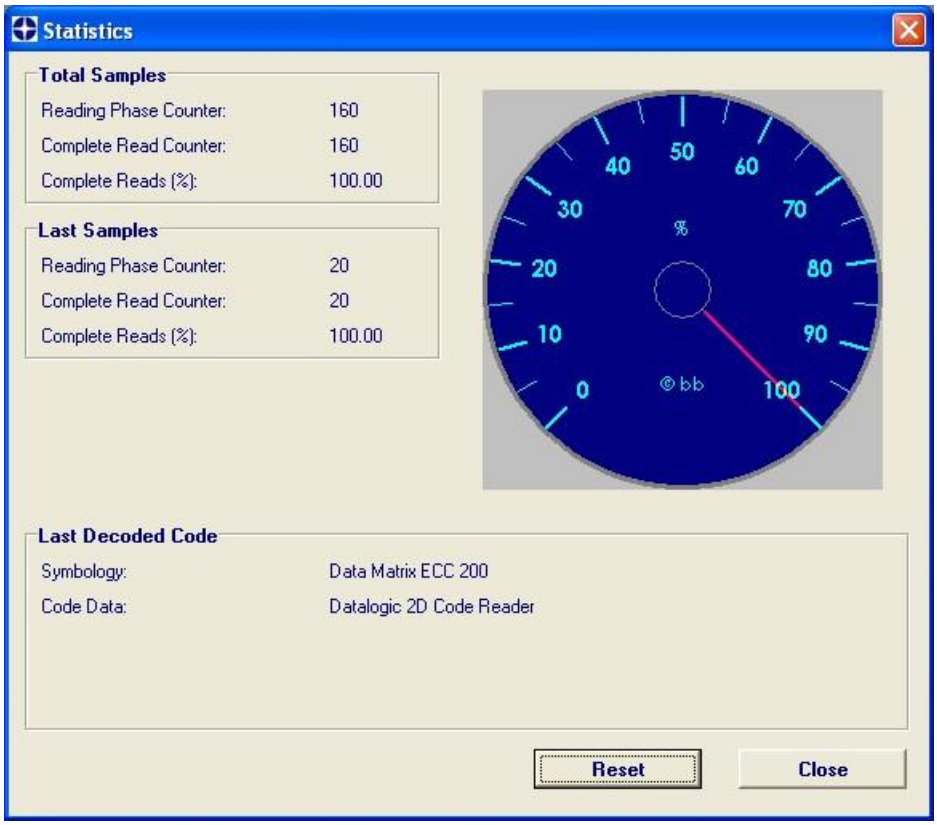
The **Last Decoded Code** area reports information about the symbology and the data regarding the last decoded code.

The tachometer indicates the **Complete Read** percentage of the last sampling.

- 2 - Phase Mode Statistics

Match Code *= disabled*
Operating Mode *= Phase Mode*
Code Collection Mode *= Within a Phase*

In this case the following window is displayed:



Each sample corresponds to the result of the data collection within a phase.
The **Total Samples** area reports the statistical data referring to all the samples elaborated since the running mode has been started or the **Reset** button has been pressed.

The **Last Samples** area reports the statistical data referring to the last sampling.

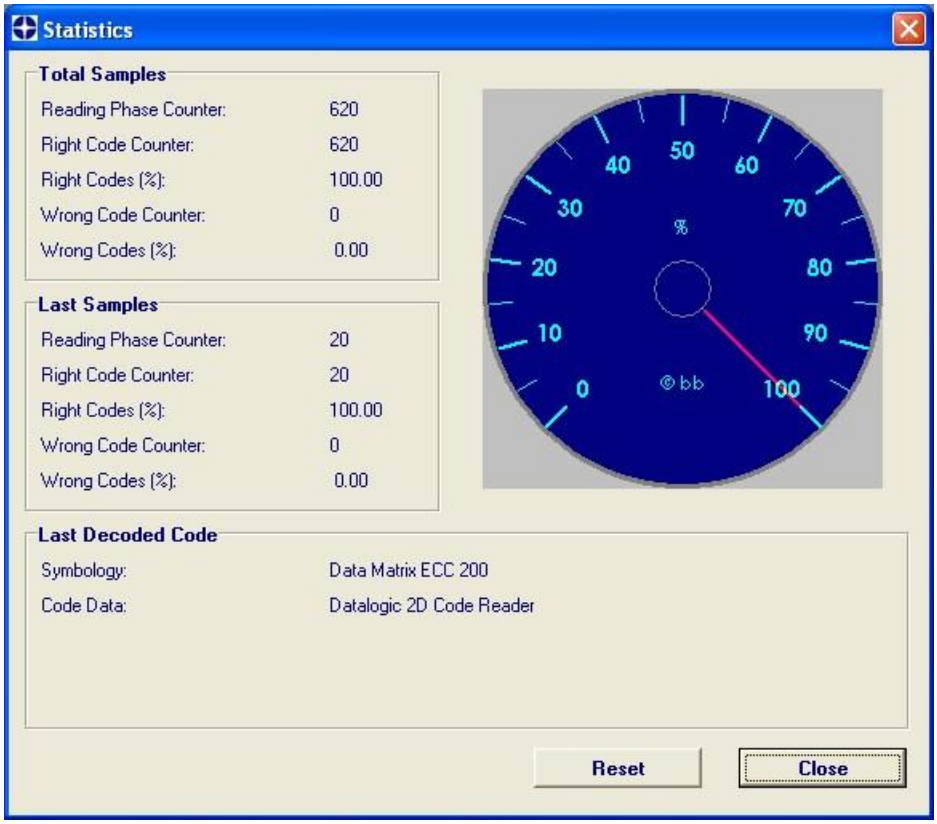
The **Last Decoded Code** area reports information about the symbology and the data regarding the last decoded code.

The tachometer indicates the **Complete Read** percentage of the last sampling.

- 3 - Match Code Statistics

Match Code = *enabled*

In this case the following window is displayed:



Each sample corresponds to the result of the data collection within an image or a phase depending on the operating mode.

The **Total Samples** area reports the statistical data referring to all the samples elaborated since the running mode has been started or the **Reset** button has been pressed.

The **Last Samples** area reports the statistical data referring to the last sampling.

The **Last Decoded Code** area reports information about the symbology and the data regarding the last decoded code.

The tachometer indicates the **Right Code** percentage of the last sampling.

Rapid Configuration Guide

Configuring your reader is a simple task that can be easily accomplished through the VisiSet™ utility program.

Setup
Rapid Configuration of your Matrix 210™ for static reading or simple code reading applications can be accomplished by using the VisiSet™ Standard Setup Wizard for easy setup.

Layouts
After launching VisiSet™, the following selections guide you in quickly configuring your reader according to the physical layout of your reading system.

How to Configure:
Point-to-Point

For details on using VisiSet™, see How to Use.

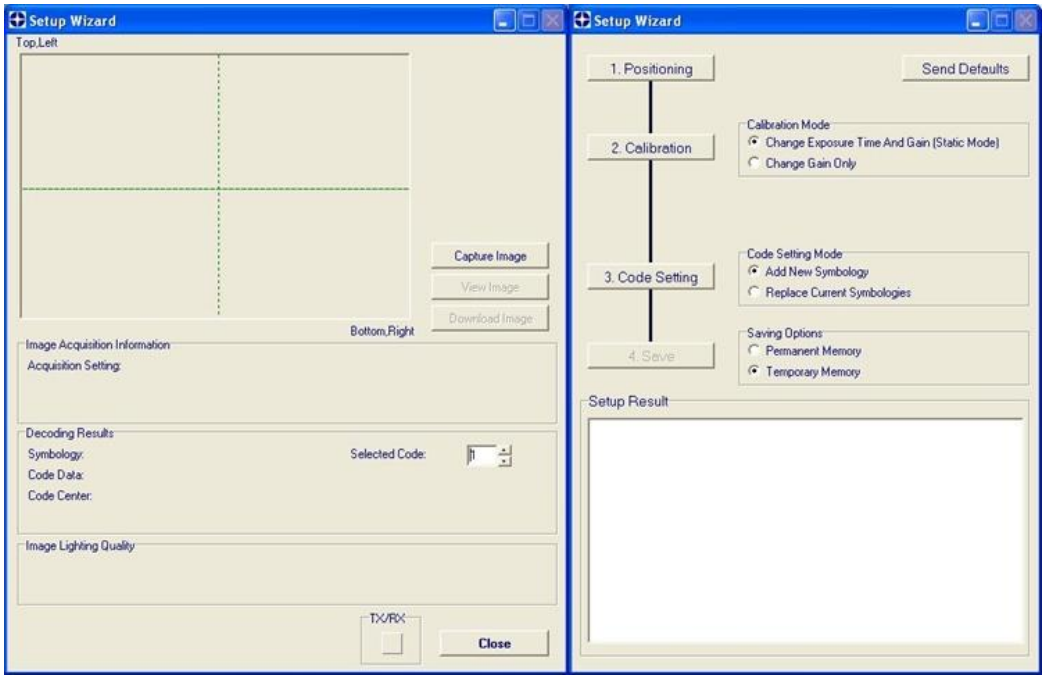
For further descriptions of configuration parameters, see the contextual Help On Line file for your specific device, by pressing the **F1** key or selecting **Parameters Help** from the VisiSet™ menu bar.

Setup

Standard Setup Wizard

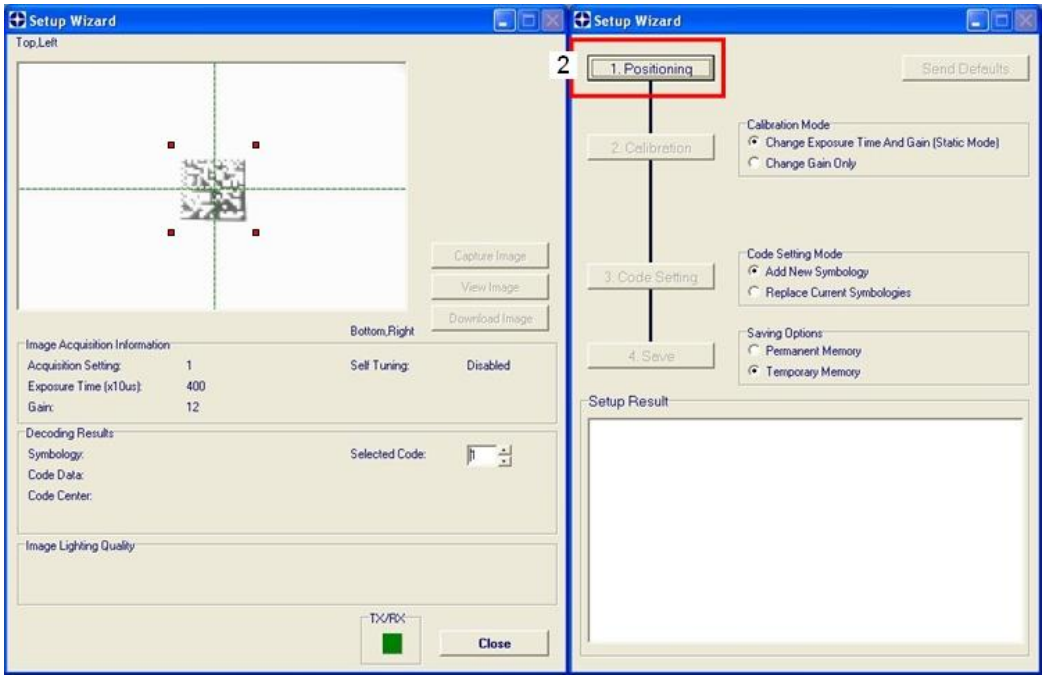
The Setup Wizard option is advised for rapid configuration or for new users. It allows reader configuration in a few easy steps.

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

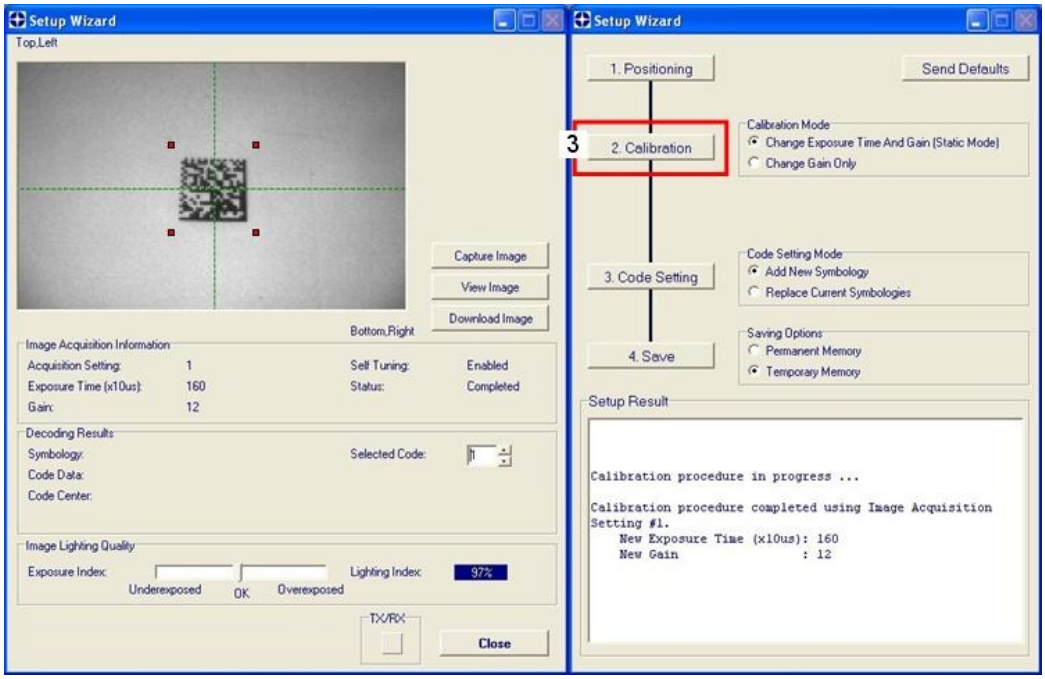


Place the application specific code in front of the reader at the correct reading distance (see step 2 and the Reading Features table in the Reference Manual).

2. 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. Move the reader (or code) to center it.
Press the Positioning button again to stop positioning.

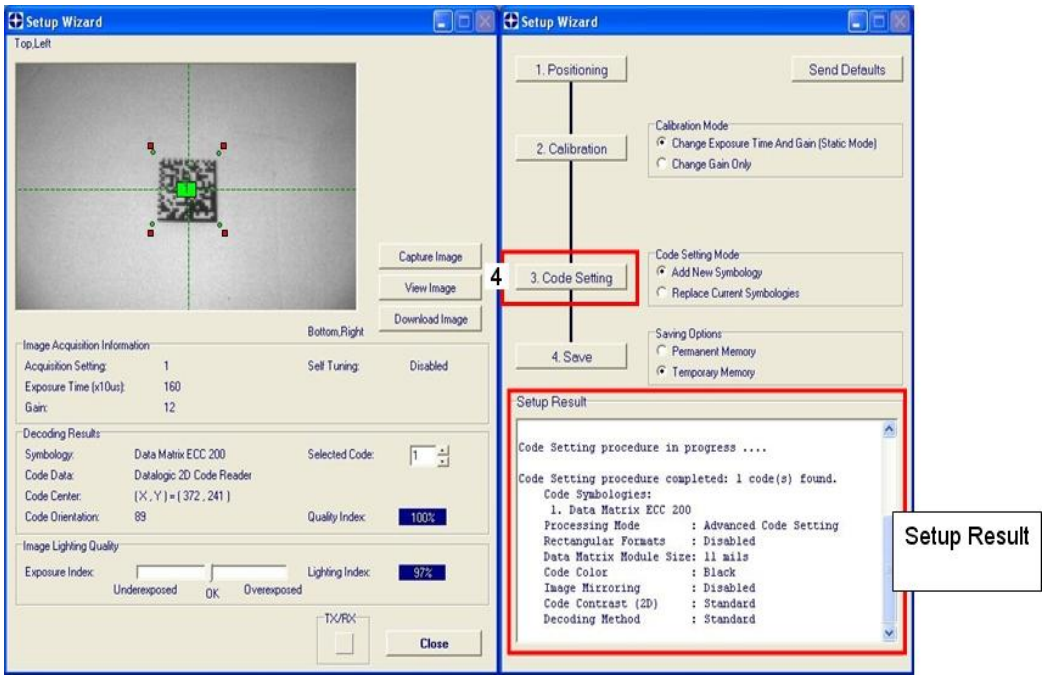


3. Select a Calibration Mode choice and press the "Calibrate" button. The reader flashes once acquiring the image and auto determines the best exposure and gain settings. If the code symbology is enabled by default, the code will also be decoded.

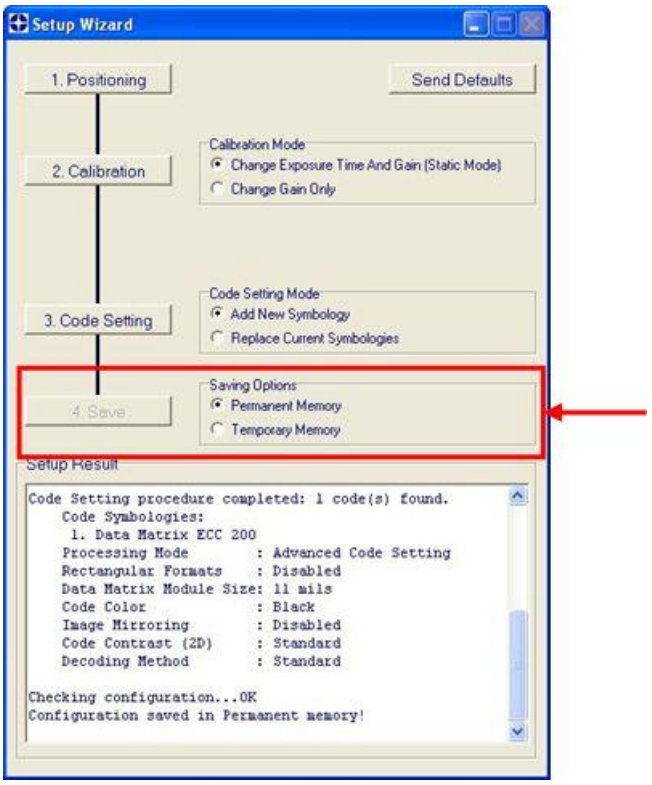


4. Select a Code Setting Mode choice and press the "Code Setting" button.

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



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



6. Close the Setup Wizard.

Data Matrix Setup Wizard

The VisiSet™ Data Matrix Setup Wizard is an **advanced** software-guided auto-configuration tool for Data Matrix ECC 200 codes.

This tool should be used for any Data Matrix reading application that does not obtain satisfactory results, in terms of Good Read percentages, from the Standard Setup Wizard. Because it produces a fine tuning effect of the acquisition parameters, it can improve the reading performance for your application. It also allows multiple acquisition settings to be determined and used in the application.

The Data Matrix Setup Wizard is mainly used in determining the best settings for Direct Part Marking (DPM) applications.

NOTE

If your DPM application requires decoding additional code symbologies, then enable them manually or during the Standard Setup Wizard before running the Data Matrix Setup Wizard. If you use the Standard Setup Wizard after the Data Matrix Setup Wizard, the Data Matrix Wizard will be disabled and therefore the Data Matrix Settings cannot be used.

Data Matrix Configuration Procedure

The Data Matrix Setup Wizard consists of a pre-configuration phase and three main steps as described below:

Pre Configuration Checklist

- The most suitable Matrix reader and relative lighting system must be selected for your application.
- Select and prepare code samples making sure they are representative of your application (especially for DPM).

NOTE

At least three different samples are required to populate the database. The richer the database, in number of images, the better the settings will be built for the application. Even multiple acquired images of a single sample, (preferably at different rotation angles), can differ enough to help improve the results of the settings built.

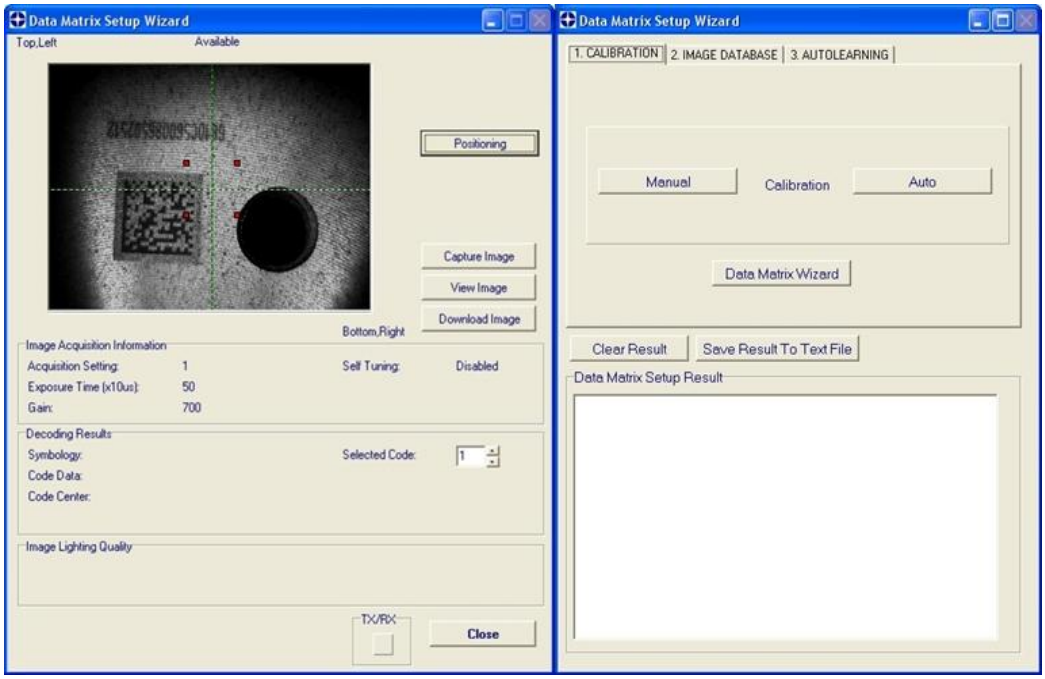
I. Run VisiSet™ and Connect to the Matrix reader.

II. Run the Standard Setup Wizard to set focusing and PPI calibration. The standard setup wizard provides rapid configuration and for most Data Matrix applications correctly configures the reader to give optimum reading results.

III. For DPM applications or for Data Matrix applications that don't provide satisfactory reading results using the Standard Setup Wizard, run the VisiSet™ Data Matrix Setup Wizard from the main menu.

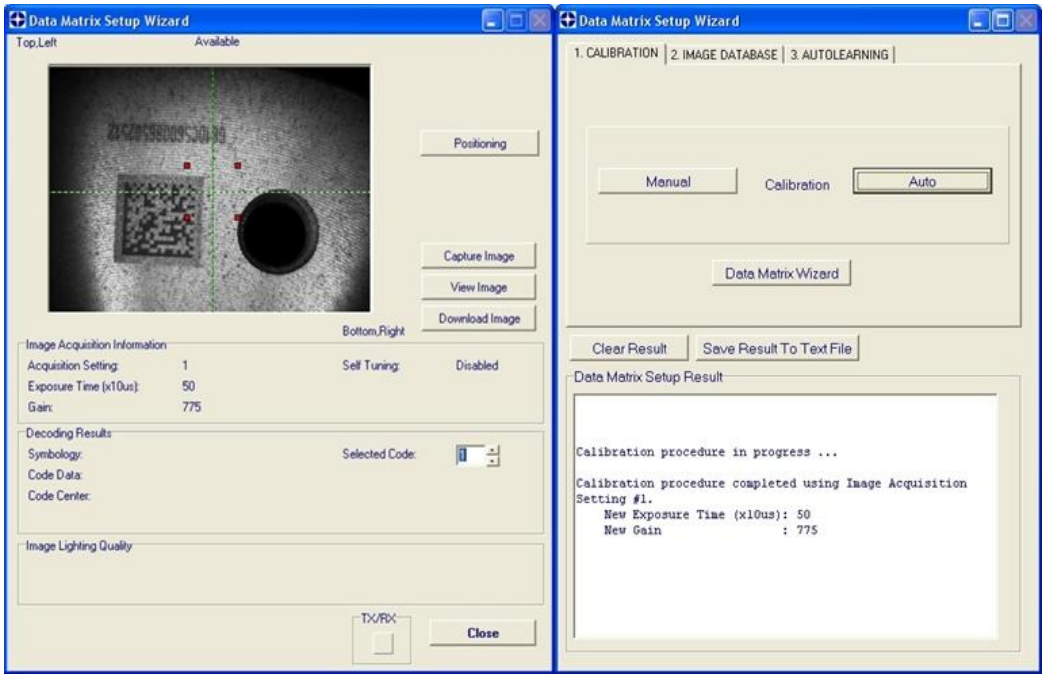
STEP 1. CALIBRATION

1. Place the first sample under the Matrix reader and center it using the **Positioning** button. When centered, press the Positioning button again to **Stop Positioning**.



2. Perform Calibration:

   a. Perform Auto Calibration by pressing the **Auto** button. The wizard will self-tune the reader on the acquired image for the brightness and contrast conditions that match your application's true operating conditions.



   b. Manual Calibration can be performed if the Auto calibration setting is not satisfactory. By pressing the **Manual** Calibration button, the Parameter Setup window is opened showing only the Calibration folder in Interactive mode. Specific parameters relative to Calibration are: Exposure Time, Gain, and Internal Lighting Mode.

When these parameters are set satisfactorily, press the **Stop Manual** Calibration button or close the window with the  to end Manual Calibration.

3. Now you are ready to set the pre-configuration wizard parameters. By clicking on the **Data Matrix Wizard** button the Parameter Setup window is opened showing only the Data Matrix Wizard folder in Interactive mode. The following pre-configuration parameters should be set to allow the wizard to reduce the time necessary to find the best Data Matrix Settings: Image Processing Timeout (set to a reasonable value for the application, necessary to avoid losing successive images); Fixed Image Mirroring (setting the known value reduces Data Matrix Autolearning processing time).

STEP 2. IMAGE DATABASE

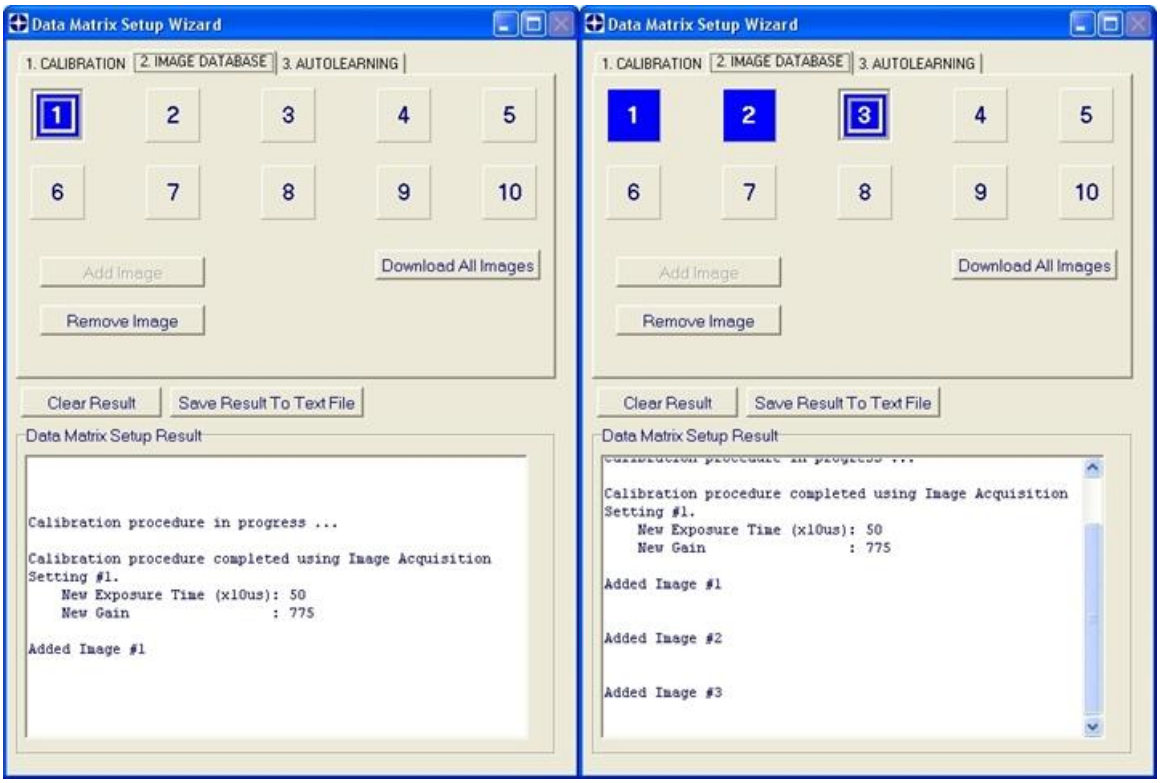
In this STEP you are supposed to create a database (up to 10 different images) representative of your application.

NOTE

During this setup, each image should contain only one Data Matrix code. If your samples contain more than one Data Matrix code, you must cover up all the codes except one; otherwise the image is considered failed. If all the codes are meaningful for your application, you should capture different images, leaving a different code visible for each image.

1. Place your samples, one after the other, under the Matrix reader in all the possible orientations covered by your application.

2. Select an empty Image Place Holder and click the **Add Image** button to store the image. Repeat this for each sample.



If you are not satisfied with the result of each acquisition, you can change the calibration configuration by going back to the *1.Calibration folder* and modifying it with the Manual Calibration.

NOTE

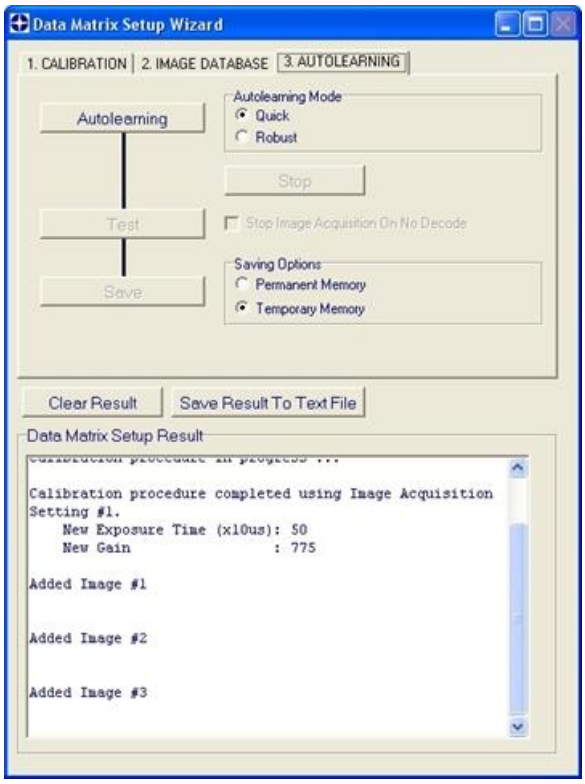
If the IMAGE ACQUISITION SETTING parameters are changed from one sample image to the next, the previous parameter values are overwritten and therefore only the last IMAGE ACQUISITION SETTING configured is used to create the Image Database. Therefore it is suggested to write down these parameter settings.

You can configure multiple IMAGE ACQUISITION SETTINGS (up to 10) for your application using the Manual Calibration. Only one Image Acquisition Setting will be considered during Data Matrix Setup Wizard Autolearning, but at application run time, all the enabled Data Matrix Settings will be applied to each enabled Image Acquisition Setting.

You can also **Remove Images** from the selected Place Holders in order to fill them with more significant samples.

STEP 3. AUTOLEARNING

1. Run the Data Matrix Wizard to perform Autolearning on the Data Matrix images you have collected in the Image Database. The auto-configuration consists in testing different possible configurations and finding out the best Settings. Each image of your IMAGE DATABASE is checked against these Settings.



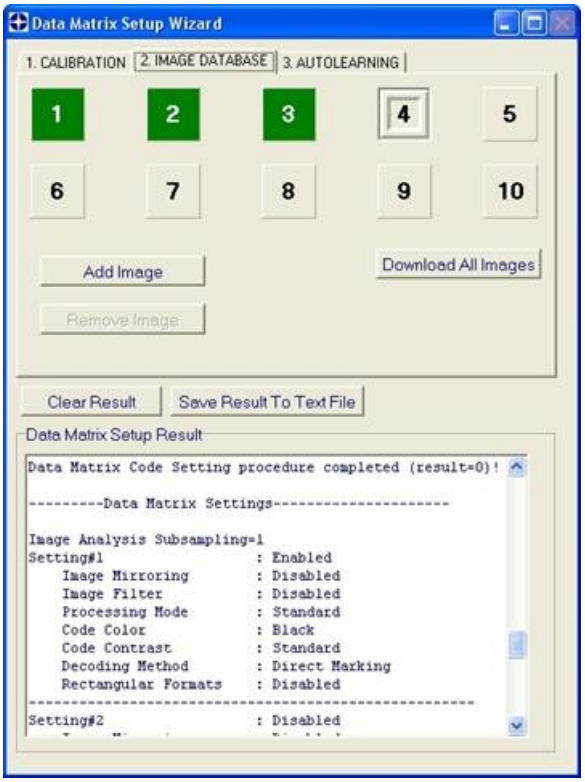
The Autolearning on each image is regulated by a timer. If the timer elapses before the Autolearning has terminated, the corresponding image is considered failed. You can choose the Quick or the Robust Autolearning mode. The two modes differ from the timeout associated with each image present in the IMAGE DATABASE and the list of the different configurations tested. The timeout associated with the Quick mode is 30 seconds while the timeout associated with the Robust Mode is 180 seconds. If the Quick Autolearning fails, you still have the possibility of obtaining a good result with the Robust mode.

You can abort the Autolearning by just pressing the Stop button.

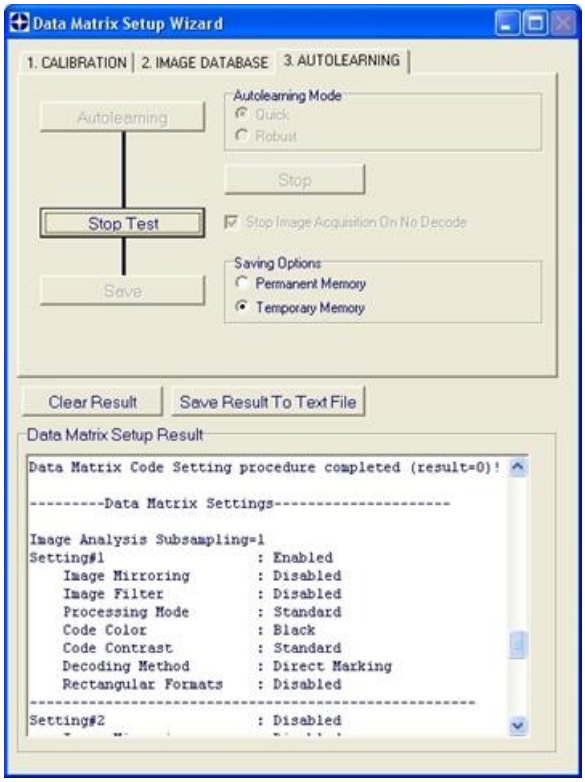
When the Autolearning ends, you can check the detailed output in the Data Matrix Setup Result window. The result is supplied for each image present in the IMAGE DATABASE.

If it ends with success, one or more Settings for the Data Matrix code are configured.

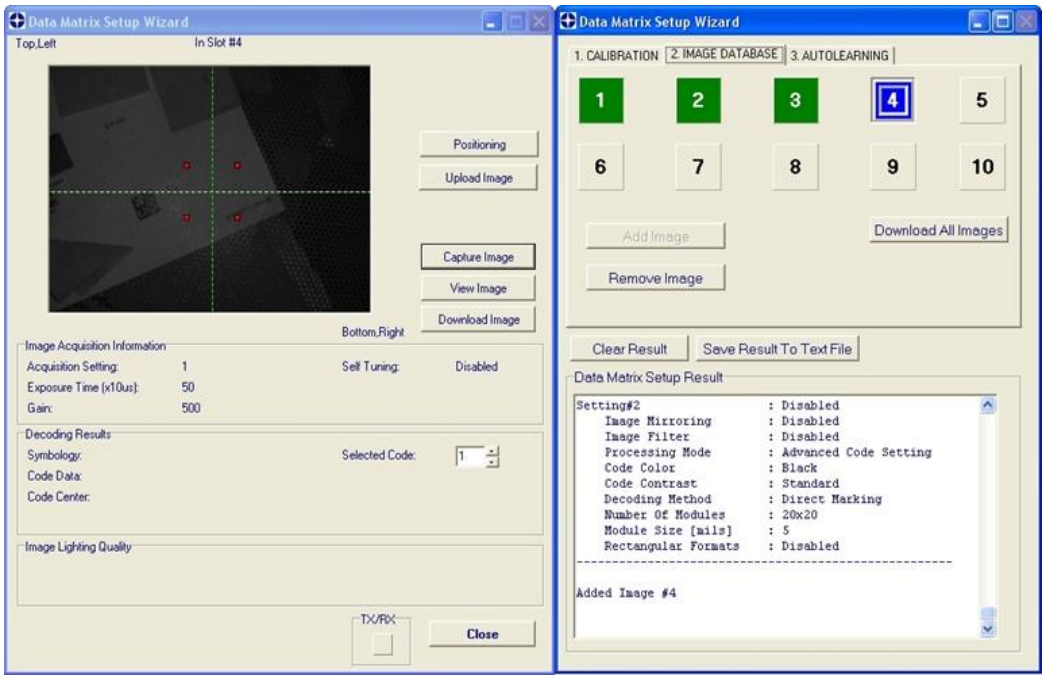
All the images of the IMAGE DATABASE containing decodable Data Matrix symbols with the selected Settings are colored green, otherwise if they are not decodable they are colored red.



2. Test the selected Setting(s) using the **Test**/**Stop Test** button.



By Testing the Settings, the Data Matrix Wizard provides another way to further improve them. During the Testing phase, you can save any No Read images (check the **Stop Image Acquisition On No Read** checkbox) and then add them (**Add Image** button) to the Image Database. By running the Autolearning on these images the Settings will be improved.

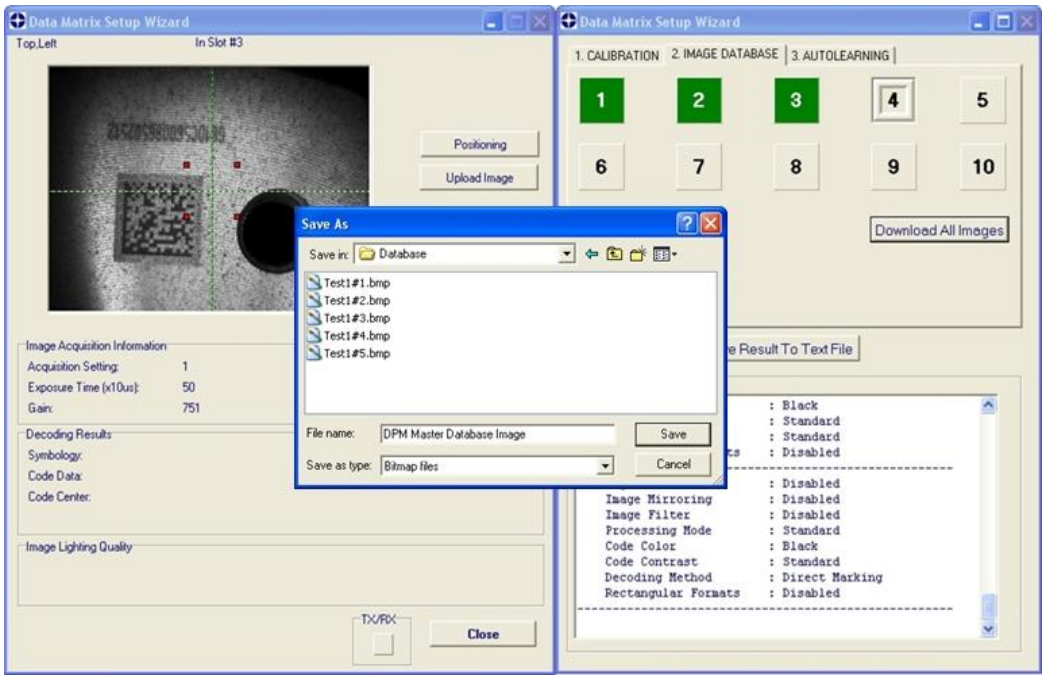


3. Save all the Settings(s) using the **Save** button. The Data Matrix Wizard now remains *Enabled* (Status parameter), allowing the Matrix reader to use the DATA MATRIX SETTING(S) while the corresponding parameters in their relative folders are ignored (and no longer visible when opening the Parameter Setup window):

    - ***Image Mirroring***, ***Processing Mode,*** and ***Self Tuning*** parameters of the **Image Processing** folder;
    - ***Code Color***, ***Code Contrast*** and all Data Matrix code parameters in the **2D Codes** folder;
    - ***Image Rescaling***, ***Image Filter***, ***Image Filter Dimensions*** in the **Calibration** folder.

NOTE

Before closing the Data Matrix Setup Wizard, you can use the **Download All Images** button to save all the images present in your IMAGE DATABASE to your PC. The database image number (#) will be appended to the common filename of each image. If you don't download the images they will be lost upon closing the Data Matrix Setup Wizard.



4. Close the Data Matrix Setup Wizard.

When all the steps above have been executed, the Matrix reader is configured and ready to run in your application.

IV. Run your application.

Layouts

Point-to-Point

The **default** configuration loaded by the connection to VisiSet™ and your reader is ready to perform Point-to-Point reading.

1. Configure the **MAIN PORT** regarding ***Baud Rate***, ***Data Bits***, ***Stop Bits*** and ***Parity*** according to the requirements for your Host.

2. Select the **OPERATING MODES** folder and configure the selectable parameters under ***Operating Mode Group*** to meet your requirements. Example: ***Operating Mode*** (*One Shot*, *Continuous*, *Phase Mode*) ***Acquisition Trigger*** or ***Reading Phase ON*** or ***Reading Phase OFF*** (*Main Port String*).

3. Select the **CALIBRATION** folder and configure the selectable parameters under the ***Image Acquisition Setting Group*** (*Exposure Time*, *Gain*,..) to get the best quality of the captured images. First, set the *Exposure Time* parameter according to the speed of the moving images (a faster target movement requires a lower exposure time to avoid image blurring). Once the exposure value has been defined, set the *Gain* value to get bright but not too grainy images.

4. Select the **OPERATING MODES** folder and configure the selectable parameters under the ***Acquisition Trigger Delay Group*** *(Status, Delay Time)*. These parameters allow delaying the image capture after an external event (i.e. ***Acquisition Trigger*** = *Main Port String*) and setting the exact instant for capturing the image. Thus, it is possible to synchronize the code acquisition with the code presence within the field of view (FOV).

5. Select the **DATA COLLECTION** folder and configure the selectable parameters under ***Data Format Group*** to get the desired output message format.

All relative ***Options*** to the various ***Operating Modes*** are conditioned so that only valid selections are available.

NOTE

The correct code type must be enabled and relative parameters configured in the **2D CODES**, **1D CODES**, and **POSTAL CODES** folders.

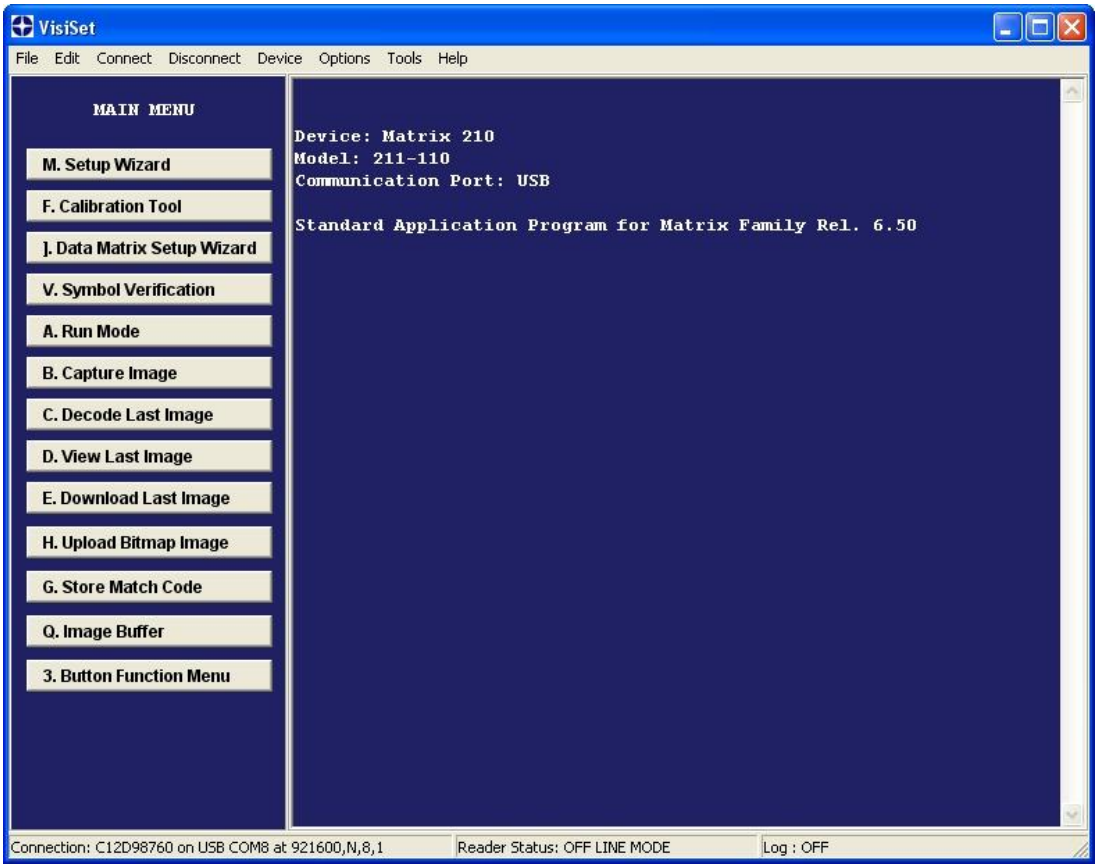
SAVE THE CONFIGURATION TO THE READER (PERMANENT MEMORY)

Matrix Standard Application Program

A Standard Application Program is factory-loaded onto Matrix 210™. This program controls code reading, serial port interfacing, data formatting and many other operating and control parameters.

It is completely user configurable from a Laptop or PC using VisiSet™ installed from the Mini-DVD supplied with the reader.

In Offline Mode the VisiSet™ main window appears as follows:



NOTE

Information about the model and the release depends on the connected reader.

The Main Menu allows selecting commands for the connected reader.

The **Setup Wizard** command opens the Setup Wizard Window which allows positioning, image calibration and code setting procedures to be set automatically.

The **Calibration Tool** command opens the Calibration Tool Window, which allows maximizing the reading performance by tuning the parameters of the **IMAGE ACQUISITION SETTING**(s) and the time of the **ACQUISITION TRIGGER DELAY**(s).

The **Data Matrix Setup Wizard** command opens the Data Matrix Setup Wizard Window which allows positioning, image calibration and Data Matrix code automatic setting procedures.

The **Symbol Verification** command should be used only when Matrix 210™ is installed and operating as a Code Quality Verifier station. This command opens the Symbol Verification Window which gives visual feedback and reporting on the Code Quality and Validation. For details see the "**Matrix Code Quality Verifier Solution**" manual.

The **Run Mode** command causes the reader to start using the configured operating mode but does not close communication between the reader and VisiSet™. In this case the output message is shown on the VisiSet™ Terminal

screen. By pressing the **ESC**. **Exit Run Mode** button the reader returns to Offline Mode, during which it can be configured and calibrated.

The **Capture Image** command acquires an image by using the current **IMAGE ACQUISITION SETTING**. The image is saved in a memory area where it can be Decoded, Viewed, and Downloaded to a file through the relative Main Menu command buttons.

The **Decode Last Image** command starts the image decoding process. Information about the decoded code(s) is displayed on the VisiSet™ terminal. As soon as a code is decoded the **Store Match Code** button appears in the Main Menu.

The **View Last Image** command opens a window displaying the last image acquired. This window provides a View menu which allows zooming the image.

The **Download Last Image** command allows saving the image to a file. You will be prompted to define the download path and file format.

The **Upload Bitmap Image** command allows loading a bitmap image from a file (.BMP) to the Matrix 210™ reader. The image is saved in a memory area where it can be Decoded, Viewed, and Downloaded to a file through the relative Main Menu command buttons.

The **Store Match Code** command opens a dialog box allowing to choose the position in the **MATCH CODE** database, where the decoded code must be stored.

The **Image Buffer** command opens the Image Buffer Menu which allows managing multiple images in the Matrix 210™ Image Buffer memory (different from the Capture Image area).

The **Button Function Menu** can be used to activate/deactivate the functions associated with the Function 1 *(Test)*, Function 2 *(Aim/Locate),* Function 3 *(Setup)* and Function 4 *(Learn)* LEDs of the X-PRESS™ multifunction key.

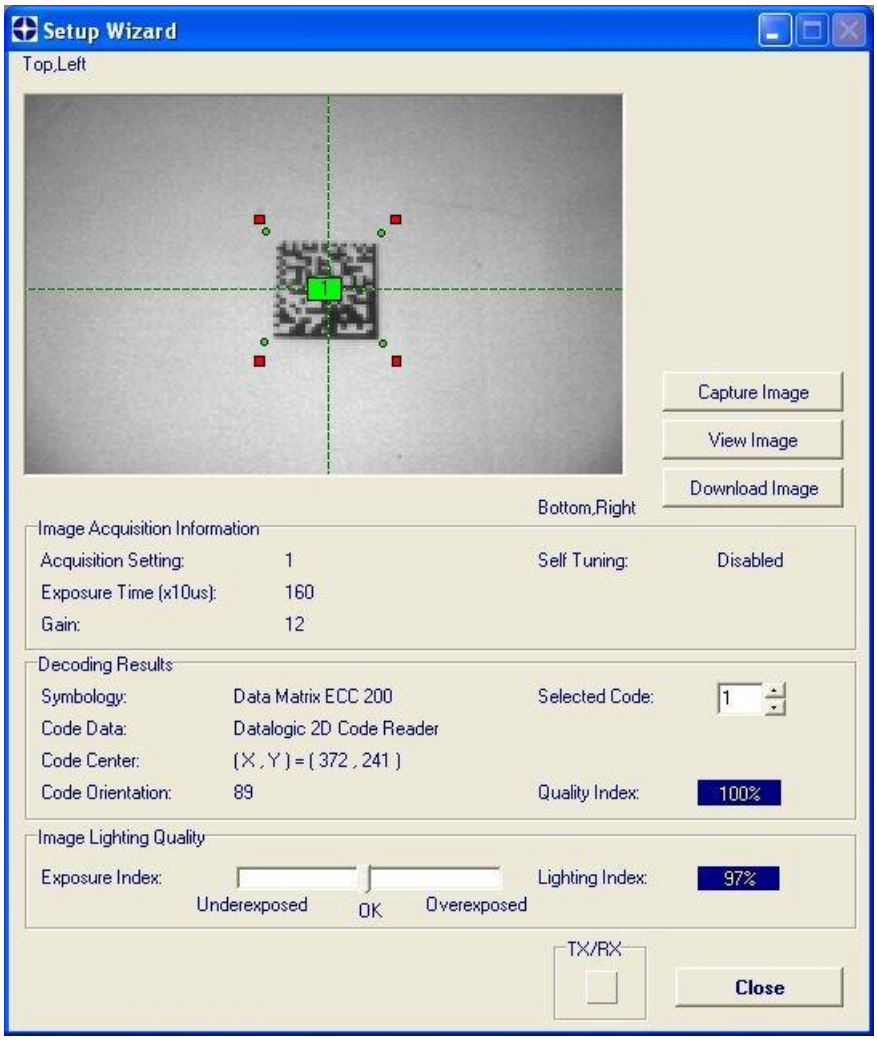
The status bar provides further information about the communication parameters of the current connection (reader/PC) on the left side, while on the right side it is possible to know if the Log option is on or off. Information about the reader status is available in the central part of the bar.

Every application requires a particular set of parameter values usually called Matrix Configuration.

Setup Wizard Window

The Setup Wizard window appears (together with the Setup Wizard parameter setting window) when the Setup Wizard button is pressed from the Main Menu (selection ***M***):

The following is a description of the Setup window items. For the Setup procedure for Rapid Configuration see Quick Setup Using Setup Wizard.



The display window of the Setup Wizard is similar to the Calibration Tool window and corresponds to the portion of the reader's Field of View, measured in pixels, selected through the Region of Interest parameters. By positioning the cursor over the label **Top,Left**, the reference coordinates (0,0) are displayed, and over the label **Bottom,Right**, the (X,Y) coordinates relative to the selected region of interest (displayed area).

The **Capture Image** button acquires a single image. If a code is present and enabled it can also be decoded.
The **View Image** button displays the captured image in the Image Viewer window.
The **Download Image** button allows saving the captured image as a bitmap file.

Independently from the Self Tuning parameter status, the Setup Wizard window indicates the region where the calibration algorithm is performed: it is within the central box delimited by the red dots.

NOTE

If using Region Of Interest windowing, some or all of the four red dots delimiting the calibration algorithm area may be located outside the VisiSet™ display area (not visible).

The Setup Wizard window also provides information about the acquisition and the decoding procedure.

The **Image Acquisition Information** area displays the **IMAGE ACQUISITION SETTING** number with its relative Exposure and Gain parameter settings. The Self Tuning parameter status is also displayed.

The **Decoding Results** area displays the results of the last successful image decoding. In particular, it provides information about the code symbology, its data, about the coordinates of the code center and orientation (these values may also be included in the **DATA FORMAT**). The center is also indicated by a square in the display area of the window.

This area also displays the **Quality Index**, results. This index indicates the relative quality of the symbol image in a range from 0 to 100. Higher values indicate better symbols. Normally a symbol's quality should be assessed only as an average over many presentations of the symbol. Alternatively, the symbol quality level may be used to detect gradual degradation of symbol printing or imaging quality. This index is displayed only if the correct ***ISO-IEC*** Standards for the relevant code type in the **SYMBOL VERIFICATION** group is enabled. This value may also be included in the **DATA FORMAT**.

When the image contains several decodable codes, it is possible to select one of them from the scrolling list (*Selected Code*). In this way all information about the selected code will be displayed, while the corresponding square indicating the center turns to green.

The **Image Lighting Quality** area displays the results of the Exposure Index and the Lighting Index. The **Lighting Index** reports a percentage (value ranging from 0 to 100) with 0 being an extremely low exposure, which would generally cause impaired decoding, and 100 being an excellent exposure. These results are displayed only if the ***Image Lighting Quality*** parameter in **IMAGE PROCESSING SETUP** group is enabled. This value may also be included in the **DATA FORMAT**.

NOTE

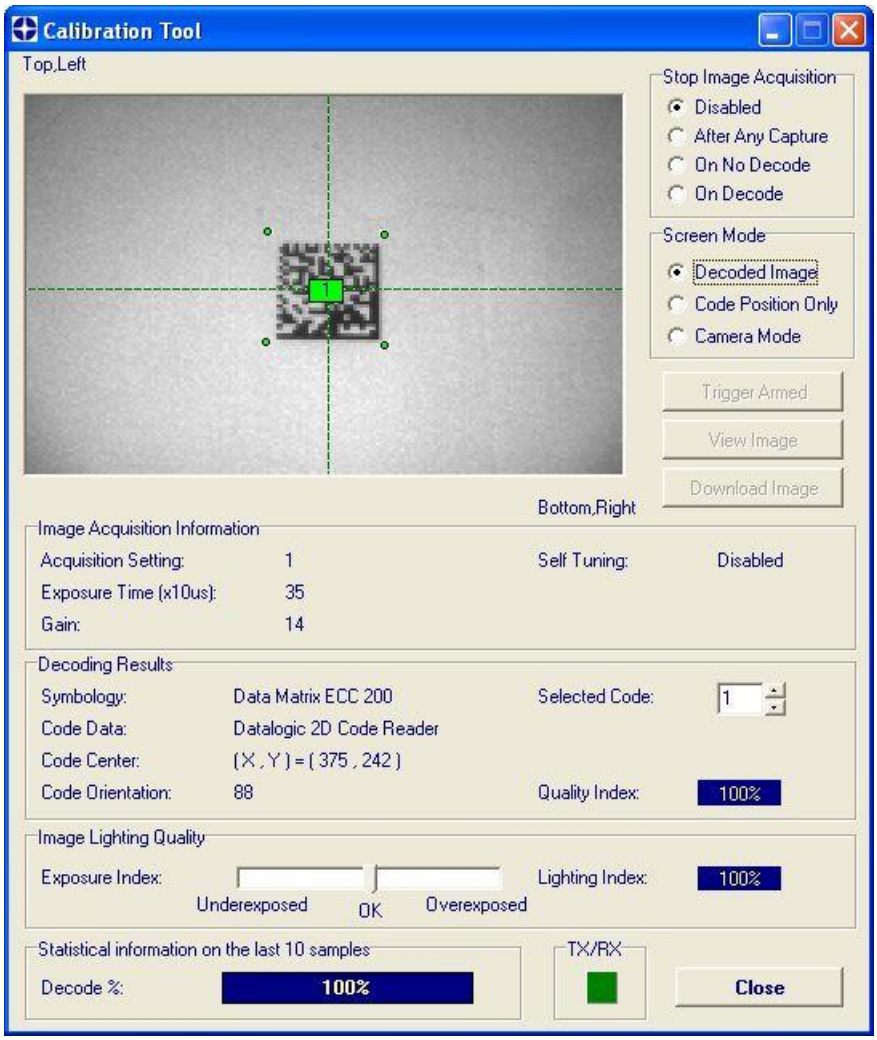
Enabling the ***Image Lighting Quality*** parameter increases the decoding time. For this reason, keep the parameter disabled if not used.

The **TX/RX** blinker indicates that serial communication between the reader and the PC is active.

Calibration Tool Window

The Calibration Tool window appears together with the parameter setup window when the Calibration Tool button is pressed from the Main Menu (selection ***F***):

The Parameter Setup window is in Interactive mode and so when image acquisition is performed it is displayed in the Calibration Tool window.



The display area in the Calibration Tool window corresponds to the portion of the reader's Field of View, measured in image pixels, selected through the Region of Interest parameters. By positioning the cursor over the label **Top,Left**, the reference coordinates (0,0) are displayed, and over the label **Bottom,Right**, the (X,Y) coordinates relative to the selected region of interest (displayed area).

The Calibration Tool provides different options satisfying the requirements of each application.

The **Stop Image Acquisition** area allows stopping the acquisition procedure *After Any Capture* or in case an image contains no decodable code (*On No Decode*) or after any successful decoding (*On Decode*). In this way it is possible to view and save the last captured and / or decoded image through the relative buttons.
By selecting *Disabled* the acquisition procedure continues depending on the current ***Operating Mode***.

The **Screen Mode** area allows managing the image display. By selecting *Decoded Image* the sampled images are decoded and downloaded from the reader to the PC. This causes the scanning rate to decrease. By selecting *Code Position Only* the sampled images are not downloaded from the reader to the PC but only the code position is indicated by the reference marks in the display area. This allows the maximum scanning rate to remain closer to the Run Mode scanning rate. The selection of the *Camera Mode* allows downloading sampled images from the reader without decoding them.

The **Trigger Armed/Arm Trigger** button allows resetting the conditions for Image Acquisition after Image Acquisition has been stopped by one of the events in the Stop Image Acquisition area.
The **View Image** button displays the captured image in the Image Viewer window.
The **Download Image** button allows saving the captured image as a bitmap file.

The Calibration Tool window also provides information about the acquisition and the decoding procedure.

The **Image Acquisition Information** area displays the **IMAGE ACQUISITION SETTING** number with its relative Exposure and Gain parameter settings. The **ACQUISITION TRIGGER DELAY** number used to capture the current image is displayed, if using *One Shot* or *Phase Mode*. The Self Tuning parameter status is also displayed. If Self Tuning is enabled, the Calibration Tool window indicates the region where the calibration algorithm is performed: it is within the central box delimited by four red dots.

NOTE

If using Region Of Interest windowing, some or all of the four red dots delimiting the calibration algorithm area may be located outside the VisiSet™ display area (not visible).

The **Decoding Results** area displays the results of the last successful image decoding. In particular, it provides information about the code symbology, its data, about the coordinates of the code center and orientation (these values may also be included in the **DATA FORMAT**). The center is also indicated by a square in the display area of the window.

This area also displays the **Quality Index**, results. This index indicates the relative quality of the symbol image in a range from 0 to 100. Higher values indicate better symbols. Normally a symbol's quality should be assessed only as an average over many presentations of the symbol. Alternatively, the symbol quality level may be used to detect gradual degradation of symbol printing or imaging quality. This index is displayed only if the correct ***ISO-IEC*** Standards for the relevant code type in the **SYMBOL VERIFICATION** group is enabled. This value may also be included in the **DATA FORMAT**.

When the image contains several decodable codes, it is possible to select one of them from the scrolling list (*Selected Code*). In this way all information about the selected code will be displayed, while the corresponding square indicating the center turns to green.

The **Image Lighting Quality** area displays the results of the Exposure Index and the Lighting Index. The **Lighting Index** reports a percentage (value ranging from 0 to 100) with 0 being an extremely low exposure, which would generally cause impaired decoding, and 100 being an excellent exposure. During calibration through the Calibration Tool window, this parameter is enabled automatically and independently from the ***Image Lighting Quality*** parameter in the **IMAGE PROCESSING SETUP** group.

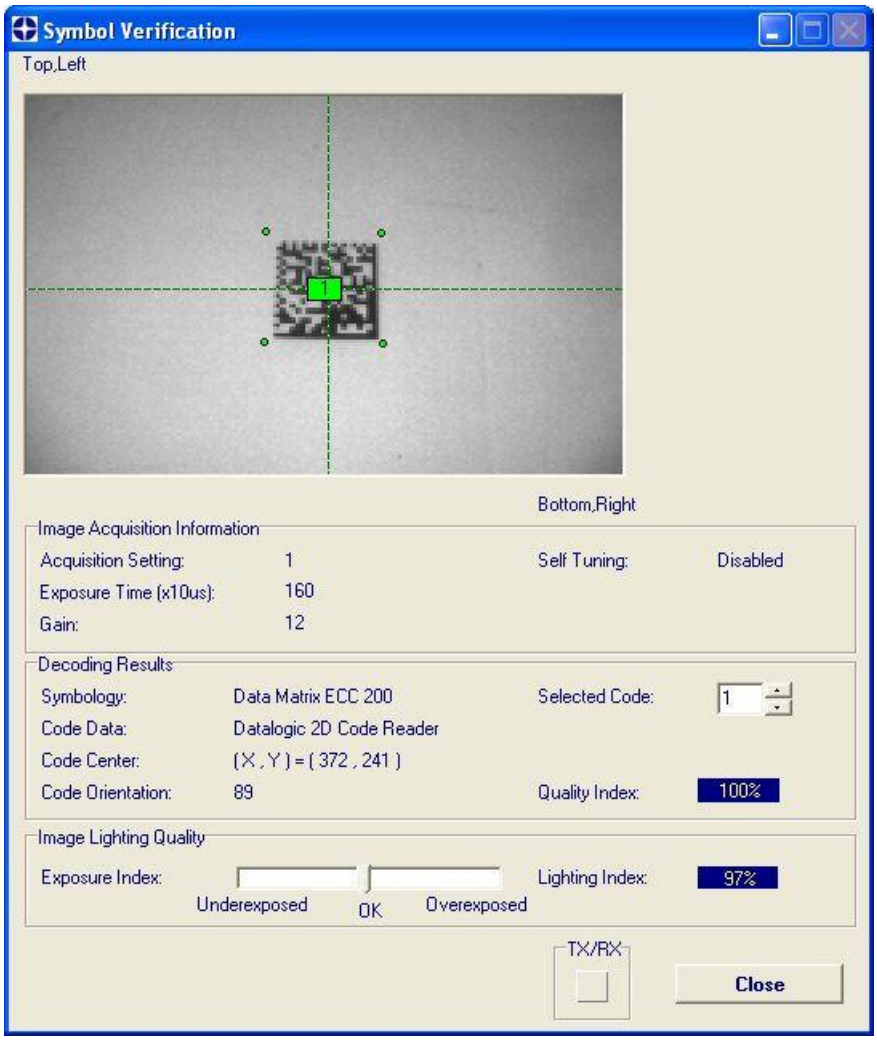
The **Statistical information on the last *n* samples** area reports the decoding percentage calculated on the last elaborated images.
The decoding percentage is increased by each image containing at least one decodable code.

The **TX/RX** blinker indicates that serial communication between the reader and the PC is active.

Symbol Verification Window

The Symbol Verification window appears (together with the Symbol Verification parameter setting window shown below) when the Symbol Verification button is pressed from the Main Menu (selection ***V***):

The following is a description of the Symbol Verification window items. For the Code Quality Verification procedure see the Code Quality Verifier Solution manual on the Mini-DVD.



The display area of the Symbol Verification window is similar to the Calibration Tool window and corresponds to the portion of the reader's Field of View, measured in pixels, selected through the Region of Interest parameters. By positioning the cursor over the label **Top,Left**, the reference coordinates (0,0) are displayed, and over the label **Bottom,Right**, the (X,Y) coordinates relative to the selected region of interest (displayed area).

The Symbol Verification window also provides information about the acquisition and the decoding procedure.

The **Image Acquisition Information** area displays the **IMAGE ACQUISITION SETTING** number with its relative Exposure and Gain parameter settings. The Self Tuning parameter status is also displayed. If Self Tuning is enabled, the Symbol Verification window indicates the region where the calibration algorithm is performed: it is within the central box delimited by four red dots.

NOTE

If using Region Of Interest windowing, some or all of the four red dots delimiting the calibration algorithm area may be located outside the VisiSet™ display area (not visible).

The **Decoding Results** area displays the results of the last successful image decoding. In particular, it provides information about the code symbology, its data, about the coordinates of the code center and orientation (these values

may also be included in the **DATA FORMAT**). The center is also indicated by a square in the display area of the window.

This area also displays the **Quality Index**, results. This index indicates the relative quality of the symbol image in a range from 0 to 100. Higher values indicate better symbols. Normally a symbol's quality should be assessed only as an average over many presentations of the symbol. Alternatively, the symbol quality level may be used to detect gradual degradation of symbol printing or imaging quality. This index is displayed only if the correct ***ISO-IEC*** Standards for the relevant code type in the **SYMBOL VERIFICATION** group is enabled. This value may also be included in the **DATA FORMAT**.

When the image contains several decodable codes, it is possible to select one of them from the scrolling list (*Selected Code*). In this way all information about the selected code will be displayed, while the corresponding square indicating the center turns to green.

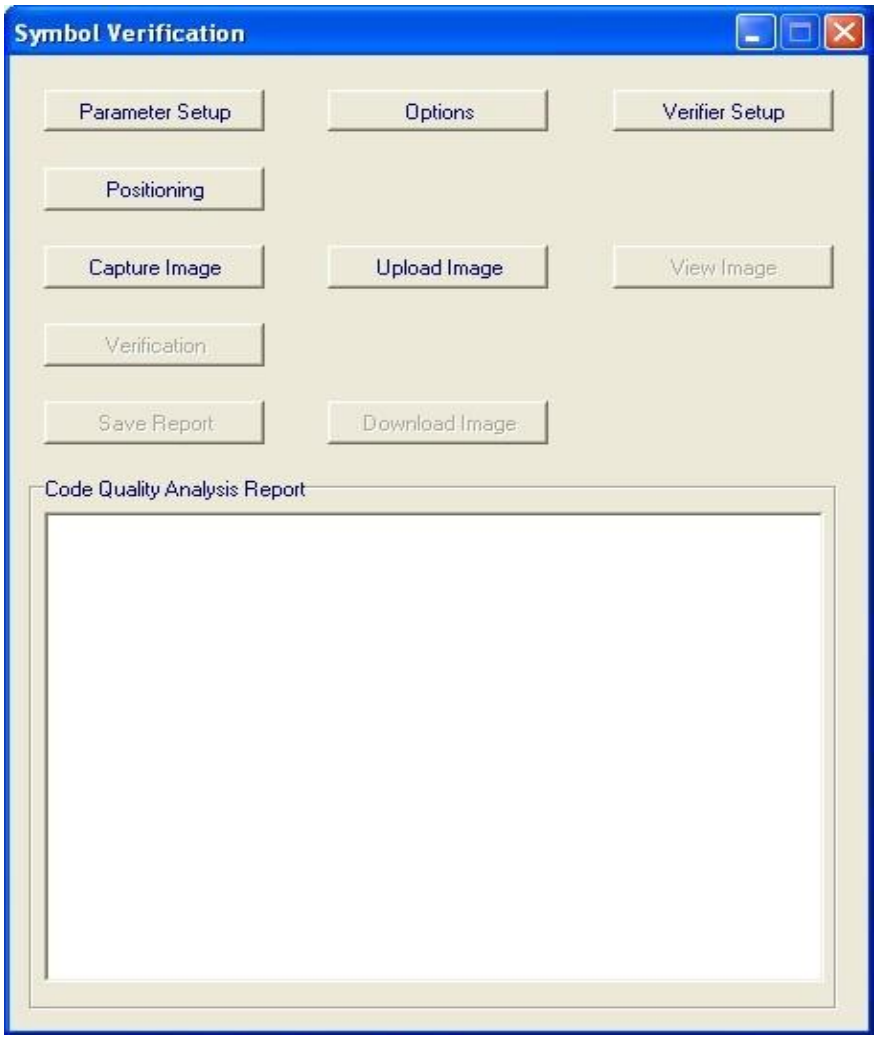
The **Image Lighting Quality** area displays the results of the Exposure Index and the Lighting Index. The **Lighting Index** reports a percentage (value ranging from 0 to 100) with 0 being an extremely low exposure, which would generally cause impaired decoding, and 100 being an excellent exposure. These results are displayed only if the ***Image Lighting Quality*** parameter in **IMAGE PROCESSING SETUP** group is enabled. This value may also be included in the **DATA FORMAT**.

NOTE

Enabling the ***Image Lighting Quality*** parameter increases the decoding time. For this reason, keep the parameter disabled if not used.

The **TX/RX** blinker indicates that serial communication between the reader and the PC is active.

The Symbol Verification parameter setting window has the following functions:



The **Parameter Setup** button opens the Parameter Setup window in interactive mode so that parameter modifications can be checked in real-time. You cannot save the Setup through this window because the Code Quality Verifier requires a complete calibration procedure described in the Code Quality Verifier Solution Manual.

The **Options** button opens the Symbol Verification Options window where you can set Report and Image format and path parameters as well as personalized report header information.

The **Verifier Setup** button opens the window for calibration and stability measurement of the Code Quality Verifier station.

The **Positioning** button starts the positioning procedure. The reader continuously acquires images and gives visual feedback in 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. Press the Positioning button again to stop positioning.

The **Capture Image** button acquires a single image.

The **Upload Image** button allows loading a previously saved image file.

The **View Image** button displays the captured image in the Image Viewer window.

The **Verification** button performs the Code Quality Analysis on the code and shows the results in the Code Quality Analysis Report window.

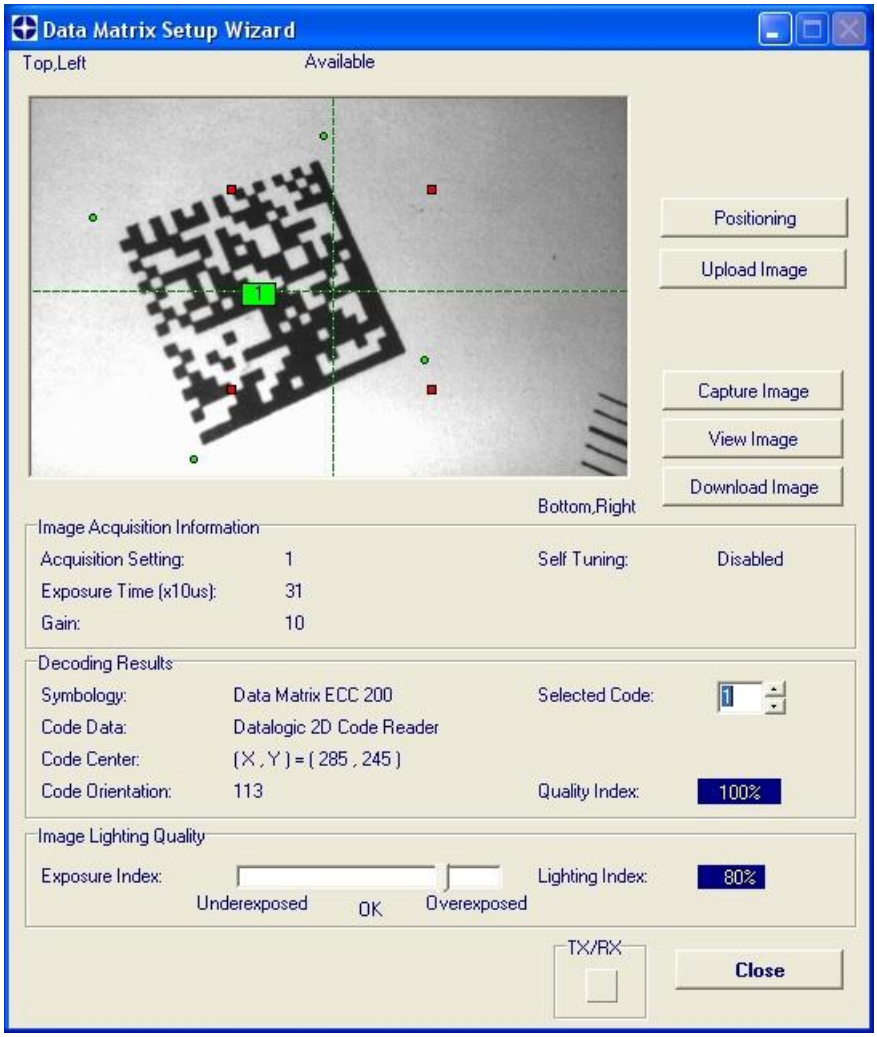
The **Save Report** button allows saving the Code Quality Analysis Report as a file to the path and in the format selected in the Symbol Verification Options window.

The **Download Image** button allows saving the captured image as a file to the path and in the format selected in the Symbol Verification Options window.

Data Matrix Setup Wizard Window

The Data Matrix Setup Wizard window appears (together the Data Matrix Setup Wizard procedure window) when the Data Matrix Setup Wizard button is pressed from the Main Menu (selection ***]***): it allows auto-configuration of multiple Data Matrix Settings and is especially indicated for DPM Applications.

The following is a description of the Data Matrix Setup Wizard window items. For the Data Matrix Setup procedure see the Data Matrix Setup Wizard page.



The display window of the Data Matrix Setup Wizard is similar to the Standard Setup Wizard window and corresponds to the portion of the reader's Field of View, measured in image pixels, selected through the Region of Interest parameters. By positioning the cursor over the label **Top,Left**, the reference coordinates (0,0) are displayed, and over the label **Bottom,Right**, the (X,Y) coordinates relative to the selected region of interest (displayed area).

The Data Matrix Setup Wizard provides different options satisfying the requirements of each application.

The **Upload Image** button (visible only when the IMAGE DATABASE tab is selected) allows loading a previously saved bitmap image file. The uploaded image is shown in the Data Matrix Setup Wizard display window and the Current Image Status shown above it is "Uploaded".

The **Capture Image** button acquires a single image. The captured image is shown in the display window and the Current Image Status becomes "Captured".
The **View Image** button displays the captured image in the Image Viewer window.
The **Download Image** button allows saving the captured image as a bitmap file.

Independently from the Self Tuning parameter status, the Data Matrix Setup Wizard window indicates the region where the calibration algorithm is performed: it is within the central box delimited by the red dots.

NOTE

If using Region Of Interest windowing, some or all of the four red dots delimiting the calibration algorithm area may be located outside the VisiSet™ display area (not visible).

The Data Matrix Setup Wizard window also provides information about the acquisition and the decoding procedure.

The **Image Acquisition Information** area displays the **IMAGE ACQUISITION SETTING** number with its relative Exposure and Gain parameter settings. The Self Tuning parameter status is also displayed.

The **Decoding Results** area displays the results of the last successful image decoding. In particular, it provides information about the code symbology, its data, about the coordinates of the code center and orientation (these values may also be included in the **DATA FORMAT**). The center is also indicated by a square in the display area of the window.

This area also displays the **Quality Index**, results. This index indicates the relative quality of the symbol image in a range from 0 to 100. Higher values indicate better symbols. Normally a symbol's quality should be assessed only as an average over many presentations of the symbol. Alternatively, the symbol quality level may be used to detect gradual degradation of symbol printing or imaging quality. This index is displayed only if the correct ***ISO-IEC*** Standards for the relevant code type in the **SYMBOL VERIFICATION** group is enabled. This value may also be included in the **DATA FORMAT**.

When the image contains several decodable codes, it is possible to select one of them from the scrolling list (*Selected Code*). In this way all information about the selected code will be displayed, while the corresponding square indicating the center turns to green.

The **Image Lighting Quality** area displays the results of the Exposure Index and the Lighting Index. The **Lighting Index** reports a percentage (value ranging from 0 to 100) with 0 being an extremely low exposure, which would generally cause impaired decoding, and 100 being an excellent exposure.
This value may be included in the output message, see **DATA FORMAT**, by enabling the ***Image Lighting Quality*** parameter in the **IMAGE PROCESSING SETUP** group.

The **TX/RX** blinker indicates that serial communication between the reader and the PC is active.

Image Transfer

Matrix 210™ offers different methods for saving images captured by the reader to a file (Downloading).

There is also a method for sending an image file to the reader temporary memory (Uploading).

Downloading Images to File

Offline Mode Through VisiSet™ Connection

Through the VisiSet™ Main Menu (Offline Mode), the Download Last Image button allows saving an image to file which has been stored in a temporary memory area by the Capture Image button or Upload Bitmap Image button.

This image will be saved as a full bitmap image (.bmp). You will be prompted to name and save the file by the standard Windows dialogue box.

Offline Mode Through Image Buffer

Matrix 210™ can be set to collect multiple images (in Run Mode), in the Image Buffer temporary memory (if enabled), for downloading in Offline Mode through the Image Buffer Menu accessible through the relative button in the Main Menu.

The **Image Buffer** parameters: **Image SubSampling**, **Image Format** and **JPG Quality** effect the collected images. You will be prompted to name and save the files by the standard Windows dialogue box. VisiSet™ will add a progressive number to each filename.

Run Mode Through VisiSet™ Connection

When in Run Mode, Matrix 210™ can be configured to download all images collected through VisiSet™ to a defined path and in a defined format.

The **VisiSet Image Saving** parameters: **Image SubSampling**, **Image Format** and **JPG Quality** effect the collected images.

The Download Event parameter defines which images to download. If this parameter is disabled, no images will be downloaded. The Image Absolute Path defines where the images will be saved.

The Max. Images Saved parameter defines how many images will be saved. The images will be named with a progressive number and after reaching the maximum number specified further images will be overwritten.

Upload Image to Reader

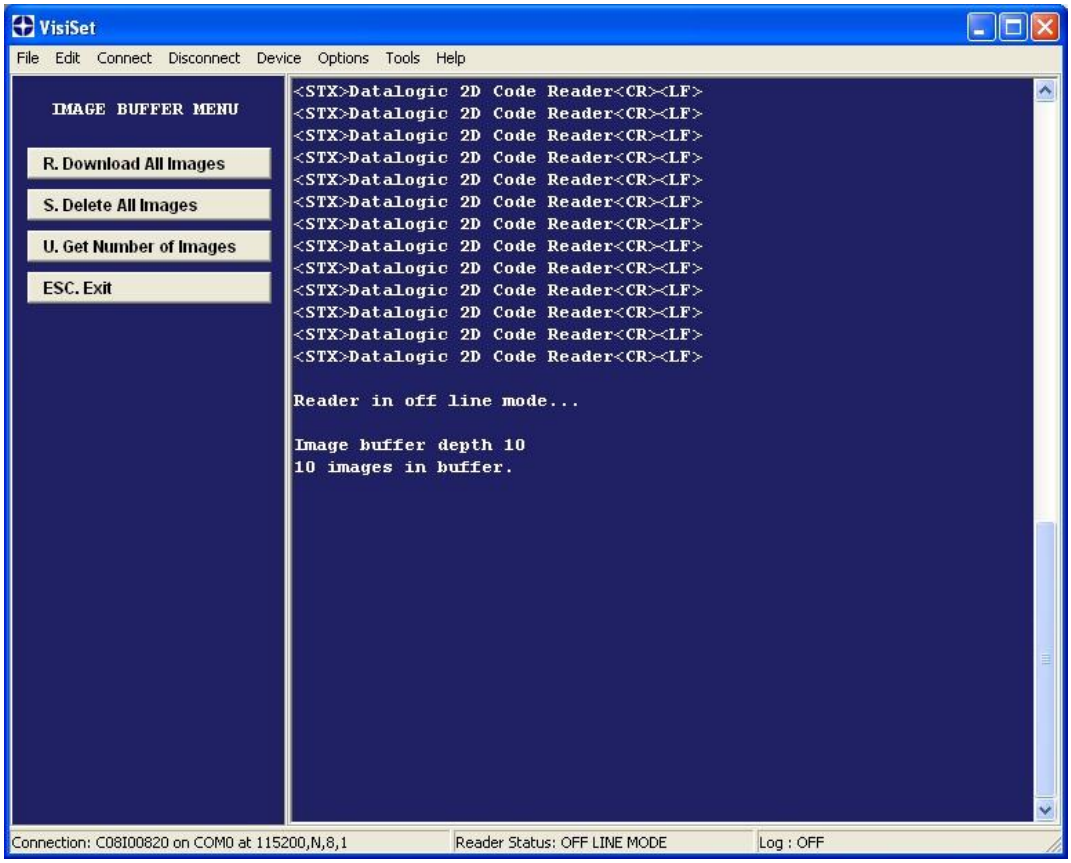
Through the VisiSet™ Main Menu (Offline Mode), the Upload Bitmap Image button allows sending a bitmap image from a file (.BMP) to the Matrix 210™ reader. The image is saved in a memory area where it can be Decoded, Viewed, and Downloaded to a file through the relative Main Menu command buttons.

This could be useful for diagnostic analysis between reader captured codes and a reference source code saved in a file.

Image Buffer Menu

The Image Buffer Menu allows you to manage images collected in the Matrix 210™ temporary memory. To collect images in the Image Buffer, the Status parameter must be enabled.

The window appears as follows:



NOTE

Information about the model and the release depends on the connected reader.

The Image Buffer Menu allows selecting commands for the connected reader.

The **Download All Images** command allows all images collected in the Image Buffer temporary memory to be saved to a file.
This command does not clear the memory. The Image Buffer parameters: Image SubSampling, Image Format and JPG Quality effect the collected images. See Image Buffer parameters for more details.

The **Delete All Images** command allows cancelling all images collected in the Image Buffer temporary memory.
Once selected, a following window will require an explicit confirmation of the choice. The option Yes will start the deletion, the option No will cancel the choice.

The **Get Number of Images** command allows Matrix 210™ to report the actual number of images stored in the Image Buffer temporary memory.

The **Exit** command returns to the Main Menu.

Message Format

Information relative to code reading is transmitted in standard formats on the Matrix 210™ Main Port interface. We refer to this as the OUTPUT MESSAGE.

The general format of the OUTPUT MESSAGE is:

<HEADER><RESULTS><STATISTICS FIELD SEPARATOR><STATISTICS FIELD><TERMINATOR>

If the <STATISTICS> field is not appended, the format becomes the following:

<HEADER><RESULTS><TERMINATOR>

The <RESULTS> field depends on the data collection results and also on the ***Match Code*** parameter setting.

If ***Match Code*** is *Enabled*, see Message Format with Match Code Enabled.

If ***Match Code*** is *Disabled*, see Standard Message Format.

ATTENTION

The **STATISTICS** group of parameters, when enabled, replaces the <RESULTS> field in the output message.
It does not control the <STATISTICS> field which can be appended to the output message and is defined by the Statistics Field Format parameter.

Standard Mode

Whenever the <STATISTICS> field is not appended, the format of the OUTPUT MESSAGE is:

<HEADER><RESULTS><TERMINATOR>

The <RESULTS> field depends on one of the following data collection results:

- Complete Read
- Partial Read
- No Read

The information is transmitted on the Main Port when **MAIN PORT *Data TX*** is *Enabled.*

ATTENTION

The **STATISTICS** group of parameters, when enabled, replaces the <RESULTS> field in the output message.

It does not control the <STATISTICS> field which can be appended to the output message and is defined by the Statistics Field Format parameter.

Complete Read

When the **Complete Read** occurs, the output message format has the following structure for both single and multiple codes:

Format: <HEADER><RESULTS><TERMINATOR>

For single code reading:

<RESULTS> = <DATA PACKET>

For multiple code reading:

<RESULTS> = <DATA PACKET #1> <DPS> <DATA PACKET #2> <DPS> ... <DATA PACKET #n>

Where:

<DATA PACKET> =	***Data Packet Format***
<CODE FIELD> =	[<CODE>] or [<CODE><FC>] or [<FC><CODE>] or [<CUT CODE FIELD>] depending on selections for ***Code Field Justification*** and ***Code Field Cutting***.
<CODE> =	Code data
<FC> =	***Fill Character(s)***
<DPS> =	***Data Packet Separator String***
n =	Up to the maximum value to be set for ***Number of Codes***

Examples

Single code reading
Number of Codes = *1*
Data Packet Format = *%1 %2*
Symbology Identifier = *]d1*
Code Field Justification = *disabled*
Code Field Cutting = *disabled*
Header String = *<2>* (<STX>)
Terminator String = *<13><10>* (<CR><LF>)
Read Code =
- Data = DATALOGIC
- Symbology = Data Matrix ECC 200

OUTPUT MESSAGE:

<STX>]d1 DATALOGIC<CR><LF>

Multiple code reading
Number of Codes = *2*
Data Packet Format = *%2*
Code Field Justification = *disabled*
Code Field Cutting = *disabled*

Header String = *<2>* (<STX>)
Terminator String = *<13><10>* (<CR><LF>)
Data Packet Separator String = *$$$*
1st Read Code =
- Data = DATALOGIC
- Symbology = Data Matrix ECC 200

2nd Read Code =
- Data = MATRIX 210
- Symbology = Data Matrix ECC 200

OUTPUT MESSAGE:

<STX>DATALOGIC$$$MATRIX 210<CR><LF>

Partial Read

When the **Partial Read** occurs and ***Partial Read Tx*** is *Disabled*, the output message format corresponds to **No Read** (see below). On the other hand, when ***Partial Read Tx*** is *Enabled*, the output message format corresponds to **Complete Read**, where the <DATA PACKET> number is less than the value set for the ***Number of Codes***.

Example

Number of Codes = 2
Data Packet Format = *%2*
Code Field Justification = *disabled*
Data Packet Separator String = *$$$*
No Read Message = *<24>* (<CAN>)
Header String = *<2>* (<STX>)
Terminator String = *<13><10>* (<CR><LF>)
Read Code =
- Data = DATALOGIC
- Symbology = Data Matrix ECC 200

OUTPUT MESSAGE with ***Partial Read Tx*** *Disabled*:

<STX><CAN><CR><LF>

OUTPUT MESSAGE with ***Partial-Read Tx*** *Enabled*:

<STX>DATALOGIC<CR><LF>

No Read

When **No Read** occurs and the ***No Read Message*** is empty, no message is transmitted. On the other hand, when a string is set for this parameter, the output message has the following format:

Format: <HEADER><RESULTS><TERMINATOR>

where:

<RESULTS> = ***No Read Message***

Examples

No Read Message = *<24>* (<CAN>)
Header String = *<2>* (<STX>)
Terminator String = *<13><10>* (<CR><LF>)

OUTPUT MESSAGE:

<STX><CAN><CR><LF>

No Read Message = (empty)
Header String = *<2>* (<STX>)
Terminator String = *<13><10>* (<CR><LF>)

OUTPUT MESSAGE:

(none)

Match Code Enabled

Whenever the <STATISTICS> field is not appended, the format of the OUTPUT MESSAGE is:

<HEADER><RESULTS><TERMINATOR>

The <RESULTS> field depends on one of the following data collection results:

- **Right Code** = the first read code matches with one of the Match Code database codes.
- **Wrong Code** = the first read code does not match with one of the Match Code database codes.
- **No Read** = no code is read.

ATTENTION

The **STATISTICS** group of parameters, when enabled, replaces the <RESULTS> field in the output message.
It does not control the <STATISTICS> field which can be appended to the output message and is defined by the Statistics Field Format parameter.

Right Code

When the **Right Code** occurs, the output message format has the following structure:

Format: <HEADER><RESULTS><TERMINATOR>

where:

<RESULTS> = [<DATA PACKET>] or [<RIGHT MSG><DATA PACKET>] or [<RIGHT MSG>] depending on the selections for the ***Right Code Message*** and ***Data Packet Format***.
<DATA PACKET> = ***Data Packet Format***
<CODE FIELD> = [<CODE>] or [<CODE><FC>] or [<FC><CODE>] depending on selections for ***Code Field Justification***
<CODE> = Code data
<FC> = ***Fill Character(s)***
<RIGHT MSG> = ***Right Code Message***

Examples
Symbology Check = *enabled*
Right Code Message = *RIGHT*
Data Packet Format = *%2*
Header String = *<2>* (<STX>)
Terminator String = *<13><10>* (<CR><LF>)
Match Code =
- Data = DATALOGIC
- Symbology = Data Matrix ECC 200

Read Code =
- Data = DATALOGIC
- Symbology = Data Matrix ECC 200

OUTPUT MESSAGE:

<STX>RIGHTDATALOGIC<CR><LF>

Symbology Check = *enabled*
Right Code Message = (empty)
Data Packet Format = *%2*
Header String = *<2>* (<STX>)
Terminator String = *<13><10>* (<CR><LF>)
Match Code =
- Data = DATALOGIC
- Symbology = Data Matrix ECC 200

Read Code =
- Data = DATALOGIC
- Symbology = Data Matrix ECC 200

OUTPUT MESSAGE:

<STX>DATALOGIC<CR><LF>

Symbology Check = *enabled*
Right Code Message = *RIGHT*
Data Packet Format = (empty)
Header String = *<2>* (<STX>)
Terminator String = *<13><10>* (<CR><LF>)
Match Code =
- Data = DATALOGIC
- Symbology = Data Matrix ECC 200

Read Code =
- Data = DATALOGIC
- Symbology = Data Matrix ECC 200

OUTPUT MESSAGE:

<STX>RIGHT<CR><LF>

NOTE
If ***Data Packet Format*** and ***Right Code Message*** are empty, no message will be transmitted.

Wrong Code

When the **Wrong Code** occurs, the output message format has the following structure:

Format: <HEADER><RESULTS><TERMINATOR>

where:

<RESULTS> =	[<DATA PACKET>] or [<WRONG MSG><DATA PACKET>] or [<WRONG MSG>] depending on the selections for the ***Wrong Code Message*** and the ***Data Packet Format***.
<DATA PACKET> =	***Data Packet Format***
<CODE FIELD> =	[<CODE>] or [<CODE><FC>] or [<FC><CODE>] depending on selections for ***Code Field Justification***
<CODE> =	Code data
<FC> =	***Fill Character(s)***
<WRONG MSG> =	***Wrong Code Message***

Examples
Symbology Check = *enabled*
Wrong Code Message = *WRONG*
Data Packet Format = *%2*
Header String = *<2>* (<STX>)

Terminator String = *<13><10>* (<CR><LF>)
Match Code =
- Data = DATALOGIC
- Symbology = Data Matrix ECC 200

Read Code =
- Data = MATRIX 210
- Symbology = Data Matrix ECC 200

OUTPUT MESSAGE:

<STX>WRONGMATRIX 210<CR><LF>

Symbology Check = *enabled*
Wrong Code Message = (empty)
Data Packet Format = *%2*
Header String = *<2>* (<STX>)
Terminator String = *<13><10>* (<CR><LF>)
Match Code =
- Data = DATALOGIC
- Symbology = Data Matrix ECC 200

Read Code =
- Data = MATRIX 210
- Symbology = Data Matrix ECC 200

OUTPUT MESSAGE:

<STX>MATRIX 210<CR><LF>

Symbology Check = *enabled*
Wrong Code Message = *WRONG*
Data Packet Format = (empty)
Header String = *<2>* (<STX>)
Terminator String = *<13><10>* (<CR><LF>)
Match Code =
- Data = DATALOGIC
- Symbology = Data Matrix ECC 200

Read Code =
- Data = MATRIX 210
- Symbology = Data Matrix ECC 200

OUTPUT MESSAGE:

<STX>WRONG<CR><LF>

NOTE

If ***Data Packet Format*** and ***Wrong Code Message*** are empty, no message will be transmitted.

No Read

When **No Read** occurs and the ***No Read Message*** is empty, no message is transmitted. On the other hand, when a string is set for this parameter, the output message has the following format:

Format: <HEADER><RESULTS><TERMINATOR>

where:

<RESULTS> = ***No Read Message***

Examples
No Read Message = *<24>* (<CAN>)
Header String = *<2>* (<STX>)
Terminator String = *<13><10>* (<CR><LF>)

OUTPUT MESSAGE:

<STX><CAN><CR><LF>

No Read Message = (empty)
Header String = *<2>* (<STX>)
Terminator String = *<13><10>* (<CR><LF>)

OUTPUT MESSAGE:

(none)

Matrix Configuration

Operating Modes

Operating Mode

Defines the reader operating mode.

By selecting:

- *One Shot*. It is possible to acquire a single image depending on the selected value for ***Acquisition Trigger*** and **ACQUISITION TRIGGER DELAY**.
- *Continuous*. Allows acquiring images continuously with a rate up to the maximum allowable frame rate per second depending on the decoding time and the ***Region of Interest*** settings.
- *Phase Mode*. The images are acquired during the reading phase depending on the selected values for the ***Acquisition Trigger*** and **ACQUISITION TRIGGER DELAY**. The ***Reading Phase ON*** and ***Reading Phase OFF*** events mark respectively the beginning and end of the reading phase.

Acquisition Trigger

Sets the trigger event(s) that cause Matrix 210™ to acquire an image.

It is possible to select multiple trigger events so that any one of them will cause the reader to acquire an image. To do this, from the pull down menu, hold down the CTRL key, select the desired events with the mouse and press ENTER. The events will be listed separated by a comma.

- One Shot -
The possible options are:

- *Main Port String.* Once the string is received, the image capture is delayed depending on the ***Delay Time*** value (if at least one **ACQUISITION TRIGGER DELAY** is enabled).

- Phase Mode -
The possible options are:

- *Continuous* allows acquiring images continuously with a rate up to the maximum allowable frame rate per second for the given sensor depending on the decoding time and the ***Region of Interest*** settings. If at least one **ACQUISITION TRIGGER DELAY** is enabled the acquisition process starts after the selected delay.
- *Multi-Delay* allows acquiring images at the exact time(s) selected for the **ACQUISITION TRIGGER DELAY**. The minimum gap allowed between two delays depends on the scanning rate.
- *Periodic* allows a continuous acquisition of images with the defined frequency. If at least one **ACQUISITION TRIGGER DELAY** is enabled the acquisition process starts after the selected delay.
- *Main Port String* Once the string is received, the image capture is delayed depending on the ***Delay Time*** value (if at least one **ACQUISITION TRIGGER DELAY** is enabled).

Acquisition Trigger Period (ms)

In Phase Mode when the Acquisition Trigger is Periodic, this parameter sets the cycle time (period) for acquiring a new image.

Acquisition Trigger Status

For Matrix 210™ USB models, in Phase Mode the Acquisition Trigger Status is always enabled.

Reading Phase ON

In Phase Mode it defines the Main Port string (event) which starts the reading phase.

Reading Phase OFF

Defines the event(s) stopping the reading phase. It is possible to select multiple events so that any one of them will stop the reading phase. To do this, from the pull down menu, hold down the CTRL key, select the desired events with the mouse and press ENTER. The events will be listed separated by a comma.

- *Main Port String*
- *Timeout*
- *Complete Read*. Once the Code Collection is completed, the end of the reading phase is automatically generated.

Reading Phase Timeout (ms)

In Phase Mode when the Reading Phase OFF is set to *Timeout*, this parameter defines the Maximum duration of the Reading Phase.

Timeout Counting From

This parameter determines whether the Timeout used to determine the reading phase will begin from the Reading Phase ON event (normal operation), or from the Reading Phase OFF event (effectively extending the reading phase duration).

NOTE

Timeout counting from the end of the Reading Phase requires to set at least one additional event for the Reading Phase OFF parameter.

First Acquisition Setting Used

Defines the IMAGE ACQUISITION SETTING to be used to capture the first image within the reading phase.
The possible options are:

- *First Enabled*, which indicates the first acquisition setting enabled among those available.
- *Last Successful*, which indicates the last acquisition setting allowing the capture of a decodable image.

Image Acquisition Buffer Size

Defines the maximum number of queued images waiting for decoding.

NOTE

It is recommended to use this parameter only when:

- lots of images must be acquired in a short time;
- enough time is available after the acquisition to guarantee the decoding of all images.

See the example for further details.

Alternative Acquisition Group Select

When working in *One Shot* or *Phase Mode*, this parameter allows dynamic switching by an external command between two different acquisition settings (or groups of settings). Each enabled IMAGE ACQUISITION SETTING is assigned to either the Standard or Alternative Acquisition Group.

This parameter defines the external command used to select the Alternative Acquisition Group. To function correctly, there must be at least one enabled **IMAGE ACQUISITION SETTING** assigned to each group.

The Alternative Acquisition Group can be selected by an External Host Command. To do this, ***Alternative Acquisition Group Select*** must be set to *External Host Command* and the Host must send the following 4-byte Hex string over the Main port:

0x08 0x47 0x53 0x01

The Reader will answer, on the same port with one of the following strings:

<ESC>W1<CR><LF> (hex values **1B 57 31 0D 0A**) In case of error (the command is not accepted)

<ESC>K<CR><LF> (hex values **1B 4B 0D 0A**) If the command is accepted

---

The following parameters are valid only if the Continuous Mode is set.

Code Filter Depth

It is used to avoid multiple reads of the same code. The selected value (other than zero) defines the number of codes to memorize in a FIFO list.
When a code is read, it is compared to the list. If the list contains a code identical to the current code being read, the current code is discarded. If not, the current code is accepted and added to the list in either the last available position or by replacing the oldest code in the list.

Example

Code Filter Depth = 3

List	Code Read	Accepted
xxx (no code in list)	A	Yes
Axx	B	Yes
BAx	B	No
BAx	C	Yes
CBA	D	Yes
DCB	A	Yes
ADC	A	No

NOTE

To avoid several No Read messages when reading the same code, it is suggested to disable the ***No Read Message*** parameter.

Code Filter Selection

When Code Filter Depth > 0 (enabled), this parameter allows selecting the method to use for accepting multiple transmission of the same code.

Selections: Acquisition Counter Threshold, Timeout Threshold

Complete Read Threshold

When Code Filter Selection = Acquisition Counter Threshold, this parameter sets an N number of acquisitions of the same code in order to accept same code transmission. After each transmission the counter is reset.
If set to 0, the counter is disabled (no multiple transmission of the same code).

No Read Threshold

When Code Filter Selection = Acquisition Counter Threshold, this parameter sets an N number of acquisitions without a code in order to accept same code transmission. After each transmission the counter is reset.
If set to 0, the counter is disabled (no multiple transmission of the same code).

Timeout Threshold (sec)

When Code Filter Selection = Timeout Threshold, this parameter sets a timeout period (in seconds), after which transmission of the same code is accepted. After each transmission the timeout is reset.
If set to 0, the timeout is disabled (no multiple transmission of the same code).

Acquisition Trigger Delay

The **ACQUISITION TRIGGER DELAY** allows delaying the image capture after an external event.
While working in *One Shot* mode the delay starts from the ***Acquisition Trigger*** event. Each successive image capture will use the next ACQUISITION TRIGGER DELAY, among those enabled, in a cyclical order.
While working in *Phase Mode* the delay starts from the ***Reading Phase ON***. If the ***Acquisition Trigger*** is *Continuous* for any one of the reading phases, a new delay among those enabled, is set following a cyclical order. On the other hand, by selecting *Multi-Delay* each enabled delayed trigger is activated at the beginning of the reading phase.

Status

Allows enabling the following delay time.

Delay Time (x100µs)

Defines the delay time value in hundreds of microseconds.

Calibration

Image Acquisition Setting

The **Image Acquisition Setting** consists of a set of parameters which influence the characteristics of the captured image. During any image capture, the enabled Image Acquisition Settings will be used in a cyclical order. While working in *Phase Mode* the first setting used within the reading phase depends on the selection of the First Acquisition Setting Used.

Status

If enabled, allows capturing images by using the parameters belonging to this Image Acquisition Setting.

Acquisition Group

When working in *One Shot* or *Phase Mode*, this defines whether the current Image Acquisition Setting belongs to the Standard or Alternative Group. If more than one enabled Image Acquisition Setting is assigned to either of these groups, they will be used in a cyclical order within that group. See Alternative Acquisition Group Select.

Self Tuning

Enables/disables the Self Tuning function for the Image Acquisition Setting parameters. Self Tuning provides automatic adjustment in run time of different acquisition parameters (*Exposure Time* and *Gain*) for each captured image based on calculations performed on the previous acquisitions. These dynamic settings will be used instead of the static settings saved in memory.

Self Tuning Mode

Defines the type of Self Tuning function to perform. The possible selections are:

- *Gain Only*: optimizes only the ***Gain*** parameter, maintaining the configured ***Exposure Time*** value (advised for dynamic reading applications)
- *Exposure Time Only*: optimizes only the ***Exposure Time*** parameter, maintaining the configured ***Gain*** value
- *Exposure Time And Gain*: optimizes both parameter values in a balanced way

Self Tuning Timeout (ms)

Sets a limited execution time for the Self Tuning function.

If set to 0, the Self Tuning Timeout is disabled.
The Self Tuning Timeout period does not include image *Exposure Time* or acquisition time (which depends on the image sensor frame rate).

Internal Lighting Mode

Sets the operating mode of the internal lighting system. Possible values are:

- *Disabled*: the built-in LED array is turned off all the time. This option can be useful if using an external lighting system;
- *Always On*: the built-in LED array is turned on all the time at the lowest power level. This option is useful if the LED-array blinking (*Strobed* operating mode) disturbs the operator.
- *Very High/High/Medium-Power Strobed*: the built-in LED array is on only during the image exposure time. Three different lighting levels can be set.

NOTE

To avoid LED array overheating, for Power Strobed settings, the program automatically limits the range of allowed values for the ***Exposure Time*** parameter.
It is strongly recommended to use high lighting values for short exposure times.

Exposure Time (x *Step*)

It defines the time during which all pixels of the CMOS image sensor synchronously capture the frame.

This parameter must be set according to the environmental conditions (external lighting, code contrast etc.).

In general, a longer time corresponds to a lighter image but is susceptible to blurring due to the code movement. A shorter exposure time corresponds to a darker image.

NOTE

The range of values and step of this parameter change according to the ***Internal Lighting Mode*** parameter setting, therefore, after changes to ***Internal Lighting Mode***, recheck ***Exposure Time***.

Gain

Amplifies or reduces the pixel gray level effectively increasing or decreasing the contrast of the image.

Gain Increasing

Multiplies the defined Gain by 2 or by 4. If set to 1, the defined Gain is left unchanged.

NOTE

Setting a value other than 1 increases the noise and degrades the decoding performance.

Image Polarity Inversion

If enabled, allows capturing and processing the negative of the image.

Region Of Interest

Allows defining a region or window within the reader FOV.
The Top, Bottom, Left and Right parameters allow to precisely define the image window to be processed, visualized and saved.

NOTE

In general the Image Processing time can be reduced by reducing the window dimensions. The smaller the window (number of rows and columns), the higher the frame rate.

Image Rescaling

After any Region Of Interest windowing, this parameter performs rescaling on the captured images to be analyzed for decoding. On codes with high PPE (pixels per element), and with good contrast, this can decrease decoding time. The PPE value is shown when performing a Capture and Decode Last Image from the VisiSet™ main menu.

- *None*: no rescaling is performed on the images to be analyzed.
- *2x2*: the images to be analyzed are rescaled to 25% of their original size.
- *4x4*: the images to be analyzed are rescaled to 6.25% of their original size.

If rescaling is used on codes with low PPE or on low contrast codes, decoding errors could result.

NOTE

Image Rescaling is performed at image acquisition **before** applying any Image Filter.

Image Filter

Sets the filter to be applied to the image before being processed. This parameter can be used to help decoding by compensating for particular imperfections on direct part mark codes. Possible values are:

- *Disabled*: no filter is applied
- *Erode*: the image dark zones are enlarged
- *Dilate*: the image white zones are enlarged
- *Open*: white small areas (defects) present in dark zones of the image are deleted
- *Close*: dark small areas (defects) present in white zones of the image are deleted
- *Contrast Stretching*: maximizes image contrast
- *Histogram Equalization*: makes the gray level distribution uniform
- *Smoothing*: deletes small (insignificant) details in the center of the image
- *Sharpening*: improves out of focus images
- *Deblurring*: improves blurred images
- *Black Enhancement*: produces a nonlinear increase in the black level for light images
- *White Enhancement*: produces a nonlinear increase in the white level for dark images

NOTE

For the following image filters: *Erode*, *Dilate*, *Open* and *Close*, the overall image processing time increases when a larger size kernel is selected in the ***Image Filter Dimensions*** parameter.

Image Filter Dimensions

Meaningful only for *Erode*, *Dilate*, *Open* and *Close* image filters, this parameter determines the dimensions in pixels of the kernel (matrix) around each examined image pixel.
When setting a larger kernel for the ***Image Filter Dimensions*** parameter, the overall image processing time increases but the quality of the filter can also increase.

Communication

Main Port

The Matrix 210™ main serial interface is available for:

- point-to-point connections

It can be used for parameter configuration through VisiSet™ and for output message on a terminal.
Refer to the Matrix 210™ Reference Manual for hardware setup.

Baud Rate

Defines the serial communication speed.

Handshake

Allows defining a control to protect the communication against data loss.

Header String

Allows defining the <HEADER> string preceding the <RESULTS> in the output message.
It is possible to leave the string empty or to select a sequence of characters in the range from *<1>* (*<SOH>*) to *<255>*.
Non-printable characters are written in decimal notation between the <>, while printable characters can be typed directly from the keyboard.

See also

Message Format

ASCII Table

Terminator String

Allows defining the <TERMINATOR> string following the <STATISTICS> field in the output message.
It is possible to leave the string empty or to select a sequence of characters in the range from *<1>* (*<SOH>*) to *<255>*.
Non-printable characters are written in decimal notation between the <>, while printable characters can be typed directly from the keyboard.

See also

Message Format

ASCII Table

Reading Phase ON String

Is available only when *Main Port String* manages the ***Reading Phase ON*** event. At least one valid character must be defined.
It is possible to select a sequence of characters in the range from *<1>* (*<SOH>*) to *<255>*.
Non-printable characters are written in decimal notation between the <>, while printable characters can be typed directly from the keyboard.

See also

ASCII Table

Acquisition Trigger String

Is available only when *Main Port String* is included in the ***Acquisition Trigger*** events. At least one valid character must be defined.
It is possible to select a sequence of characters in the range from *<1>* (*<SOH>*) to *<255>*.
Non-printable characters are written in decimal notation between the <>, while printable characters can be typed directly from the keyboard.

See also

ASCII Table

Reading Phase OFF String

Is available only when *Main Port String* is included in the ***Reading Phase OFF*** events. At least one valid character must be defined.
It is possible to select a sequence of characters in the range from *<1>* (*<SOH>*) to *<255>*.
Non-printable characters are written in decimal notation between the <>, while printable characters can be typed directly from the keyboard.

See also

ASCII Table

Image Processing

Image Processing Setup

Processing Mode

This parameter allows setting the algorithm used to elaborate each individual captured image:

- *Standard*: is normally used for applications where the magnification is highly variable, and the position and orientation of the symbol is generally unpredictable (e.g. manually presenting a symbol to the reader).
- *Low Height Codes*: can be used to increase the decode rate when the symbol images have generally low height or low aspect ratios.
- *Advanced Code Setting*: can be used to increase the decode rate on very small or difficult codes when the symbol is presented at a fixed magnification and may have known properties such as resolution, number of modules, orientation, minimum code height, etc.

Using Low Height Codes or Advanced Code Setting allows (or, in many cases, requires) setting additional properties describing the symbol image. This normally produces decode rate gains and often significantly reduces decoding time.

NOTE

For Symbol Verification according to the ISO/IEC 15415, ISO/IEC 15416, and AS9132A Standards, the ***Processing Mode*** *Advanced Code Setting* is forced.

Identical Codes Decoding

Specifies whether identical codes (within the same image) should be decoded. A code is considered non-unique if it has the exact same length, symbology, and data string as a symbol already decoded.
This parameter has effect only for the Operating Modes where the decoding result is transmitted for each single image acquisition: *One Shot*, *Continuous*, and *Phase Mode* when ***Code Collection Mode*** = *Within An Image*.

NOTE

If enabled, this parameter may produce multiple identical decodes even if only one decode is expected. This may happen in particular with damaged codes.

Image Lighting Quality

Enables the computing of the Image Lighting Quality index which can be included in the **DATA FORMAT** and visualized in the Setup Wizard and Symbol Verification windows. When opening the Calibration Tool window this parameter is automatically and independently enabled.

> **NOTE**
> Enabling this parameter increases the decoding time.

Image Mirroring

When enabled, processes reverse printed or marked codes (mirrored images).

Gray Level Autocalibration

Enables a pre-processing step which aims to compensate non-uniformity in the gray level distribution of the image. It is advised to improve image quality when working conditions may vary significantly. It is especially designed to compensate for sharp declines in light intensity.
It is suggested to disable this parameter for applications having dark and uniform backgrounds (i.e. Tires).

Image Processing Timeout (ms)

Sets a limited processing time for each captured image.

The Processing Timeout period does not include image acquisition time (which depends on the image sensor frame rate).
If a timeout occurs during processing, the image will be recorded as a No Read event. For this reason the Timeout period must be set, taking into consideration the enabled symbologies, in order to allow reliable decoding.

Image Processing Timeout Precision

This parameter is only available for One Shot Operating Mode and can be used to force a *High* precision of the Image Processing Timeout, for rare critical-timing applications.
A side effect of setting this parameter to *High* is that successive Image Acquisition Triggers will be accepted only after the image acquisition + elaboration cycle of the previous image is complete, independent from the Image Acquisition Buffer availability.

> **NOTE**
> This parameter is forced to Standard when Data Matrix Settings are enabled.

Self Tuning

Enables/disables the Self Tuning function for Image Processing and Symbology related parameters.
This function performs different processing attempts on the same captured image according to the selected Self Tuning Mode parameter value.

Self Tuning Mode

Defines the type of Image Processing Self Tuning to perform. The possible selections are:

- *Symbologies Only*: attempts to process and decode the symbologies from all those available in software
- *Processing Modes Only*: cycles the ***Processing Mode*** options on the symbologies already enabled
- *Decoding Methods Only*: cycles the ***Decoding Methods*** options on the 2D symbologies already enabled
- *Code Contrast Levels Only*: cycles the possible values for the ***Code Contrast*** parameter on the 2D symbologies already enabled
- *Image Mirroring Only*: makes attempts with and without Mirroring on the symbologies already enabled
- *General Purpose*: makes all attempts

Self Tuning Timeout (ms)

Sets a limited execution time for Self Tuning function.

If set to 0, the Processing Timeout is disabled.

> **NOTE**
> This timeout must be longer than the ***Image Processing Timeout*** value.

2D Codes

2D Codes Setup

> **NOTE**
> The following parameters affect only Data Matrix ECC 200 and QR Code reading.

Code Color

Allows to pre-select the color of the code to be read. It is possible to select a black code on a white background (*black*), a white code on a black background (*white*) or *both colors*.

Code Contrast

Defines the symbol contrast threshold to be used during the decoding process. The possible selections are:

- *High*
- *Standard*
- *Low*
- *Very Low*
- *Automatic*

By setting low contrast values for very low contrast symbols the decoding time may increase.
By setting high contrast values for very high contrast symbols the decoding time may decrease.
By selecting *Automatic*, the reader automatically determines the symbol contrast threshold which best suits the code to be read.

Data Matrix ECC 200

Status

Enables/disables the reading of this code symbology.

> **NOTE**
> This code group includes the GS1 Data Matrix symbology.

Decoding Method

Selects the decoding algorithm according to the printing/marking technique used to create the symbol and on the overall printing/marking quality. The possible selections are:

- *Standard*: advised for printed codes or for good quality Direct Part Mark codes.

- *Direct Marking*: advised to improve the decode rate for low quality Direct Part Mark codes and in general for Direct Part Mark codes with dot peening type module shapes. This algorithm is more aggressive but in general it has longer decoding times than the *Standard* algorithm.

Rectangular Formats

Enables the reading of rectangular Data Matrix ECC 200 codes. If disabled, only square codes can be read.
If your application only uses square codes, disabling this parameter helps reduce the decoding time.

Decoding Performance

This parameter refers to printed Data Matrix family codes and is available when Processing Mode is set to *Standard*. The possible selections are:

- *Quick*: can improve decoding time for good print quality and/or relatively normal size codes. This is the default setting.
- *Robust*: can improve the decode rate for low print quality and/or small size codes. This algorithm is more aggressive but in general it may have longer decoding times than the *Quick* algorithm. This is the default setting for the Autolearning function.

NOTE

If Autolearning is used (i.e. for rapid configuration), this parameter will remain set to Robust.

Legacy

For Data Matrix ECC 200 codes which are of good to high quality, **Legacy** enables a special algorithm for improving decoding performance in terms of constant decoding time (repeatability). This parameter is available when Processing Mode is set to *Standard* and when enabled, the Decoding Performance parameter is not available.

Advanced Box Improvement

When enabled, this parameter increases the precision of the decoding area BOX around the Data Matrix code. This box is visible (indicated by 4 green dots), in various VisiSet™ Tools such as the Calibration Tool Window. Advanced Box Improvement is recommended when using OCR.

The following parameters are valid only when the Processing Mode is set to *Advanced Code Setting*. They must be set appropriately according to the application requirements.

Code Orientation

Allows selecting the orientation at which the symbols can be decoded. The possible selections are:

- *Aligned*: decodes Data Matrix symbols only if its finder pattern is aligned with the *x* and *y* axes of the image, with a tolerance of + /- 20°.
- *Free*: decodes Data Matrix symbols regardless of orientation.

NOTE

Symbols with an orientation out of the defined range may sometimes be decoded.

Code Size

Allows either reading codes with any module number (*Free*) or correctly setting the number of modules for codes to be read (*Defined*).

Number of Modules

Allows specifying one or more defined number of modules (rows x columns) of codes to be read when the ***Code Size*** parameter is set to *Defined*. To select more than one Number of Modules so that any one of them will cause the code to be decoded, from the pull down menu, hold down the CTRL key and select the desired values with the mouse. The values will be listed separated by a comma.

Module Size (mils)

Allows setting the typical resolution of codes to be read (in mils).
This parameter is also valid when the Processing Mode is set to *Low Height Codes*.

Decoding Time Improvement

Enables/disables a special algorithm for improving decoding time of the Data Matrix ECC 200 codes.

QR Code

Status

Enables/disables the reading of this code symbology.

The following parameter is valid only when the Processing Mode is set to *Advanced Code Setting* or *Low Height Codes*.

Module Size (mils)

Allows setting the typical resolution of codes to be read (in mils).

Micro QR Code

Status

Enables/disables the reading of this code symbology.

Aztec Code

Status

Enables/disables the reading of this code symbology.

Maxicode

Status

Enables/disables the reading of this code symbology.

Modes

Selects the appropriate Maxicode mode(s). To select more than one Mode so that any one of them will cause the code to be decoded, from the pull down menu, hold down the CTRL key and select the desired values with the mouse. The values will be listed separated by a comma.

Partial Code TX

Enables/disables the transmission of the partial code information content.

1D Codes

1D Codes Setup

Advanced Box Improvement

When enabled, this parameter increases the precision of the decoding area BOX around the 1D code. This box is visible (indicated by 4 green dots), in various VisiSet™ Tools such as the Calibration Tool Window. Advanced Box Improvement is forced to enabled when using OCR.

Subpixel Decoding Improvement

Enables a special algorithm designed for high resolution 1D codes. It is advised to improve decoding rate for 1D codes with a resolution of less than 1.2 ppm. This algorithm is more aggressive but generally has longer decoding times than the standard algorithm. It is suggested to disable this parameter for time-critical applications (i.e. high-speed conveyor, Tires or low resolution 1D codes).

The following parameter is valid only when the Processing Mode is set to *Advanced Code Setting* or *Low Height Codes.* It must be set appropriately according to the application requirements.

Minimum Code Height (mm)

Allows specifying the minimum height of barcodes (including PDF417) in millimeters. A symbology with a code height less than this value may sometimes be decoded.

You must appropriately set the following code features whenever the Processing Mode is set to *Advanced Code Setting*.

Code Aspect Ratio

When selecting the *Low* value a special algorithm is enabled for locating low aspect ratio symbols.

NOTE

Enabling this algorithm can substantially increase the time needed to decode symbols.

Code Contrast

When selecting the *Low* value, a special algorithm is enabled for the decoding of low contrast symbols. Low contrast images may occur for many reasons such as printing or lighting problems, motion blur, oblique reader angles, etc.

Small Codes Improvement

This parameter can improve the reading percentage on physically small dimension linear codes.

NOTE

Enabling this algorithm can substantially increase the time needed to decode symbols.

Tires Improvement

Selects special algorithms for decoding 1D codes on tires in order to speed-up the mean decoding time. It must be enabled (Method 1 or Method 2), only if the application is set to read linear barcodes (black on white) found on a uniform dark background. The possible selections are:

- *Disabled*: No tire improvement algorithm is enabled
- *Method 1 (Scans)*: implements a statistical approach on barcode localization independently from the code orientation in the image
- *Method 2 (Sigma ROI)*: implements a statistical approach on barcode localization when codes are found in a diagonal orientation in the image

NOTE

Enabling the Method 2 (Sigma ROI) algorithm requires the disabling of the Identical Codes Decoding.

Tires Sigma ROI Algorithm (Severity)

When *Method 2* of **Tires Improvement** is selected, this parameter determines whether the Basic algorithm is implemented or an additional Advanced set of parameters (more aggressive), are used. However, please note that the Advanced setting increases the possibility of decoding errors.

Code Search Priority

Selects special algorithms for decoding 1D codes on tires in order to speed-up the mean decoding time. The possible selections are:

- *Horizontal/Vertical*: prioritizes the code search along horizontal and vertical directions in the image
- *45 Degrees*: prioritizes the code search along diagonal directions in the image. This selection must be enabled only if the application is set to read linear barcodes (black on white) found on a uniform dark background.

PDF417

Status

Enables/disables the reading of this code symbology.

MICRO PDF417

Status

Enables/disables the reading of this code symbology.

Code 128

Status

Enables/disables the reading of this code symbology.

Narrow Margins

Enables the decoding of symbologies with substandard width margins (quiet zone). To disable this parameter, GS1-128 Narrow Margins must also be disabled.

Start/Stop Characters Tx

Enables/disables Start/Stop character transmission. To disable this parameter, GS1-128 Start/Stop Characters Tx must also be disabled.

Characters Tx

Enables/disables transmission of any Function characters contained in the code.

GS1-128 (ex EAN 128)

Status

Enables/disables the reading of this code symbology.

Narrow Margins

Enables the decoding of symbologies with substandard width margins (quiet zone). To disable this parameter, Code 128 Narrow Margins must also be disabled.

Start/Stop Characters Tx

Enables/disables Start/Stop character transmission. To disable this parameter, Code 128 Start/Stop Characters Tx must also be disabled.

Code 39

Status

Enables/disables the reading of this code symbology.

Character Set

Allows selecting Standard or full ASCII characters set.

Check Digit Status

The check digit control can be enabled to improve decoding safety: it is generally the last digit aligned to the right of the code that verifies the validity of the preceding digits.
The calculation technique and number of check digits depend on the code symbology.
It is advised to control the check digit whenever the codes are provided with it.

Check Digit TX

Allows including the Check Digit in the output message.

Narrow Margins

Enables the decoding of symbologies with substandard width margins (quiet zone).

Code 32 Decoding

Enables decoding of the Code 32 symbology.

MSI

Status

Enables/disables the reading of this code symbology.

> **NOTE**
> MSI symbology is not compatible with the X-PRESS™ Learn or AUTOLEARNING procedure.

Check Digit Status

The check digit control can be enabled to improve decoding safety: it is generally the last digit aligned to the right of the code that verifies the validity of the preceding digits.
The calculation technique and number of check digits depend on the code symbology. For MSI there are three possible Check Digit algorithms that can be selected: Single Mod 10, Mod 10 + Mod 11, Two Mod 10. This selection must match the Check Digit used in the code.
It is advised to control the check digit whenever the codes are provided with it.

Check Digit TX

Allows including the Check Digit in the output message.

Narrow Margins

Enables the decoding of symbologies with substandard width margins (quiet zone).

Standard 2 of 5

Status

Enables/disables the reading of this code symbology.

> **NOTE**
> Standard 2 of 5 symbology is not compatible with the X-PRESS™ Learn or AUTOLEARNING procedure.

Check Digit Status

The check digit control can be enabled to improve decoding safety: it is generally the last digit aligned to the right of the code that verifies the validity of the preceding digits.
The calculation technique and number of check digits depend on the code symbology.
It is advised to control the check digit whenever the codes are provided with it.

Check Digit TX

Allows including the Check Digit in the output message.

Narrow Margins

Enables the decoding of symbologies with substandard width margins (quiet zone).

Matrix 2 of 5

Status

Enables/disables the reading of this code symbology.

NOTE

Matrix 2 of 5 symbology is not compatible with the X-PRESS™ Learn or AUTOLEARNING procedure.

Check Digit Status

The check digit control can be enabled to improve decoding safety: it is generally the last digit aligned to the right of the code that verifies the validity of the preceding digits.
The calculation technique and number of check digits depend on the code symbology.
It is advised to control the check digit whenever the codes are provided with it.

Check Digit TX

Allows including the Check Digit in the output message.

Narrow Margins

Enables the decoding of symbologies with substandard width margins (quiet zone).

Interleaved 2 of 5

Status

Enables/disables the reading of this code symbology.

Check Digit Status

The check digit control can be enabled to improve decoding safety: it is generally the last digit aligned to the right of the code that verifies the validity of the preceding digits.
The calculation technique and number of check digits depend on the code symbology.
It is advised to control the check digit whenever the codes are provided with it.

Check Digit TX

Allows including the Check Digit in the output message.

Narrow Margins

Enables the decoding of symbologies with substandard width margins (quiet zone).

Decoding Severity

During decoding, poorly printed or damaged codes could be discarded and not transmitted because their image does not match the expected code image.
Through the Decoding Severity parameter, a ratio between the actual and the expected code image can be considered. The *Standard* value means there can be a larger difference between the images. Setting this parameter to *High* increases the possibility of No Reads but reduces the possibility of decoding errors.

Minimum Number of Characters

Allow setting the minimum code length for this symbology. A code with a number of characters less than the one selected causes a decoding failure.

Pharmacode

Status

Enables/disables the reading of this code symbology.

> **NOTE**
> Pharmacode symbology is not compatible with the X-PRESS™ Learn or AUTOLEARNING procedure.

The following parameters are valid only when the Processing Mode is set to *Advanced Code Setting*. They must be set appropriately according to the application requirements.

Output Format

Defines the format of decoded Pharmacode codes. The possible selections are:

- *Encoded*: the code is transmitted using the standard numeric format.
- *Binary*: the wide bars (corresponding to digit 1) and narrow bars (corresponding to digit 0) of the code are transmitted in binary format.

Min Bar Count and Max Bar Count

Allows setting the minimum / maximum number of bars in the pharmacode symbology.

Decoded Min and Max Value

This parameter is available only when the ***Output Format*** parameter is set to *Encoded*. It allows defining the minimum / maximum value of data to be decoded.

Code Orientation

Allows setting the orientation at which the symbols can be decoded.
The possible selections are:

- *Horizontal*: the symbology is aligned to the x axis with a tolerance of +/- 45°.
- *Vertical*: the symbology is aligned to the y axis with a tolerance of +/- 45°.

> **NOTE**
> Symbols outside the specified orientation may sometimes be decoded.

Direction of Decoding

Defines the direction to be followed when decoding a code. The possible selections are:

- *Normal*: decoding direction is from left to right (horizontal code) or from top to bottom (vertical code);
- *Reverse*: decoding direction is from right to left (horizontal code) or from bottom to top (vertical code).

Colored Bars Check

Enables/disables the checking of colored bars.

UPC - EAN

Status
Enables/disables the reading of these code symbologies.

Addon 2 and 5 Status
Enables/disables the decoding of 2 and 5 supplemental digits added to the right of the UPC-EAN code symbology.
The possible selections are:

- *Disabled*: disables the supplemental digit decoding;
- *Enabled*: enables the supplemental digit decoding;
- *Enabled (Addon 2 no quiet zone)*: enables the supplemental digit decoding allowing a substandard trailing quiet zone on a 2 supplemental digit symbol.

CAUTION

The substandard trailing quiet zone option allows a successful decoding of 2 supplemental digits with a trailing quiet zone smaller than 5 modules. This option should only be enabled when it is guaranteed that a 2 digit supplemental symbol is present, for example, codes used on periodicals sold for retail. In case this option is enabled and no 2 digit supplemental symbol is present, there is an increased probability that the reader will create a fictitious 2 digit supplemental symbol , thus causing a (partial) misread.

Expand UPC E0-E1 Symbols
Specifies whether the UPC E0 and UPC E1 symbols should be expanded according to the UPC specification or should be left unexpanded in the result string.

Narrow Margins
Enables the decoding of symbologies with substandard width margins (quiet zone).

The following parameter is valid only when Narrow Margins has been enabled.

Margin Size
Is expressed as a percentage of the narrow linear code module. 200(%) corresponds to an acceptable Margin Size value of 2 modules.

Decoding Severity
During decoding, poorly printed or damaged codes could be discarded and not transmitted because their image does not match the expected code image.
Through the Decoding Severity parameter, a ratio between the actual and the expected code image can be considered. The *Standard* value means there can be a larger difference between the images. Setting this parameter to *High* increases the possibility of No Reads but reduces the possibility of decoding errors.

Codabar

Status
Enables/disables the reading of this code symbology.

Check Digit Status
The check digit control can be enabled to improve decoding safety: it is generally the last digit aligned to the right of the code that verifies the validity of the preceding digits.
The calculation technique and number of check digits depend on the code symbology.
It is advised to control the check digit whenever the codes are provided with it.

Check Digit TX
Allows including the Check Digit in the output message.

Narrow Margins
Enables the decoding of symbologies with substandard width margins (quiet zone).

Start/Stop Characters Tx
Enables/disables Start/Stop character transmission.

Code 93

Status
Enables/disables the reading of this code symbology.

Narrow Margins
Enables the decoding of symbologies with substandard width margins (quiet zone).

GS1 DataBar Codes

GS1 DataBar Expanded

Status
Enables/disables the reading of this code symbology.

GS1 DataBar Expanded Stacked

Status
Enables/disables the reading of this code symbology.

GS1 DataBar Limited

Status
Enables/disables the reading of this code symbology.

GS1 DataBar, GS1 DataBar Truncated

Status
Enables/disables the reading of these code symbologies.

NOTE

GS1 DataBar also enables the GS1 DataBar Truncated symbology.

GS1 DataBar Stacked, GS1 DataBar Stacked Omnidirectional

Status

Enables/disables the reading of these code symbologies.

NOTE

GS1 DataBar Stacked also enables the GS1 DataBar Stacked Omnidirectional symbology.

Composite Code

The Composite code symbology consists of two different codes: the first one is a linear code, the second one is a PDF code. It is not necessary to enable the single code symbologies.

NOTE

This code symbology requires using the ***Image Processing Mode*** *Advanced Code Settings*.

Status

Enables/disables the reading of this code symbology.

If ***Composite Code*** is enabled, both codes present in the Composite code are decoded and transmitted as if they were two different codes within the same image.

Example 1

When Matrix 210™ is set to collect a single code in the same image (in Run Mode), a Complete Read occurs upon the reading of the first code (linear symbology) of the Composite symbology.

Number of Codes = *1*

Status = *enabled*

Read Code =

- Data = 987695969785
- Symbology = UPC-A

OUTPUT MESSAGE:

<STX>]E0-987695969785<CR><LF>

Example 2

When Matrix 210™ is set to collect two codes in the same image (in Run Mode), a Complete Read occurs upon the reading of both codes of the Composite symbology.

Number of Codes = 2

Status = *enabled*

Read Code =

- Linear Symbology Data = 987695969785
- Linear Symbology = UPC-A
- PDF Symbology Data = good news for people who like bad news
- PDF Symbology = CC_B of CC

OUTPUT MESSAGE:

<STX>]E0-987695969785<CR><LF>
]C1-good news for people who like bad news<CR><LF>

If ***Composite Code*** is disabled, only the linear code present in a Composite code could be decoded as a separate code (if its 1D code symbology is enabled). Its symbology can also be indicated. On the other hand, the PDF code in a Composite code cannot be decoded separately even if its code symbology is enabled.

Postal Codes

This folder allows you to set the parameters of the following code symbologies:

- Australia Post
- Royal Mail 4State Customer
- Kix Code
- Japan Post
- PLANET
- POSTNET
- Intelligent Mail
- Swedish Postal

Status

Enables/disables the reading of this code symbology.

Customer Field Decoding

Allows setting the type of Australia Post Customer Field Decoding value from a list of recognized standards (N Decoding Table, C Decoding Table, Decimal Bars Value).

The following parameters are valid only when the Advanced Code Setting Processing Mode is selected.

Min Bar Count and Max Bar Count

Allows setting the minimum / maximum number of bars in a postal symbology.

NOTE

Symbols with a barcount out of this range may sometimes be decoded.

Code Orientation

Allows setting the orientation at which the symbols can be decoded.
The possible selections are:

- *Omnidirectional*: decodes postal symbologies regardless of orientation.
- *Horizontal*: the symbology is aligned to the x axe with a tolerance of +/- 20°.
- *Vertical*: the symbology is aligned to the y axe with a tolerance of +/- 20°.
- *Horizontal and Vertical*: the symbology is aligned to the x or y axes with a tolerance of +/- 20°.

NOTE

Symbols outside the specified orientation may sometimes be decoded.

Bar Edge Spacing

Allows setting the typical value of the sum of the Bar Width + Space Width in mils.

Data Matrix Wizard

NOTE

This folder contains the Data Matrix Setting parameters managed by the Data Matrix Setup Wizard. It is not recommended to set these from this folder but rather run the Data Matrix Setup Wizard from the main menu in VisiSet™. From the Data Matrix Setup Wizard this folder can be opened in interactive mode by pressing the Data Matrix Wizard button. The parameters which should be set in order to reduce the time required to perform Autolearning by the Data Matrix Setup Wizard are: Image Processing Timeout and Fixed Image Mirroring.

Wizard Pre-Configuration

Status

Enables the Data Matrix Setup Wizard to manage the Data Matrix Settings. This parameter is automatically enabled when running the Data Matrix Setup Wizard from the VisiSet™ main menu. The parameters in this folder are meant to be modified through the Data Matrix Setup Wizard. Using the Data Matrix Wizard button, the Parameter Setup window is opened in interactive mode.

When enabled, the relative Common Setting and Data Matrix Setting parameters are no longer configurable on their original folder pages.

Image Processing Timeout (ms)

Sets a limited processing time for each captured image. This is a global value for all Settings when running the wizard. See also Setting Timeout.

The Processing Timeout period does not include image acquisition time (which depends on the image sensor frame rate).
If the timeout occurs during processing, the image will be recorded as a No Read event (true for One Shot Operating Mode or for Phase Mode when Code Collection Mode is = *Within an Image*). For this reason the Timeout period must be set, taking into consideration the enabled symbologies, in order to allow reliable decoding.

Fixed Image Mirroring

Mirrored images are produced when codes are printed or marked on surfaces as a reverse image or read as a mirrored reflection of the code itself.
Perform Data Matrix Autolearning on mirrored images (*Enabled*), without mirroring (*Disabled*), or if *Unknown*, attempt Autolearning on both types of images.
If Image Mirroring is known, specifying *Enabled* or *Disabled* will reduce the time required for Data Matrix Autolearning. By default this parameter is set to look for both conditions (*Unknown*).

Common Setting

Gray Level Autocalibration

Enables a pre-processing step which aims to compensate non-uniformity in the gray level distribution of the image. It is advised to improve image quality when working conditions may vary significantly. It is especially designed to compensate for sharp declines in light intensity.
It is suggested to disable this parameter for applications having dark and uniform backgrounds (i.e. Tires).

Image Rescaling

Performs rescaling on the captured images to be analyzed for decoding. On codes with high PPE (pixels per element), and with good contrast, this can decrease decoding time. The PPE value is shown when performing a Capture and Decode Last Image from the VisiSet™ main menu.

- *None*: no rescaling is performed on the images to be analyzed.
- *2x2*: the images to be analyzed are rescaled to 25% of their original size.
- *4x4*: the images to be analyzed are rescaled to 6.25%.

If rescaling is used on codes with low PPE or on low contrast codes, decoding errors could result.

NOTE

Image Rescaling is performed **before** applying any Image Filter.

Code Orientation

Allows selecting the orientation at which the symbols can be decoded. The possible selections are:

- *Aligned*: decodes Data Matrix symbols only if its finder pattern is aligned with the *x* and *y* axes of the image, with a tolerance of + /- 20°.
- *Free*: decodes Data Matrix symbols regardless of orientation.

NOTE

Symbols with an orientation out of the defined range may sometimes be decoded.

Data Matrix Setting

Status

Enables the specific Data Matrix Setting which is defined by the group of relative Data Matrix parameters. Up to 10 different Settings can be enabled.

Setting Timeout (ms)

This is the same as the "global" Image Processing Timeout in the Wizard Pre-Configuration parameters, but it is relative to the specific Data Matrix Setting. It sets a limited processing time for each captured image using this setting. The Wizard sets this value to the global Image Processing Timeout value, but expert users can reduce this value manually for the specific Setting after the wizard is run.

NOTE

The Image Processing Timeout Precision parameter is forced to Standard when Data Matrix Settings are enabled.

Processing Mode

This parameter allows setting the algorithm used to elaborate each individual captured image:

- *Standard*: is normally used for applications where the magnification is highly variable, and the position and orientation of the symbol is generally unpredictable (e.g. manually presenting a symbol to the reader).
- *Low Height Codes*: can be used to increase the decode rate when the symbol images have generally low height or low aspect ratios.

- *Advanced Code Setting*: can be used to increase the decode rate on very small or difficult codes when the symbol is presented at a fixed magnification and may have known properties such as resolution, number of modules, orientation, minimum code height, etc.

Using Low Height Codes or Advanced Code Setting allows (or, in many cases, requires) setting additional properties describing the symbol image. This normally produces decode rate gains and often significantly reduces decoding time.

NOTE

For Symbol Verification according to the ISO/IEC 15415, ISO/IEC 15416, and AS9132A Standards, the ***Processing Mode*** *Advanced Code Setting* is forced.

Image Mirroring

When enabled, processes reverse printed or marked codes (mirrored images).

Image Filter

Sets the filter to be applied to the image before being processed. This parameter can be used to help decoding by compensating for particular imperfections on direct part mark codes. Possible values are:

- *Disabled*: no filter is applied
- *Erode*: the image dark zones are enlarged
- *Dilate*: the image white zones are enlarged
- *Open*: white small areas (defects) present in dark zones of the image are deleted
- *Close*: dark small areas (defects) present in white zones of the image are deleted
- *Contrast Stretching*: maximizes image contrast
- *Histogram Equalization*: makes the gray level distribution uniform
- *Smoothing*: deletes small (insignificant) details in the center of the image
- *Sharpening*: improves out of focus images
- *Deblurring*: improves blurred images
- *Black Enhancement*: produces a nonlinear increase in the black level for light images
- *White Enhancement*: produces a nonlinear increase in the white level for dark images

NOTE

For the following image filters: *Erode*, *Dilate*, *Open* and *Close*, the overall image processing time increases when a larger size kernel is selected in the ***Image Filter Dimensions*** parameter.

Image Filter Dimensions

Meaningful only for *Erode*, *Dilate*, *Open* and *Close* image filters, this parameter determines the dimensions in pixels of the kernel (matrix) around each examined image pixel.
When setting a larger kernel for the ***Image Filter Dimensions*** parameter, the overall image processing time increases but the quality of the filter can also increase.

Code Color

Allows to pre-select the color of the code to be read. It is possible to select a black code on a white background (*black*), a white code on a black background (*white*) or *both colors*.

Code Contrast

Defines the symbol contrast threshold to be used during the decoding process. The possible selections are:

- *High*
- *Standard*
- *Low*
- *Very Low*
- *Automatic*

By setting low contrast values for very low contrast symbols the decoding time may increase.
By setting high contrast values for very high contrast symbols the decoding time may decrease.
By selecting *Automatic*, the reader automatically determines the symbol contrast threshold which best suits the code to be read.

Decoding Method

Selects the decoding algorithm according to the printing/marking technique used to create the symbol and on the overall printing/marking quality. The possible selections are:

- *Standard*: advised for printed codes or for good quality Direct Part Mark codes.
- *Direct Marking*: advised to improve the decode rate for low quality Direct Part Mark codes and in general for Direct Part Mark codes with dot peening type module shapes. This algorithm is more aggressive but in general it has longer decoding times than the *Standard* algorithm.

Rectangular Formats

Enables the reading of rectangular Data Matrix ECC 200 codes. If disabled, only square codes can be read.
If your application only uses square codes, disabling this parameter helps reduce the decoding time.

Decoding Performance

This parameter refers to printed Data Matrix family codes and is available when Processing Mode is set to *Standard*. The possible selections are:

- *Quick*: can improve decoding time for good print quality and/or relatively normal size codes.
- *Robust*: can improve the decode rate for low print quality and/or small size codes. This algorithm is more aggressive but in general it may have longer decoding times than the *Quick* algorithm. This is the default setting for the Data Matrix Setup Wizard Autolearning function.

Code Size

Allows either reading codes with any module number (*Free*) or correctly setting the number of modules for codes to be read (*Defined*).

Number of Modules

Allows specifying one or more defined number of modules (rows x columns) of codes to be read when the ***Code Size*** parameter is set to *Defined*. To select more than one Number of Modules so that any one of them will cause the code to be decoded, from the pull down menu, hold down the CTRL key and select the desired values with the mouse. The values will be listed separated by a comma.

Module Size (mils)

Allows setting the typical resolution of codes to be read (in mils).
This parameter is also valid when the Processing Mode is set to *Low Height Codes*.

Decoding Time Improvement

Enables/disables a special algorithm for improving decoding time of the Data Matrix ECC 200 codes.

Legacy

For Data Matrix ECC 200 codes which are of good to high quality, **Legacy** enables a special algorithm for improving decoding performance in terms of constant decoding time (repeatability). This parameter is available when Processing Mode is set to *Standard* and when enabled, the Decoding Performance parameter is not available.

Data Collection

Code Collection

Matrix 210™ can collect several codes before providing a single output result.

Code Collection Mode

Is available only when the ***Operating Mode*** is set to *Phase Mode*.
By setting *Within a Phase* the collection takes place during the whole reading phase and a single result is provided to the user for each phase. On the other hand, by selecting *Within an Image* the reader searches for the defined number of codes within the single image and a result is provided to the user after each image decoding.

Number of Codes

Defines the number of codes to be read within the collection time.
If the defined number of codes to be read is reached, a ***Complete Read*** event occurs.
If less than the defined number of codes are read, a ***Partial Read*** event occurs.
If no code is read, a ***No Read*** event occurs.

Multiple Read

Allows detecting and collecting multiple codes during the same reading operation.
Multiple Read operations refer to codes having the same characteristics (Symbology, Min & Max Number of Characters, …) but different information content.
This parameter is only available when the following conditions are met:

- Code Collection Mode is enabled;
- Code Collection Filters are enabled;
- the number of active collection slots (**M***)* in the *Code Filter Setting* corresponds to the Number of Codes (**N**) to be decoded: **M** = **N**.

The possible selections are:

- *Disabled:* no Multiple Read event occurs. This is the default value;
- *Enabled*: when set to Enabled, the scanner reads more than the number of the expected codes set by the Number of Codes parameter. The scanner stops decoding as soon as the **Image Processing Timeout (ms)** value is reached (operating modes Continuous and One Shot), or after **Reading Phase Off**.

Refer to the Example for further details.

Code Collection Filters

Enables/disables the use of Code Collection Filters when collecting data.

Minimum Phase Duration (ms)

In Phase Mode, in order to filter spurious (unwanted) reading phases, this parameter sets a minimum time (in milliseconds) for the reading phase to be considered valid between Reading Phase ON and Reading Phase OFF. A reading phase shorter than this value will not generate any output.
The default value = 0 indicates this control is disabled, any reading phase duration will generate an output.

NOTE

This parameter may be overridden by certain Reading Phase OFF selections (i.e. Reading Phase OFF = Complete Read or Timeout less than Minimum Phase Duration).

Code Filter Setting

Manages the group of parameters that define a Code Collection Filter. For each specific filter, it allows ordering read codes and filtering them according to their symbology, length and position. The actual number of enabled Code Collection Filters (up to 100) does not have to be consecutive and also does not have to correspond to the number set in the ***Number of Codes*** parameter.

See Also

Examples

Status

Enables/disables the specific Code Collection Filter.

Symbology

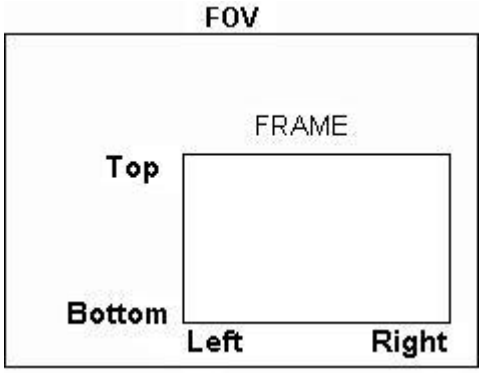
It allows selecting the symbology to be collected.

Min/Max Number of Characters

It allows setting a range of acceptable code lengths for the selected symbology. A code with a number of characters out of this range causes a decoding failure.

Code Position Frame: Top, Bottom, Left, Right

These coordinates define the FOV sub-area inside which the code center must be located. A code with a center positioned out of this frame causes a decoding failure.



Make sure that Left<Right and Top<Bottom.

Code Quality Index

The Code Quality Index allows selecting from a list of Standard Code Quality Parameters, which the codes read must meet or exceed in order to be accepted in the collection.

	ISO-IEC 16022-18004	ISO-IEC 15415	ISO-IEC 15416	AIM DPM	AS9132
ISO-IEC / AIM DPM Overall Grade	•	•	•	•	
ISO-IEC Symbol Contrast	•	•	•		
ISO-IEC Print Growth	•				
ISO-IEC / AIM DPM Axial Non Uniformity	•	•		•	
ISO-IEC / AIM DPM Unused ECC	•	•		•	
ISO-IEC Modulation		•	•		
ISO-IEC Min Edge Contrast			•		
ISO-IEC Decodability			•		
ISO-IEC / AIM DPM Fixed Pattern Damage		•		•	
ISO-IEC / AIM DPM Grid Non Uniformity		•		•	
ISO-IEC / AIM DPM Minimum Reflectance			•	•	

ISO-IEC Defects			•		
ISO-IEC / AIM DPM Decode		•	•	•	
AIM DPM Cell Contrast				•	
AIM DPM Cell Modulation				•	
AS9132 Dot Size/Cell Fill					•
AS9132 Dot Center Offset					•
AS9132 Dot Ovality					•
AS9132 Quiet Zone					•
AS9132 Angle of Distortion					•
AS9132 Symbol Contrast					•

ISO-IEC 16022-18004 Threshold

This parameter is available when the ***ISO-IEC 16022-18004*** **SYMBOL VERIFICATION** parameter is enabled. It defines the grade threshold for the ISO/IEC 16022 and ISO/IEC 18004 code quality parameter selected in ***Code Quality Index***, under which the code will be filtered. A code presented to the reader which has a code quality parameter grade lower than that specified in this parameter will cause the code to be filtered (not collected). The valid code quality index parameters for this standard are:

ISO-IEC Overall Grade
ISO-IEC Symbol Contrast
ISO-IEC Print Growth
ISO-IEC Axial Non-Uniformity
ISO-IEC Unused ECC

ISO-IEC 15415 Threshold

This parameter is available when the ***ISO-IEC 15415*** **SYMBOL VERIFICATION** parameter is enabled. It defines the grade threshold for the ISO/IEC 15415 code quality parameter selected in ***Code Quality Index***, under which the code will be filtered. A code presented to the reader which has a code quality parameter grade lower than that specified in this parameter will cause the code to be filtered (not collected). The valid code quality index parameters for this standard are:

ISO-IEC Overall Grade
ISO-IEC Symbol Contrast
ISO-IEC Axial Non-Uniformity
ISO-IEC Unused ECC
ISO-IEC Modulation
ISO-IEC Fixed Pattern Damage
ISO-IEC Grid Non-Uniformity
ISO-IEC Decode

ISO-IEC 15416 Threshold

This parameter is available when the ***ISO-IEC 15416*** **SYMBOL VERIFICATION** parameter is enabled. It defines the grade threshold for the ISO/IEC 15416 code quality parameter selected in ***Code Quality Index***, under which the code will be filtered. A code presented to the reader which has a code quality parameter grade lower than that specified in this parameter will cause the code to be filtered (not collected). The valid code quality index parameters for this standard are:

ISO-IEC Overall Grade
ISO-IEC Symbol Contrast
ISO-IEC Modulation
ISO-IEC Min Edge Contrast
ISO-IEC Decodability
ISO-IEC Minimum Reflectance
ISO-IEC Defects
ISO-IEC Decode

AIM DPM Threshold

This parameter is available when the ***AIM DPM* SYMBOL VERIFICATION** parameter is enabled. It defines the grade threshold for the AIM DPM code quality parameter selected in ***Code Quality Index***, under which the code will be filtered. A code presented to the reader which has a code quality parameter grade lower than that specified in this parameter will cause the code to be filtered (not collected). The valid code quality index parameters for this standard are:

AIM DPM Overall Grade
AIM DPM Axial Non Uniformity
AIM DPM Unused ECC
AIM DPM Fixed Pattern Damage
AIM DPM Grid Non Uniformity
AIM DPM Minimum Reflectance
AIM DPM Decode
AIM DPM Cell Contrast
AIM DPM Cell Modulation

Wildcard Character

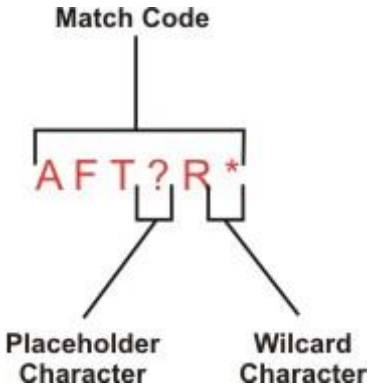
This character is placed within the ***Match Code***. All characters following the defined one are accepted as matching characters.

Placeholder Character

This character is placed within the ***Match Code***. It indicates that a character must share the same position for a correct matching.

Match Code

It defines the code to be matched. The following is an example of match code:



All codes starting with the "AFT" characters are accepted as matching codes, if:

- any single character is placed between the "T" and "R" characters;
- any character(s) follows the "R" character.

Local No Read Message

This parameter is valid only when ***Partial Read TX*** is *Enabled*. It allows defining the string to be transmitted when, during collection, no read code matches with the current Code Collection Filter.

See Also

Examples

Partial Read TX

No Read Message

Local Multiple Read Message

It defines the string to be displayed in case of Multiple Read, according to the active collection slot selected.
This parameter is valid only when both Multiple Read and Partial Read TX parameters are enabled.
Maximum length: up to 64 bytes.

Data Format

Code Field Justification

If enabled, it aligns the code to the *left* or *right* side of the <CODE FIELD>.
Refer to the example 1, 2 and 3 for further details.

See Also

Standard Message Format

Code Field Length

Defines the length of the <CODE FIELD> in characters.
Refer to the example 1, 2 and 3 for further details.

NOTE

The code data is truncated if longer than the fixed value or filled with a ***Fill Character*** if shorter (see example 3 for details).

See Also

Standard Message Format

Fill Character

Is repeated in the <CODE FIELD> many times in order to obtain the defined ***Code Field Length***. It is used whenever the number of characters of the code is lower then the ***Code Field Length***.
Non-printable characters are written in decimal notation between the <>, while printable characters can be typed directly from the keyboard.
Refer to the example 1, 2 and 3 for further details.

See Also

Standard Message Format

ASCII Table

Code Field Cutting

Defines a part of the code data to be cut by using the separator string.
The possible selections are:

- *Beginning*: returns the part of code data preceding the first occurrence of the defined separator string;
- *Middle*: returns the part of code data included between the first two occurrences of the same separator string;
- *End*: returns the part of code following the last occurrence of the defined separator string.

For details, refer to example 4, 5, and 6.

Separator String

Defines the string allowing to cut the decoded code.
For details, refer to example 4, 5, and 6.

No Read Message

Defines the message sent as <RESULTS> when a **No Read** event takes place.
It is possible to leave the message empty or to select a sequence of characters in the range from *<1>* (*<SOH>*) to *<255>*.
Non-printable characters are written in decimal notation between the <>, while printable characters can be typed directly from the keyboard.

See Also

Examples

Standard Message Format

ASCII Table

Multiple Read Message

It defines the string to be displayed in case of **Multiple Read** of one or more codes.
This parameter is valid only when the Multiple Read parameter is enabled.
Maximum length: up to 64 bytes.

Phase-Overrun Message

This parameter is available only when ***Operating Mode*** is set to *Phase Mode*.
Defines the message sent in the <STATISTICS> field when a new Reading Phase ON event occurs during the decoding of the images captured within the previous reading phase.

> **NOTE**
> When this condition occurs, it is necessary to decrease the frequency of the reading phases.

It is possible to leave the message empty or to select a sequence of characters in the range from <1> (<SOH>) to <255>.
Non-printable characters are written in decimal notation between the <>, while printable characters can be typed directly from the keyboard.

See Also

Standard Message Format

ASCII Table

Data Packet Separator String

Defines the message used to separate <DATA PACKET> when more than one code has been read.
It is possible to leave the message empty or to select a sequence of characters in the range from *<1>* (*<SOH>*) to *<255>*.
Non-printable characters are written in decimal notation between the <>, while printable characters can be typed directly from the keyboard.

See Also

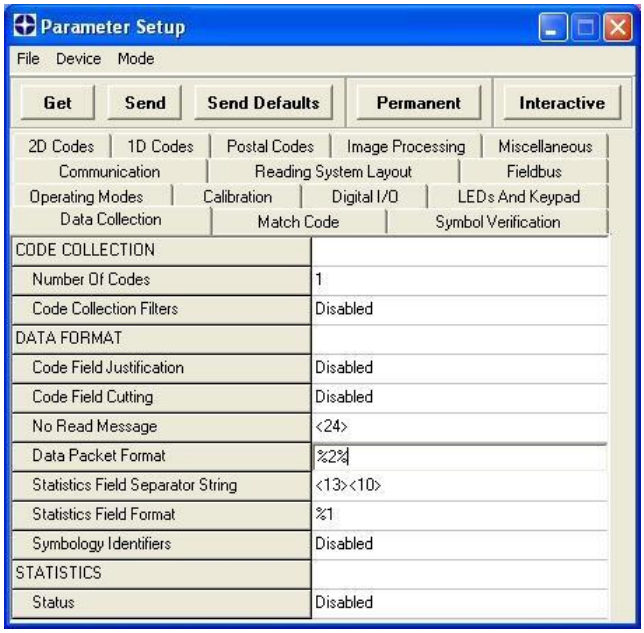
Number of Codes

Standard Message Format

ASCII Table

Data Packet Format

Allows the definition of the output data string format. It is possible to type any printable or non-printable character and to select special symbols to have a customized data format output.
Non-printable characters are written in decimal notation between the <>, while printable characters can be typed directly from the keyboard.



Several code-related fields can be included in the Data Packet Format as special symbols:

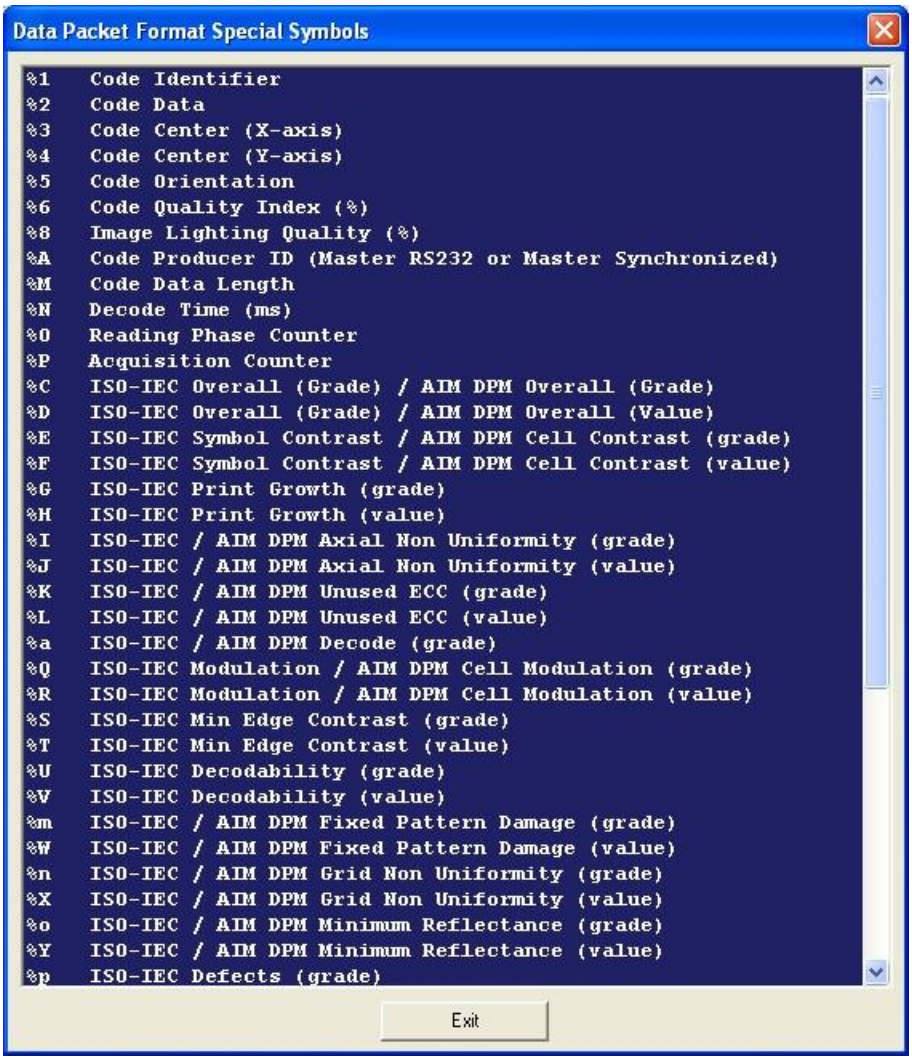
- Code Identifier
- Code Center Position
- Code Orientation
- Code Data Length
- Decoding Time (ms)

..

You can also include information about the code quality parameters calculated according to the following Standards:

- ISO/IEC 16022 (grade and numeric values)
- ISO/IEC 18004 (grade and numeric values)
- ISO/IEC 15415 (grade and numeric values)
- ISO/IEC 15416 (grade and numeric values)
- AS9132A (grade and numeric values)
- AIM DPM (grade and numeric values)

To open the window with the list of the Data Packet Format Special Symbols, position the cursor in the ***Data Packet Format*** field and press the % key. The following window will appear:



Example: to have a <DATA PACKET> composed of Code Identifier followed by Code Data, separated by a space, followed by the Code Center Coordinates in parentheses, the Data Packet Format string must be the following:

Data Packet Format = %1 %2 (%3,%4)

Code Identifier:	] C1
Code Data:	DATALOGIC
Code Center (X-axis):	100
Code Center (Y-axis):	200
Header String:	<2> (STX)
Terminator String:	<10><42> (<LF><CR>)

The data packet format output will be:

<2>] C1 DATALOGIC (100,200)<LF><CR>

To have the symbol % in the Data Packet Format output, it is necessary to type %%.

See Also

Standard Message Format

Statistics Field Separator String

Defines the string used to separate the <STATISTICS> field from the <RESULTS> field in the output message.
It is possible to leave the message empty or to select a sequence of characters in the range from *<1>* (*<SOH>*) to *<255>*.
Non-printable characters are written in decimal notation between the <>, while printable characters can be typed directly from the keyboard.

See Also

Standard Message Format

ASCII Table

Statistics Field Format

Defines the <STATISTICS> field in the output message.
It is possible to leave the message empty or to select a sequence of characters in the range from *<1>* (*<SOH>*) to *<255>*.
Non-printable characters are written in decimal notation between the <>, while printable characters can be typed directly from the keyboard.

See Also

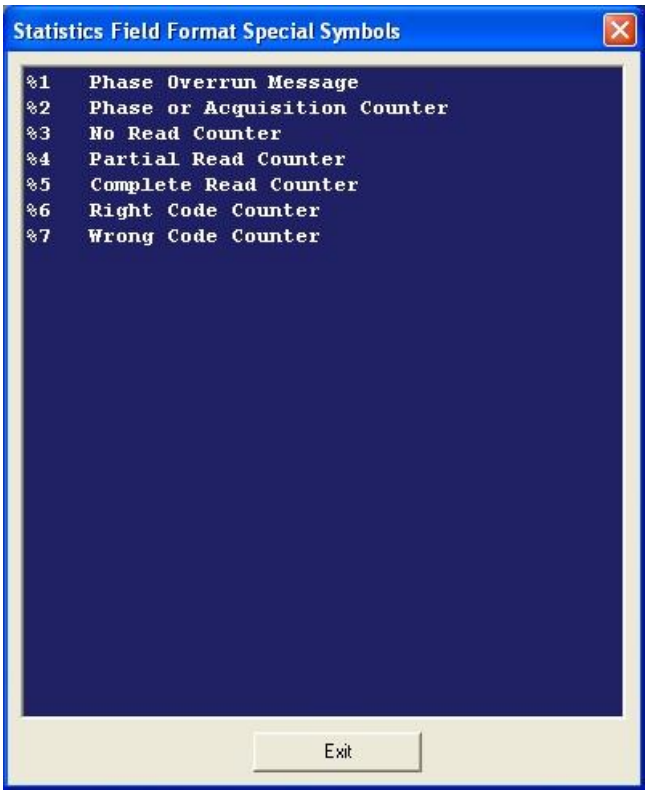
Standard Message Format

ASCII Table

Statistical counters relative to reading results can be included in the Statistics Field Format as special symbols:

- Reading Phase or Acquisition Counter
- Complete Read Counter
- Partial Read Counter
- No Read Counter
- Right Code Counter (Match Code enabled)
- Wrong Code Counter (Match Code enabled)

To open the window with the list of the Statistics Field Format Special Symbols, position the cursor in the ***Statistics Field Format*** field and press the % key. The following window will appear:



Example: to have a <STATISTICS> field composed of Phase or Acquisition Counter followed by Complete Read Counter, separated by a space, followed by No Read Counter in parentheses, the Statistics Field Format string must be the following:

Statistics Field Format = %2%5 (%3)

Phase or Acquisition Counter:	100
Complete Read Counter:	97
No Read Counter:	3
Header String:	<2> (STX)
Statistics Field Separator String:	<9> (HT)
Terminator String:	<10><42> (<LF><CR>)

The statistics field format output will be:

<2> <DATA PACKET> <9> <0000000100 0000000097 (0000000003)> <LF><CR>

To have the symbol % in the Statistics Field Format output, it is necessary to type %%.

Symbology Identifiers

If enabled, opens the **SYMBOLOGY IDENTIFIERS group** in the Parameter Setup Window for modification.
Symbology Identifiers transmission can be enabled by including the related Special Symbol in the Data Packet Format parameter.

Symbology Identifiers

Contains the list of strings identifying each code symbology which can be included in the <DATA PACKET>.
For each symbology it is possible to leave the string empty or to select a sequence of characters in the range from *<1>* (*<SOH>*) to *<255>*.
Non-printable characters are written in decimal notation between the <>, while printable characters can be typed directly from the keyboard.

See Also

Standard Message Format

ASCII Table

Data Transmission

NOTE

This group of parameters is available **only** when Operating Mode is set to *Phase Mode.*

Partial Read TX

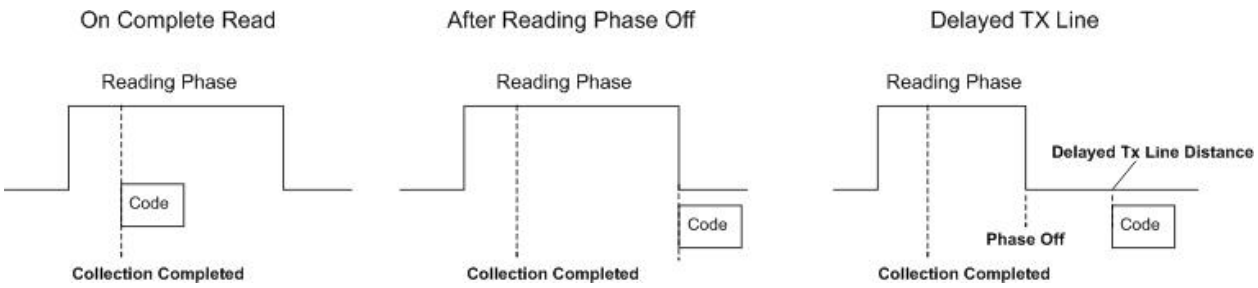
When a **Partial Read** event occurs and this parameter is enabled, the read codes are formatted in the output message as described in Standard Message Format. If disabled, the output message format corresponds to **No Read**.

If the **CODE FILTER SETTING** parameter group is enabled, the ***Local No Read Message*** string is transmitted whenever the code defined by the current Code Collection Filter is not read.
See the example for further details.

Message Tx Selection

Selects the transmission of the output message.

Selections: *On Complete Read.* The output message is transmitted as soon as the collection is completed.
After Reading Phase Off. The output message is transmitted after the **Reading *Phase OFF***.
Delayed Tx Line. The output message is transmitted after the **Reading *Phase OFF*** plus the Delayed Tx Line Distance.



Conveyor Speed (mm/sec)

This parameter is available only when Operating Mode is set to *Phase Mode* and Message Tx Selection is set to *Delayed Tx Line*. It defines the constant speed of the conveyor in mm/sec.
Range: from 50 to 10000.

Delayed Tx Line Distance (mm)

This parameter is available only when Operating Mode is set to *Phase Mode* and Message Tx Selection is set to *Delayed Tx Line*. It defines the distance in mm (delay) from the Phase Off event to the TX line based on the Conveyor Speed.
Range: from 100 to 20000.

NOTE

The trigger LED on the reader is activated/deactivated at Phase On/Phase Off independent from the Delayed Tx Line Distance.

In the case of Reading Phase OFF on Timeout, the Delayed Tx Line Distance starts **after** the Reading Phase Timeout parameter expires.

Statistics

Allows evaluating the reading performance while the reader is normally running. This can be helpful during installation to have feedback on the reading performance.

ATTENTION

This group of parameters, when enabled, replaces the <RESULTS> field in the output message.

It does not control the <STATISTICS> field which can be appended to the output message and is defined by the Statistics Field Format parameter.

Status

If enabled, the reader waits for the defined ***Number of Samples*** before sending the statistical data on all of its interfaces and updating the Statistics window in VisiSet™.

Number of Samples

Defines the number of image acquisitions or reading phases (depending on the operating mode and the code collection time) used for the statistical computation.

Output Format

Defines the transmitted output message format when the **STATISTICS** are enabled. The possible selections are:

- *% (on Last Samples)*: reading percentage calculated on the defined ***Number Of Samples***.
- *N/M (on Last Samples)*: number of complete reads or right code / total number of reads on the defined ***Number Of Samples***.
- *%+N/M (on Last Samples)*: reading percentage + number of complete reads or right code / total number of reads calculated on the defined ***Number Of Samples***.
- *% (on All Samples)*: reading percentage calculated on all samples (image acquisitions or reading phases).
- *N/M (on All Samples)*: number of complete reads or right code / total number of reads on all samples (image acquisitions or reading phases).
- *%+N/M (on All Samples)*: reading percentage + number of complete reads or right code / total number of reads calculated on all samples (image acquisitions or reading phases).

Last Read Code TX

This parameter is available only when the Status parameter is set to Enabled. Allows appending the last decoded code to the output format.

Selections: *Disabled*

Enabled. If enabled, this selection allows appending the last read code

Enabled with Code Center. If enabled, this selection allows appending the last read code and the coordinates of its center.

Enable with Code Center and Bounds. If enabled, this selection allows appending last decoded code, center coordinates and bounds.

Match Code

NOTE

The Match Code option is available only for applications where a single code at a time is presented to the reader for acquisition and therefore it forces ***Number of Codes*** = *1*.

The Match Code option allows comparing the read code to a user-defined database (up to 10 **MATCH CODE SLOTS**).

The database can be updated as follows:

- By setting the desired ***Data*** and ***Symbology*** values in the **MATCH CODE SLOT** parameter group.
- By using VisiSet™ in Offline Mode. First it is necessary to Capture and Decode the image containing the desired match code. Then, by pressing the Store Match Code button, it is possible to choose the database position where the decoded code must be stored.
- By setting one of the keypad Button Functions to *Store Match Code* and then selecting it using the X-PRESS™ procedure.

NOTE

The ***X-PRESS™*** procedure allows updating either the first match code slot or the first free slot of the database depending on the ***Store Match Code Policy*** parameter.

When the Match Code option is enabled, the result of the data collection can be one of the following:

- **Right Code** = the first read code matches with one of the database codes.
- **Wrong Code** = the first read code does not match with one of the database codes.
- **No Read** = no code is read.

Match Code

Status

Enables the Match Code option.

Symbology Check

If enabled, the **Right Code** event occurs only when both data and symbology match. When disabled, only the code data is checked.

Right Code Message

Defines the message inserted in the <RESULTS> field when a **Right Code** event takes place.
It is possible to leave the message empty or to select a sequence of characters in the range from *<1>* (*<SOH>*) to *<255>*.
Non-printable characters are written in decimal notation between the <>, while printable characters can be typed directly from the keyboard.

Wrong Code Message

Defines the message inserted in the <RESULTS> field when a **Wrong Code** event takes place.
It is possible to leave the message empty or to select a sequence of characters in the range from *<1>* (*<SOH>*) to *<255>*.
Non-printable characters are written in decimal notation between the <>, while printable characters can be typed directly from the keyboard.

Store Memory

Defines the Match Code storage memory type when an automatically stored operation of the Match Code is performed (see Button Function):

- *Permanent Memory*: the Match Code is saved to the reader permanent memory (Flash)
- *Temporary Memory*: the Match Code is saved to the reader temporary memory (RAM)

Match Code Slot

Manages the parameters that define a Match Code. For each specific Match Code (up to 10), it allows defining symbology and content.

Symbology

Is available only when the ***Symbology Check*** is enabled. It selects the match code symbology.

Data

Defines the match code data. It can include Wildcard and Placeholder characters.

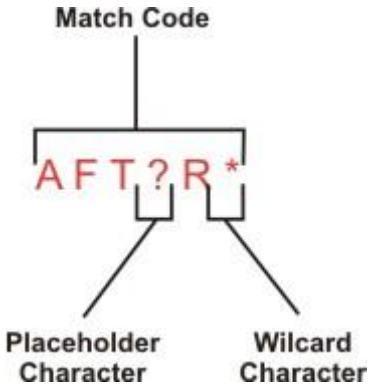
Wildcard Character

This character is placed within the ***Data***. All characters following the defined one are accepted as matching characters.

Placeholder Character

This character is placed within the ***Data***. It indicates that a character must share the same position for a correct matching.

The following is an example of match code:



All codes starting with the "AFT" characters are accepted as matching codes, if:

- any single character is placed between the "T" and "R" characters;
- any character(s) follows the "R" character.

Miscellaneous

Reader Information

The parameters in the Reader Information group are text fields that allow you to add information about the reader to help identify it in the system layout and to facilitate replacement, if it ever becomes necessary.

Reader Name

Must be a directory name compatible string. It is advised to give each installed reader a unique name. When a reader is connected to VisiSet™ its name appears in the status bar (bottom side of the main window).

VisiSet™ creates the following directory structure starting from its working directory:

\<SW RELEASE DIR>\
<READER NAME 1 DIR>
<READER NAME 2 DIR>
...
<READER NAME i DIR>
...
<READER NAME n DIR>

The VisiSet™ default working directory is the directory containing VisiSet.exe.

The <SW RELEASE DIR> is the directory where the reader uploads the parameter template file (info.cmp) upon connection to VisiSet™. If this directory does not exist it will be created.

The <READER NAME i DIR> is the directory where the reader uploads the configuration file (param.ini) upon connection to VisiSet™. If this directory does not exist it will be created.

User Name

Add the User or Company name to the reader information.

Line Name

Add the workstation Line Name or device position to the reader information.

Image Buffer

Status

Enables or disables saving images in the reader Image Buffer temporary memory. Disabling this parameter cancels all previously saved images in the buffer.

Saving Event

It is possible to select more than one event so that any one of them will cause the saving event. To do this, from the pull down menu, hold down the CTRL key and select the desired events with the mouse. The events will be listed separated by a comma.

Max. Images in Buffer

Defines the maximum number of images that can be saved in the Image Buffer temporary memory.

NOTE

This number depends on the amount of memory available in the reader determined by:

- the number of slots configured (Image Acquisition Buffer Size); allocated memory not available to the Image Buffer.
- the remaining memory allocated to the application program and configuration.
- any applied Region of Interest windowing.

By decreasing the **Image Subsampling** value, a greater quantity of images can be saved to the Image Buffer.

Image Subsampling

Reduces the image dimensions:

- *1/1*: maintains the image real dimensions;
- *1/4*:divides each image side by 2 (final image area corresponds to 1/4 of the source);
- *1/16*:divides each image side by 4 (final image area corresponds to 1/16 of the source);
- *1/64*:divides each image side by 8 (final image area corresponds to 1/64 of the source);

Image Format

Defines the format of the image to be saved: Bitmap (.bmp), Jpeg (.jpg) TIFF (.tif) or Binary (.raw) format.

JPG Quality (1-100)

Defines the compression quality of a jpeg image when .jpg is selected in the Image Format.

VisiSet Image Saving

Download Event

In Run Mode, allows saving an image to a file through the VisiSet™ program by using the serial channel.

- *Disabled*: image downloading via VisiSet™ is disabled;
- *Enabled on Successful Decoding*: the image is transmitted only in case of successful decoding;
- *Enabled on Decoding Failure*: the image is transmitted only in case of decoding failure;
- *Always Enabled*: the image is always transmitted independently from the decoding result.

Image Subsampling

Reduces the image dimensions:

- *1/1*: maintains the image real dimensions;
- *1/4*:divides each image side by 2 (final image area corresponds to 1/4 of the source);
- *1/16*:divides each image side by 4 (final image area corresponds to 1/16 of the source);
- *1/64*:divides each image side by 8 (final image area corresponds to 1/64 of the source);

Image Format

Defines the format of the image to be saved: Bitmap (.bmp), Jpeg (.jpg) TIFF (.tif) or Binary (.raw) format.

JPG Quality (1-100)

Defines the compression quality of a jpeg image when .jpg is selected in the Image Format.

Image Absolute Path

Defines the absolute path where the image file will be saved.

Max. Images Saved

Defines the maximum number of image files to be saved through the VisiSet™ program. Once the defined number is reached, the previously saved files will be overwritten.

NOTE

The use of this parameter is not advised, since it takes a long time to complete the procedure (several seconds).

Miscellaneous

Calibration Image Quality Level

Selections:

- *Low* - the subsampling configuration corresponds to the one used in the previous versions with serial connection
- *Medium* - new subsambpling configuration with a value between *Low* and *High*
- *High* - the subsampling configuration corresponds to the one used in the previous versions with Ethernet connection

By increasing the Quality Level parameter, the updating speed of the windows "calibration tool/autolearning tool/verifier tool" decreases.

Symbol Verification

ISO-IEC 16022-18004

Status

Enables/disables symbol verification according to ISO-IEC 16022 and ISO-IEC 18004 international standards respectively for DataMatrix ECC200 and QR Code symbologies.

ISO-IEC 15415-15416 SETUP

Aperture Mode

Allows configuration of the Aperture parameter according to the ISO-IEC 15415 and ISO-IEC 15416 international standards. The possible selections are:

- *Automatic*: the physical size of the virtual aperture applied to the captured symbol image is automatically calculated by the verification software.
- *Custom*: allows specifying the physical size of the virtual aperture applied to the captured symbol image.

Aperture (mils)
Sets the physical size of the virtual aperture applied to the captured symbol image by the verification software.

Angle
Sets the incidence angle at which the symbol is illuminated by the lighting system during the verification process.

Light Wavelength
Sets the wavelength of the LED illumination directed at the symbol during the verification process.

ISO-IEC 15415

Status
Enables/disables symbol verification according to the ISO-IEC 15415 international standard for DataMatrix ECC200 and QR Code symbologies.

ISO-IEC 15416

Status
Enables/disables symbol verification according to the ISO-IEC 15416 international standard for Code 128, Code 39, MSI, Standard 2 of 5, Matrix 2 of 5, Interleaved 2 of 5, Codabar, Code 93, EAN-8/EAN-13, UPC-A/UPC-E symbologies.

Grade Type
Allows selecting the appearance of the ISO-IEC 15416 verification output. The possible selections are:

- *10 Scans*: supplies Scan Reflectance Profile Grades for each quality parameter on each of 10 code scans.
- Media: supplies the mathematical average Scan Reflectance Profile Grade for each quality parameter over 10 code scans.
- Media & 10 Scans: supplies Scan Reflectance Profile Grades for each quality parameter on each of 10 code scans plus the mathematical average.

AS9132A

Status
Enables/disables symbol verification according to the AS9132A standard for direct part mark DataMatrix ECC200 symbology.

Module Shape
Allows specifying the module shape of the code to be verified (dot or square). This option affects the symbol verification results according to the AS9132A standard.

Marking Method
Allows specifying the method used to create the symbol to be verified (Ink Jet/Dot Peening or Laser Etching/Chemical Etching). This option affects the symbol verification results according to the AS9132A standard.

AIM DPM SETUP

Aperture Mode

Allows configuration of the Aperture parameter according to the AIM DPM quality guideline. The possible selections are:

- *Automatic*: the physical size of the virtual aperture applied to the captured symbol image is automatically calculated by the verification software.
- *Custom*: allows specifying the physical size of the virtual aperture applied to the captured symbol image.

Aperture (mils)

Sets the physical size of the virtual aperture applied to the captured symbol image by the verification software.

Lighting

Indicates the angle and configuration of illumination used in the verifier system according to the AIM DPM quality guideline. The possible selections are:

- 90: Diffuse Perpendicular (On Axis DOAL/Bright)
- D: Diffuse Off Axis (Dome)
- 30Q: Low Angle Four Direction
- 30T: Low Angle Two Direction
- 30S: Low Angle Single Direction
- 45Q: Medium Angle Four Direction

Light Wavelength

Sets the wavelength of the LED illumination directed at the symbol during the verification process.

AIM DPM

Status

Enables/disables symbol verification according to the AIM DPM quality guideline for direct part mark Data Matrix ECC200 and QR Code symbologies.

COMMON VERIFIER SETTINGS

Excluded Metrics From Overall Grade

Excludes a particular code quality parameter (metric), from being used in the overall code quality grade calculation according to the specific Standard. See the Symbol Verification Table.

LEDs and Keypad

Keypad

Status

Enables/disables the Keypad button.
When enabled, the button has four positions, selectable by the length of time that the button is pushed and indicated by one, two three and four beeps in succession and by the activation of the Function 1 *(Test)*, Function 2 *(Aim)*, Function 3 *(Setup)* and Function 4 *(Learn)* LEDs. Each position can be programmed for any of several options.
When the **Status** is disabled, pressing the keypad button performs no action.

Button Function 1

Defines the function associated with the keypad button Function 1 *(Test)* position. The possible selections are:

- *Disabled*: the Function 1 *(Test)* position has no function associated with it.
- *Autolearning*: releasing the button at this position starts the Auto Learn procedure. It performs **both** image acquisition parameters calibration and code setting procedures automatically. See Autolearning Setup for further details and parameter settings.
- *Calibration Only (Setup)*: releasing the button at this position starts the Calibration procedure. It performs image acquisition parameters calibration automatically.
- *Code Setting Only (Learn)*: releasing the button at this position starts the Code Setting procedure. It performs code setting automatically.
- *Positioning*: releasing the button at this position activates the blue ring aiming system and starts the reader Positioning procedure. See Positioning Setup for further details and parameter settings.
- *Restore Default*: releasing the button at this position restores the factory default settings.
- *Test Mode (Test)*: releasing the button at this position starts the Test Mode procedure. It shows the good read percentage using the Function LEDs as a bar graph. See Test Mode Setup for further parameter settings and the Matrix 210™ Reference Manual for Bar Graph details.
- *Locate (Aim)*: releasing the button at this position allows activating/deactivating the blue ring aiming system, which is used to position the reader.
- *Store Match Code*: releasing the button at this position starts the Code Setting procedure. It performs code setting automatically and stores the decoded code in either the first match code slot or the first free slot of the database depending on the Store Match Code Policy parameter.

Button Function 2

Defines the function associated with the keypad button Function 2 *(Focus)* position. The possible selections are:

- *Disabled*: the Function 2 *(Focus)* position has no function associated with it.
- *Autolearning*: releasing the button at this position starts the Auto Learn procedure. It performs **both** image acquisition parameters calibration and code setting procedures automatically. See Autolearning Setup for further details and parameter settings.
- *Calibration Only (Setup)*: releasing the button at this position starts the Calibration procedure. It performs image acquisition parameters calibration automatically.
- *Code Setting Only (Learn)*: releasing the button at this position starts the Code Setting procedure. It performs code setting automatically.
- *Positioning*: releasing the button at this position activates the blue ring aiming system and starts the reader Positioning procedure. See Positioning Setup for further details and parameter settings.
- *Restore Default*: releasing the button at this position restores the factory default settings.
- *Test Mode (Test)*: releasing the button at this position starts the Test Mode procedure. It shows the good read percentage using the Function LEDs as a bar graph. See Test Mode Setup for further parameter settings and the Matrix 210™ Reference Manual for Bar Graph details.
- *Locate (Aim)*: releasing the button at this position allows activating/deactivating the blue ring aiming system, which is used to position the reader.
- *Store Match Code*: releasing the button at this position starts the Code Setting procedure. It performs code setting automatically and stores the decoded code in either the first match code slot or the first free slot of the database depending on the Store Match Code Policy parameter.

Button Function 3

Defines the function associated with the keypad button Function 3 *(Setup)* position. The possible selections are:

- *Disabled*: the Function 3 *(Setup)* position has no function associated with it.
- *Autolearning*: releasing the button at this position starts the Auto Learn procedure. It performs **both** image acquisition parameters calibration and code setting procedures automatically. See Autolearning Setup for further details and parameter settings.
- *Calibration Only (Setup)*: releasing the button at this position starts the Calibration procedure. It performs image acquisition parameters calibration automatically.
- *Code Setting Only (Learn)*: releasing the button at this position starts the Code Setting procedure. It performs code setting automatically.
- *Positioning*: releasing the button at this position activates the blue ring aiming system and starts the reader Positioning procedure. See Positioning Setup for further details and parameter settings.
- *Restore Default*: releasing the button at this position restores the factory default settings.
- *Test Mode (Test)*: releasing the button at this position starts the Test Mode procedure. It shows the good read percentage using the Function LEDs as a bar graph. See Test Mode Setup for further parameter settings and the Matrix 210™ Reference Manual for Bar Graph details.
- *Locate (Aim)*: releasing the button at this position allows activating/deactivating the blue ring aiming system, which is used to position the reader.
- *Store Match Code*: releasing the button at this position starts the Code Setting procedure. It performs code setting automatically and stores the decoded code in either the first match code slot or the first free slot of the database depending on the Store Match Code Policy parameter.

Button Function 4

Defines the function associated with the keypad button Function 4 *(Learn)* position. The possible selections are:

- *Disabled*: the Function 4 *(Learn)* position has no function associated with it.
- *Autolearning*: releasing the button at this position starts the Auto Learn procedure. It performs **both** image acquisition parameters calibration and code setting procedures automatically. See Autolearning Setup for further details and parameter settings.
- *Calibration Only (Setup)*: releasing the button at this position starts the Calibration procedure. It performs image acquisition parameters calibration automatically.
- *Code Setting Only (Learn)*: releasing the button at this position starts the Code Setting procedure. It performs code setting automatically.
- *Positioning*: releasing the button at this position activates the blue ring aiming system and starts the reader Positioning procedure. See Positioning Setup for further details and parameter settings.
- *Restore Default*: releasing the button at this position restores the factory default settings.
- *Test Mode (Test)*: releasing the button at this position starts the Test Mode procedure. It shows the good read percentage using the Function LEDs as a bar graph. See Test Mode Setup for further parameter settings and the Matrix 210™ Reference Manual for Bar Graph details.
- *Locate (Aim)*: releasing the button at this position allows activating/deactivating the blue ring aiming system, which is used to position the reader.
- *Store Match Code*: releasing the button at this position starts the Code Setting procedure. It performs code setting automatically and stores the decoded code in either the first match code slot or the first free slot of the database depending on the Store Match Code Policy parameter.

LEDs

Green Spot Activation Events

Defines the event(s) that activate the Green Spot.
The possible selections are:

- *None*
- *Decoding*
- *Complete Read*
- *Partial Read*

- *No Read*
- *Multiple Read*

If Match Code is enabled the possible selections are:

- *None*
- *Decoding*
- *Right Code*
- *Wrong Code*
- *No Read*

It is possible to select more than one event so that any one of them will cause the Green Spot to activate. To do this, from the pull down menu, hold down the CTRL key and select the desired events with the mouse. The events will be listed separated by a comma.
By selecting *Decoding* the Green Spot is activated each time a code is read.
None causes the Green Spot to always be off.

Green Spot Deactivation Timeout (sec)

Indicates the maximum duration of the Green Spot activation.
If set to 0 (no timeout), the Green Spot will remain active until the start of a new reading phase.

COM LED Function

Defines the event / condition to be signaled by the COM LED.
The possible selections are:

- *Main COM Port RX*: the reader is receiving on the Main Serial COM port;
- *Main COM Port TX*: the reader is transmitting on the Main Serial COM port.

Aiming System Status

Selects the aiming system function. If disabled, the blue ring cannot be activated by the X-PRESS™ keypad button.

- *Disabled*: the aiming system is off
- *Blue Ring*: the blue ring is used to aim the reader onto the code
- *Internal Lighting System*: the internal illuminators are used to aim the reader onto the code
- *Blue Ring And Internal Lighting System*:both the blue ring and the internal illuminators are used to aim the reader onto the code

LEDs Deactivation Timeout (sec)

Indicates the maximum duration of the result LED activation.
If set to 0 (no timeout), the result LED will remain active until the start of a new reading phase.

Partial Read Treated As

Defines the behavior of the result LEDs when a partial read condition occurs.

Multiple Read Treated As

Defines the behavior of the result LEDs when a multiple read condition occurs.

Beeper

Status

Enables/disables the beeper, including the acoustic feedback of the Test (Function 1), Locate/Aim (Function 2), Setup (Function 3) and Learn (Function 4) functions.

Activation Events

Defines the event(s) activating the beeper.
The possible selections are:

- *None*
- *Decoding*
- *Complete Read*
- *Partial Read*
- *No Read*
- *Multiple Read*

If Match Code is enabled the possible selections are:

- *None*
- *Decoding*
- *Right Code*
- *Wrong Code*
- *No Read*

It is possible to select more than one event so that any one of them will cause the beeper activation. To do this, from the pull down menu, hold down the CTRL key and select the desired events with the mouse. The events will be listed separated by a comma.
By selecting *Decoding* a beep occurs each time a code is read.
None causes the beeper to always be off except for the acoustic feedback of the Test (Function 1), Locate/Aim (Function 2), Setup (Function 3) and Learn (Function 4) functions.

Deactivation Timeout (ms)

Represents the beep duration. The acoustic signal stops after the defined number of milliseconds.

Test Mode Setup

Image Acquisition Setting

Sets the **IMAGE ACQUISITION SETTING** used by the Test Mode function.

Number Of Samples

Sets the number of acquisition samples used to calculate the reading percentage.

Test Mode Data TX

Allows managing the Test Mode Data transmission. The possible selections are:

- *None*: Test Mode Data Tx is disabled.
- *Main Port*: Test Mode Data Tx is enabled on the Main serial interface.

Test Mode Exit Timeout (sec)

Sets a limited execution time for the Test Mode function.
The Test Mode function exits automatically after this timeout expires.

If set to 0, the Test Mode Exit Timeout is disabled.

Autolearning Setup (X-PRESS™)

The X-PRESS™ Autolearning procedure functions as follows:

1. Place the desired code in front of the reader at the correct reading distance (depending on the model, see the Reading Diagrams in the Reference Manual).

2. Enter the X-PRESS™ Autolearning function associated with the selected button position by pressing and holding the push button until the relative Function LED is on.

3. Release the button to enter the X-PRESS™ Autolearning function. Once entered, the reader acquires an image and automatically configures the optimal Exposure Time and Gain parameters for static reading, as well as detecting and recognizing the code, which is presented to it. The Function LED blinks during this process.

4. At the end of the procedure, the new configuration parameters will be stored to permanent memory, the Function LED remains on continuously and then the function automatically exits, the Function LED turns off. Matrix 210™ also emits 3 high pitched beeps.

NOTE

The X-PRESS™ *Autolearning* and *Learn* procedures will not recognize **Pharmacode, MSI, Matrix 2 of 5, Standard 2 of 5** symbologies.

If reading a Data Matrix code, *Autolearning* automatically sets the Data Matrix family ***Decoding Performance*** parameter to *Robust*.

Image Acquisition Setting

Sets the **IMAGE ACQUISITION SETTING** on which the Autolearning and Calibration Only procedures are performed. This parameter also affects the same functions performed through the Setup Wizard.

Calibration Mode

Defines the type of photometry parameters to optimize for Autolearning and Calibration Only procedures. The possible selections are:

- *Gain Only*: optimizes only the ***Gain*** parameter, maintaining the configured ***Exposure Time*** value (advised for dynamic reading applications)
- *Exposure Time Only*: optimizes only the ***Exposure Time*** parameter, maintaining the configured ***Gain*** value
- *Exposure Time And Gain*: optimizes both parameter values in a balanced way

Code Setting Mode

Defines the type of image processing and decoding attempts to perform for Autolearning and Code Setting procedures. The possible selections are:

- *General Purpose*: attempts to process and decode all the possible symbologies
- *2D Codes Only*: attempts to process and decode only all the possible 2D symbologies
- *1D Codes Only*: attempts to process and decode only all the possible 1D symbologies including the PDF417 family
- *Direct Marking Only*: attempts to process and decode only the possible Direct Part Mark type 2D symbologies

This parameter also affects the same functions performed through the Setup Wizard.

Add New Symbology

Select whether to overwrite the list of decodable symbologies (*Disable*), or to add the new symbology to the list (*Enable*), for the Autolearning procedure.

Store Memory

Selects which type of memory the configuration parameters will be saved to after a successful Autolearning, Calibration Only or Code Setting Only procedure:

- *Permanent Memory*: the configuration parameters are saved to the reader permanent memory (Flash)
- *Temporary Memory*: the configuration parameters are saved to the reader temporary memory (RAM)

Store Match Code Policy

It allows choosing the position in the Match Code database, where the decoded code must be stored. The possible selections are:

- *First Free Slot* (default). If selected, the decoded code is stored in the first slot free, that is, in the first entry of the Match Code Slot parameter with data equal to a null string. If all slots are full, the decoded code will be discarded.
- *First Slot.* If selected, the decoded code is stored in the first slot even if full, overwriting it with the new data.

Autolearning Timeout (sec)

Sets a limited execution time for Autolearning, Calibration Only and Code Setting Only functions.
The Autolearning procedure exits automatically after this timeout expires.

If set to 0, the Autolearning Timeout is disabled.

This parameter also affects the same functions performed through the Setup Wizard.

Positioning Setup

The Positioning procedure functions as follows:

1. While the desired code is in front of the reader at the correct reading distance, enter the Positioning function associated with the selected button position by pressing and holding the push button until the relative Function LED is on.

2. Release the button to enter the Positioning function. Once entered, the reader continuously acquires images and gives visual feedback using the relative Function LED to indicate when the code is centered with respect to the reader's FOV. Slow blinking means that the positioning value must be improved.

3. To obtain the best value in terms of positioning, move the code and/or the reader so as to position the code as close as possible to the center of the Field of View, keeping the correct focus distance. Check the Function LED blinking: the best code positioning corresponds to fast (almost continuous) blinking.

4. After a short timeout the function automatically exits, the Function LED remains on continuously and then stops blinking. Matrix 210™ also emits 3 high pitched beeps.

Image Acquisition Setting

Sets the **IMAGE ACQUISITION SETTING** used by the Positioning procedure.

Positioning Mode

Defines which type of positioning procedure to perform. The possible values are:

- *Standard*: the LED(s) associated with the function are active if the code is present in the window and readable. The LED(s) indicate how close the code is to the center of the window by the frequency at which they blink. The procedure ends after a certain number of consecutive reads of the same code in the same position or after the ***Positioning Timeout*** expires.
- *Accurate*: the LED(s) associated with the function are active if the code is present in the window, it is readable, and the difference between the center of the image and the center of the code is less than the value specified in the ***Position Tolerance*** parameter. The procedure ends after a certain number of consecutive reads of the same code in the same position within the frame defined by the ***Position Tolerance*** parameter or after the ***Positioning Timeout*** expires.

Positioning Tolerance (mm)

Sets the tolerance between the center of the code and the center of the image used by the Positioning function when ***Positioning Mode*** is *Accurate*.

Positioning Timeout (sec)

Sets a limited execution time for Positioning function.
The Positioning procedure exits automatically after this timeout expires.

If set to 0, the Positioning Timeout is disabled.

Diagnostics

Heartbeat

The Heartbeat message is used to signal the device's status at regular intervals to the Host.

Status

This parameter enables/disables transmission of the Heartbeat message.

Selections: *Disabled*
Enabled

The Heartbeat message is independent from the status of Data Tx parameter (Enabled/Disabled).

Actions

When diagnostics are enabled, this group allows selection of all the parameters managing diagnostic message transmission by the reader.

Heartbeat TX Mode

This parameter is available when the Status parameter is enabled. Defines the transmission modality of the Heartbeat message.

Selections: *Unconditioned.* The Heartbeat message is always transmitted, even if data communication is still active.
Conditioned. The Heartbeat message is transmitted only when there is no data communication.

Heartbeat TX Timeout (sec)

This parameter is available when the Status parameter is enabled. Defines the amount of time between two message transmissions.
If the selected timeout expires and no transmission has occurred, the Heartbeat message will be transmitted.
Selections: from 1 to 180 sec.

Interface Transmission: Main Port

Allows enabling or disabling the main interface on which the diagnostic messages will be transmitted. If disabled, the Heartbeat message will not be transmitted.

Format

This group allows definition of the Heartbeat message formatting sent by the reader to the system.

The format of Heartbeat messages is:

<Header><Message><Terminator>

where:

Header and Terminator are defined through the Header String and Terminator String parameters respectively; the Message can be expressed as a numeric value or user defined string.

The **Internal Numeric Message** has the following fixed syntax:

00#999

where:

999 is the internal number associated with the Heartbeat Message.

The **User Defined Message** has the following syntax:

00#yyy

where:

yyy is user defined string which can be set through the Heartbeat Message string parameter.

Header String

A Header String (up to 128 bytes) can be defined and transmitted as a block preceding the Heartbeat message.
Selections: characters from **NUL** (00H) to **~** (7EH).

Terminator String

A Terminator String (up to 128 bytes) can be defined and transmitted as a block following the Heartbeat message.
Selections: characters from **NUL** (00H) to **~** (7EH).

Heartbeat Message Format

It defines whether the message will be sent as an Internal Numeric Message or as a User Defined Message.

User Defined Messages

Heartbeat Message

This parameter is available when the Heartbeat Status parameter is enabled and the Heartbeat Message Format parameter is set to *User Defined Message*.
Allows entering the desired string for the Heartbeat message.
Default string: HBT.

Examples and References

Code Filter Setting Examples

- 1 -

This is an example of the message formatting when using the **CODE FILTER SETTING** parameters together with the **Partial Read TX** and ***No Read Message***. The number of active collection slots (**M**) corresponds to the ***Number of Codes*** (**N**) to be decoded: **M = N**.

Number of Codes:	2
Data Packet Format:	%2
Code Field Justification:	Disabled
Code Field Cutting:	None
Data Packet Separator String:	$$$
No Read Message:	<24> (<CAN>)
Header String:	<2>> (<STX>)
Terminator String:	<13><10> (<CR><LF>)
Code Collection Filters:	Enabled

CODE FILTER SETTING #1

Filter:	Enabled
Symbology:	Data Matrix ECC 200
Min Number of Characters:	9
Max Number of Characters:	9
Code Position Frame: Left:	0
Code Position Frame: Right:	639
Code Position Frame: Top:	0
Code Position Frame: Bottom:	479
Local No Read Message:	Code#1NotCollected

CODE FILTER SETTING #2

Filter:	Enabled
Symbology:	Code 39
Min Number of Characters:	5
Max Number of Characters:	7
Code Position Frame: Left:	0
Code Position Frame: Right:	639
Code Position Frame: Top:	0
Code Position Frame: Bottom:	479
Local No Read Message:	Code#2NotCollected

Code #1 to be read:	Data = DATALOGIC Symbology = Data Matrix ECC 200
Code #2 to be read:	Data = MATRIX Symbology = Code 39

1. OUTPUT MESSAGE with ***Partial Read TX*** disabled and successful reading of both codes:
   <STX>DATALOGIC$$$MATRIX<CR><LF>

2. OUTPUT MESSAGE with ***Partial Read TX*** disabled and successful reading of one or none of the two codes:
   <STX><CAN><CR><LF>

3. OUTPUT MESSAGE with ***Partial Read TX*** enabled and successful reading of both codes:
   <STX>DATALOGIC$$$MATRIX<CR><LF>

4. OUTPUT MESSAGE with ***Partial Read TX*** enabled and successful reading of the first code only:
   <STX>DATALOGIC$$$Code#2NotCollected<CR><LF>

5. OUTPUT MESSAGE with ***Partial Read TX*** enabled and successful reading of the second code only:
   <STX> Code#1NotCollected$$$MATRIX<CR><LF>

6. OUTPUT MESSAGE with ***Partial Read TX*** enabled and reading failure of both codes:
   <STX><CAN><CR><LF>

- 2 -

This is an example of the message formatting when using the **CODE FILTER SETTING** parameters together with the **Partial Read TX** and ***No Read Message***. The number of active collection slots (**M**) corresponds to the ***Number of Codes*** (**N**) to be decoded: **M = N**.

Number of Codes:	2
Data Packet Format:	%2
Code Field Justification:	Disabled
Code Field Cutting:	None
Data Packet Separator String:	$$$
No Read Message:	<NULL>
Header String:	<2>> (<STX>)
Terminator String:	<13><10> (<CR><LF>)
Code Collection Filters:	Enabled

CODE FILTER SETTING #1

Filter:	Enabled
Symbology:	Data Matrix ECC 200
Min Number of Characters:	9
Max Number of Characters:	9
Code Position Frame: Left:	0
Code Position Frame: Right:	639
Code Position Frame: Top:	0
Code Position Frame: Bottom:	479
Local No Read Message:	Code#1NotCollected

CODE FILTER SETTING #2

Filter:	Enabled
Symbology:	Code 39
Min Number of Characters:	5
Max Number of Characters:	7
Code Position Frame: Left:	0
Code Position Frame: Right:	639
Code Position Frame: Top:	0
Code Position Frame: Bottom:	479
Local No Read Message:	Code#2NotCollected

Code #1 to be read:	Data = DATALOGIC Symbology = Data Matrix ECC 200
Code #2 to be read:	Data = MATRIX Symbology = Code 39

1. OUTPUT MESSAGE with ***Partial Read TX*** disabled and successful reading of both codes:

   <STX>DATALOGIC$$$MATRIX<CR><LF>

2. OUTPUT MESSAGE with ***Partial Read TX*** disabled and successful reading of one or none of the two codes:

   none

3. OUTPUT MESSAGE with ***Partial Read TX*** enabled and successful reading of both codes:

   <STX>DATALOGIC$$$MATRIX<CR><LF>

4. OUTPUT MESSAGE with ***Partial Read TX*** enabled and successful reading of the first code only:

   <STX>DATALOGIC$$$Code#2NotCollected<CR><LF>

5. OUTPUT MESSAGE with ***Partial Read TX*** enabled and successful reading of the second code only:

   <STX> Code#1NotCollected$$$MATRIX<CR><LF>

6. OUTPUT MESSAGE with ***Partial Read TX*** enabled and reading failure of both codes:

   <STX>Code#1NotCollected$$$Code#2NotCollected<CR><LF>

- 3 -

This is an example of the message formatting when using the **CODE FILTER SETTING** parameters together with the **Partial Read TX** and ***No Read Message***. The number of active collection slots (**M**) is higher than the ***Number of Codes*** (**N**) to be decoded: **M > N**.

Number of Codes:	2
Data Packet Format:	%2
Code Field Justification:	Disabled
Code Field Cutting:	None
Data Packet Separator String:	$$$
No Read Message:	<24> (<CAN>)
Header String:	<2>> (<STX>)
Terminator String:	<13><10> (<CR><LF>)
Code Collection Filters:	Enabled

CODE FILTER SETTING #1

Filter:	Enabled
Symbology:	Data Matrix ECC 200
Min Number of Characters:	9
Max Number of Characters:	9
Code Position Frame: Left:	0
Code Position Frame: Right:	639
Code Position Frame: Top:	0
Code Position Frame: Bottom:	479
Local No Read Message:	Code#1NotCollected

CODE FILTER SETTING #2

Filter:	Enabled
Symbology:	Code 39
Min Number of Characters:	5
Max Number of Characters:	7
Code Position Frame: Left:	0
Code Position Frame: Right:	639
Code Position Frame: Top:	0
Code Position Frame: Bottom:	479
Local No Read Message:	Code#2NotCollected

CODE FILTER SETTING #5

Filter:	Enabled
Symbology:	Codabar
Min Number of Characters:	9
Max Number of Characters:	9
Code Position Frame: Left:	0
Code Position Frame: Right:	639
Code Position Frame: Top:	0
Code Position Frame: Bottom:	479
Local No Read Message:	Code#3NotCollected

Code #1 to be read: Data = DATALOGIC
Symbology = Data Matrix ECC 200

OR

Code #2 to be read: Data = MATRIXCode39
Symbology = Code 39

OR

Code #3 to be read: Data = MatrixCodabar
Symbology = Codabar

Total Codes to be collected = 2

1. OUTPUT MESSAGE with ***Partial Read TX*** disabled and successful reading of Code#1 and Code#2 codes:

<STX>DATALOGIC$$$MATRIXCode39<CR><LF>

OR successful reading of Code#1 and Code#3:

<STX>DATALOGIC$$$MATRIXCodabar<CR><LF>

2. OUTPUT MESSAGE with ***Partial Read TX*** disabled and successful reading of one or none of the two codes:

<STX><CAN><CR><LF>

3. OUTPUT MESSAGE with ***Partial Read TX*** enabled and successful reading of Code#1 and Code#2 codes:

<STX>DATALOGIC$$$MATRIXCode39<CR><LF>

OR successful reading of Code#1 and Code#3:

<STX>DATALOGIC$$$MATRIXCodabar<CR><LF>

4. OUTPUT MESSAGE with ***Partial Read TX*** enabled and successful reading of one code only (for instance the first one):

<STX>DATALOGIC<CR><LF>

5. OUTPUT MESSAGE with ***Partial Read TX*** enabled and successful reading of one of the remaining codes (for instance the second or third code only):

<STX>MATRIXCode39<CR><LF>

OR

<STX>MATRIXCodabar<CR><LF>

6. OUTPUT MESSAGE with ***Partial Read TX*** enabled and reading failure of all codes:

<STX><CAN><CR><LF>

- 4 -

This is an example of the message formatting when using the **CODE FILTER SETTING** parameters together with the **Partial Read TX** and ***No Read Message***. The number of active collection slots (**M**) is lower than the ***Number of Codes*** (**N**) to be decoded: **M < N**.

Number of Codes:	2
Data Packet Format:	%2
Code Field Justification:	Disabled
Code Field Cutting:	None
Data Packet Separator String:	$$$
No Read Message:	<24> (<CAN>)
Header String:	<2>> (<STX>)
Terminator String:	<13><10> (<CR><LF>)
Code Collection Filters:	Enabled

CODE FILTER SETTING #3

Filter:	Enabled
Symbology:	Data Matrix ECC 200
Min Number of Characters:	9
Max Number of Characters:	9
Code Position Frame: Left:	0
Code Position Frame: Right:	639
Code Position Frame: Top:	0
Code Position Frame: Bottom:	479
Local No Read Message:	Code#1NotCollected

Code #1 to be read:	Data = DATALOGIC Symbology = Data Matrix ECC 200
Code #2 to be read:	Data = MATRIXCode39 Symbology = Code 39

1. OUTPUT MESSAGE with ***Partial Read TX*** disabled and successful reading of Code#1 and Code#2 codes:

<STX>DATALOGIC$$$MATRIXCode39<CR><LF>

2. OUTPUT MESSAGE with ***Partial Read TX*** disabled and successful reading of one or none of the codes:

<STX><CAN><CR><LF>

3. OUTPUT MESSAGE with ***Partial Read TX*** enabled and successful reading of Code#1 and Code#2 codes:

<STX>DATALOGIC$$$MATRIXCode39<CR><LF>

4. OUTPUT MESSAGE with ***Partial Read TX*** enabled and successful reading of the first code only:

<STX>DATALOGIC<CR><LF>

5. OUTPUT MESSAGE with ***Partial Read TX*** enabled and successful reading of the second code only:

<STX>Code#1NotCollected$$$MATRIXCode39<CR><LF>

6. OUTPUT MESSAGE with ***Partial Read TX*** enabled and reading failure of all codes:

<STX><CAN><CR><LF>

Multiple Read Examples

- 1 -

This is an example of the message formatting when using the **Single Label** modality: **Number Of Codes = 1** and **Multiple Read = Enabled.**

CODE COLLECTION

Number of Codes:	1
Multiple Read:	Enabled
Multiple Read String:	MULREAD
Code Collection Filters:	Enabled

CODE FILTER SETTING #1

Filter:	Enabled
Symbology:	Code 1

DATA FORMAT

No Read Message:	NOREAD

1. OUTPUT MESSAGE in case of reading failure:

<Header>NOREAD<Terminator>

2. OUTPUT MESSAGE in case of successful reading of two or more codes:

<Header>MULREAD<Terminator>

- 2 -

This is an example of the message formatting when using the **Multiple Label** modality: **Number Of Codes = 2** and **Multiple Read = Enabled.**

CODE COLLECTION

Number of Codes:	2
Multiple Read:	Enabled
Multiple Read String:	MULREAD
Code Collection Filters:	Enabled
Partial Read TX:	Enabled

CODE FILTER SETTING #1

Local No Read Message:	NOREAD1
Local Multiple Read Message:	MULREAD1

CODE FILTER SETTING #2

Local No Read Message:	NOREAD2
Local Multiple Read Message:	MULREAD2

DATA FORMAT

No Read Message:	Empty

1. OUTPUT MESSAGE in case of reading failure:

   <Header>NOREAD1<Separator>NOREAD2<Terminator>

2. OUTPUT MESSAGE in case of single reading of both codes:

   <Header>CODE1<Separator>CODE2<Terminator>

3. OUTPUT MESSAGE in case of successful reading of 2 or more codes according to the configuration of Slot 1 and 1 code according to the configuration of Slot 2

   <Header>MULREAD1<Separator>CODE2<Terminator>

4. OUTPUT MESSAGE in case of successful reading of 2 or more codes according to the configuration of Slot 1 and 2 or more codes according to the configuration of Slot 2

   <Header>MULREAD1<Separator>MULREAD2<Terminator>

5. OUTPUT MESSAGE in case of successful reading of 2 or more codes according to the configuration of Slot 1 and no code according to the configuration of Slot 2

   <Header>MULREAD1<Separator>NOREAD2<Terminator>

Data Format Examples

- 1 -

This is an example of the message formatting when using the ***Code Field Justification***, ***Code Field Length*** and ***Fill Character*** parameters:

Data: 1256AVV5396
Code Field Justification: *right*
Code Field Length: *14*
Fill Character: ** (asterisk)*

Transmitted Code Field:

*****1256AVV5396**

- 2 -

This is an example of the message formatting when using the ***Code Field Justification***, ***Code Field Length*** and ***Fill Character*** parameters:

Data: MATRIX 210
Code Field Justification: *left*
Code Field Length: *15*
Fill Character: *@ (at symbol)*

Transmitted Code Field:

MATRIX 210@@@@@

- 3 -

This is an example of the message formatting when using the ***Code Field Justification***, ***Code Field Length*** and ***Fill Character*** parameters:

Data: 1256AVV5396
Code Field Justification: *right*
Code Field Length: *5*
Fill Character: ** (asterisk)*

Transmitted Code Field:

V5396

- 4 -

This is an example of the message formatting when using the ***Code Field Cutting*** and ***Separator String*** parameters:

Data: 1256AVV5396
Code Field Cutting: *beginning*
Separator String: *6*

Transmitted Code Field:

125

- 5 -

This is an example of the message formatting when using the ***Code Field Cutting*** and ***Separator String*** parameters:

Data: 1256AVV5396
Code Field Cutting: *middle*
Separator String: *5*

Transmitted Code Field:

6AVV

- 6 -

This is an example of the message formatting when using the ***Code Field Cutting*** and ***Separator String*** parameters:

Data: 1256AVV5396
Code Field Cutting: *end*
Separator String: *V*

Transmitted Code Field:

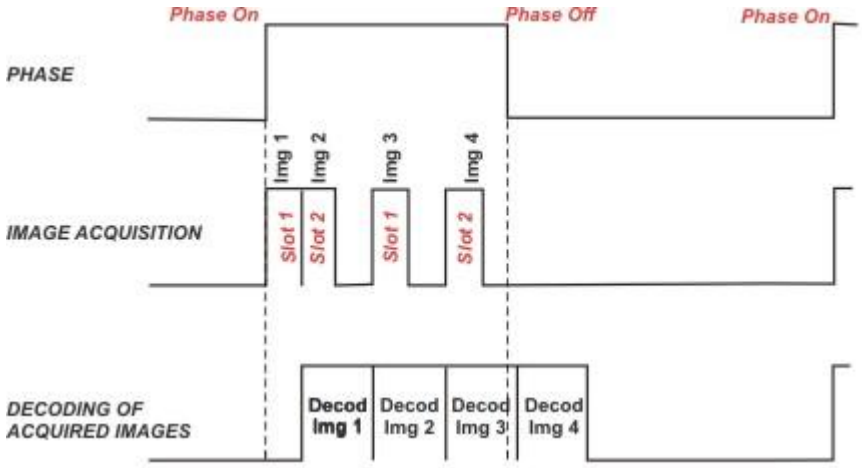
5396

Operating Mode Examples

- 1 -

This is an example of the image acquisition when using the Reading Phase ON, Reading Phase OFF, Acquisition Trigger and Image Acquisition Buffer Size parameters:

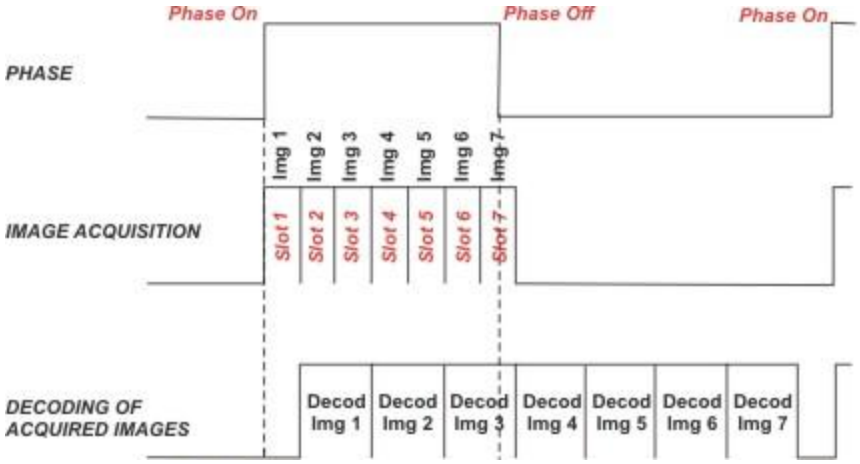
Operating Mode: *Phase Mode*
Reading Phase ON: *Main Port String*
Reading Phase OFF: *Main Port String*
Acquisition Trigger: *Continuous*
Image Acquisition Buffer Size: *2*



- 2 -

This is an example of the image acquisition when using the Reading Phase ON, Reading Phase OFF, Acquisition Trigger and Image Acquisition Buffer Size parameters:

Operating Mode: *Phase Mode*
Reading Phase ON: *Main Port String*
Reading Phase OFF: *Main Port String*
Acquisition Trigger: *Continuous*
Image Acquisition Buffer Size: *7*



ASCII Table

CHARACTER TO DECIMAL CONVERSION TABLE							
char	**dec**		**char**	**dec**		**char**	**dec**
NUL	**00**		*	**42**		U	**85**
SOH	**01**		+	**43**		V	**86**
STX	**02**		,	**44**		W	**87**
ETX	**03**		-	**45**		X	**88**
EOT	**04**		.	**46**		Y	**89**
ENQ	**05**		/	**47**		Z	**90**
ACK	**06**		0	**48**		[	**91**
BEL	**07**		1	**49**		\	**92**
BS	**08**		2	**50**		]	**93**
HT	**09**		3	**51**		^	**94**
LF	**10**		4	**52**		_	**95**
VT	**11**		5	**53**		'	**96**
FF	**12**		6	**54**		a	**97**
CR	**13**		7	**55**		b	**98**
SO	**14**		8	**56**		c	**99**
SI	**15**		9	**57**		d	**100**
DLE	**16**		:	**58**		e	**101**
DC1	**17**		;	**59**		f	**102**
DC2	**18**		<	**60**		g	**103**
DC3	**19**		=	**61**		h	**104**
DC4	**20**		>	**62**		i	**105**
NAK	**21**		?	**63**		j	**106**
SYN	**22**		@	**64**		k	**107**
ETB	**23**		A	**65**		l	**108**
CAN	**24**		B	**66**		m	**109**
EM	**25**		C	**67**		n	**110**
SUB	**26**		D	**68**		o	**111**
ESC	**27**		E	**69**		p	**112**
FS	**28**		F	**70**		q	**113**
GS	**29**		G	**71**		r	**114**
RS	**30**		H	**72**		s	**115**
US	**31**		I	**73**		t	**116**
SPACE	**32**		J	**74**		u	**117**
!	**33**		K	**75**		v	**118**
"	**34**		L	**76**		w	**119**
#	**35**		M	**77**		x	**120**
$	**36**		N	**78**		y	**121**
%	**37**		O	**79**		z	**122**
&	**38**		P	**80**		{	**123**
'	**39**		Q	**81**		|	**124**
(	**40**		R	**82**		}	**125**
)	**41**		S	**83**		~	**126**
			T	**84**		DEL	**127**

Symbol Verification Standards

ISO-IEC 16022 - Data Matrix - Symbology Specifications
The ISO-IEC 16022 Standard specifies general requirements (data character encoding, error correction rules, decoding algorithm, etc.) for Data Matrix symbology.

ISO-IEC 18004 - QR Code - Symbology Specifications
The ISO-IEC 18004 Standard specifies general requirements (data character encoding, error correction rules, decoding algorithm, etc.) for QR Code symbology.

ISO-IEC 15415 - 2D Symbols - Print Quality Test Specifications
The ISO-IEC 15415 Standard specifies the methodologies for the measurement of specific attributes of two-dimensional bar code symbols, and methods for evaluating and grading these measurements and deriving an overall assessment of symbol quality.

ISO-IEC 15416 - Linear Symbols - Print Quality Test Specifications
The ISO-IEC 15416 Standard specifies the methodologies for the measurement of specific attributes of linear bar code symbols, and methods for evaluating and grading these measurements and deriving an overall assessment of symbol quality.

AIM DPM - Direct Part Mark Quality Guideline
The AIM DPM Quality Guideline is applicable to the symbol quality assessment of direct parts marking performed in using two-dimensional bar code symbols. It defines modifications to the measurement and grading of several symbol quality parameters.
The marking processes covered by this guideline are as follows: Dot Peening, Ink Jet, Laser Etching and Electro-Chemical Etching.

AS9132A - Data Matrix Quality Requirements for Parts Marking
This SAE Aerospace Standard (AS) defines uniform Quality and Technical requirements relative to direct parts marking performed in using Data Matrix symbology. The marking processes covered by this standard are as follows: Dot Peening, Ink Jet, Laser Etching and Electro-Chemical Etching.

	ISO-IEC 16022-18004	ISO-IEC 15415	ISO-IEC 15416	AIM DPM	AS9132
ISO-IEC / AIM DPM Overall Grade	•	•	•	•	
ISO-IEC Symbol Contrast	•	•	•		
ISO-IEC Print Growth	•				
ISO-IEC / AIM DPM Axial Non Uniformity	•	•		•	
ISO-IEC / AIM DPM Unused ECC	•	•		•	
ISO-IEC Modulation		•	•		
ISO-IEC Min Edge Contrast			•		
ISO-IEC Decodability			•		
ISO-IEC / AIM DPM Fixed Pattern Damage		•		•	
ISO-IEC / AIM DPM Grid Non Uniformity		•		•	
ISO-IEC / AIM DPM Minimum Reflectance			•	•	
ISO-IEC Defects			•		
ISO-IEC / AIM DPM Decode		•	•	•	
AIM DPM Cell Contrast				•	
AIM DPM Cell Modulation				•	
AS9132 Dot Size/Cell Fill					•
AS9132 Dot Center Offset					•
AS9132 Dot Ovality					•
AS9132 Quiet Zone					•
AS9132 Angle of Distortion					•
AS9132 Symbol Contrast					•

Host Mode Programming

An alternative method of programming the Matrix family devices is by sending programming strings over the serial interface.

These strings take the form of ESCAPE sequences and are transmitted from the Host system to the Matrix reader on the main serial interface.

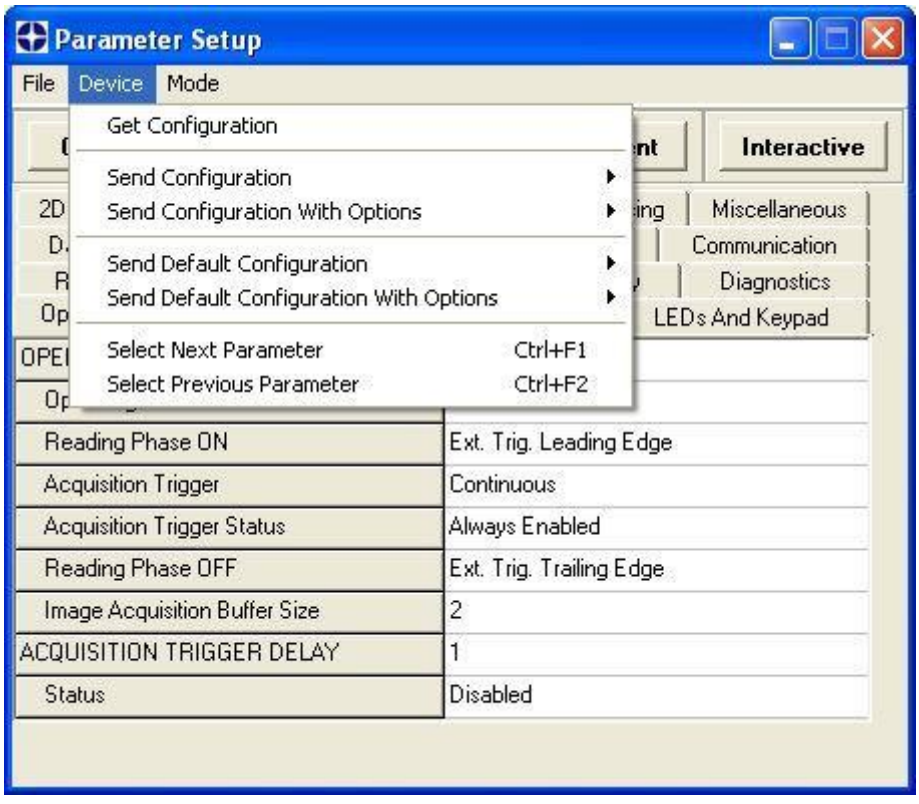
This is called Host Mode programming.

For a detailed description of the programming commands refer to the Host Mode Programming documents on the Mini-DVD.

Send Configuration Options

The device parameters are divided into two main classes, Configuration and Environmental which are effected differently by the Send Configuration and Send Default Configuration commands.

Configuration Parameters regard parameters that are specific to the device. These parameters are influenced by the Send Configuration and Send Default Configuration commands, that is they are overwritten by these commands. The same parameters are modified by the following "Send Configuration with Options" and "Send Default Configuration with Options" dialogs from the Device Menu:

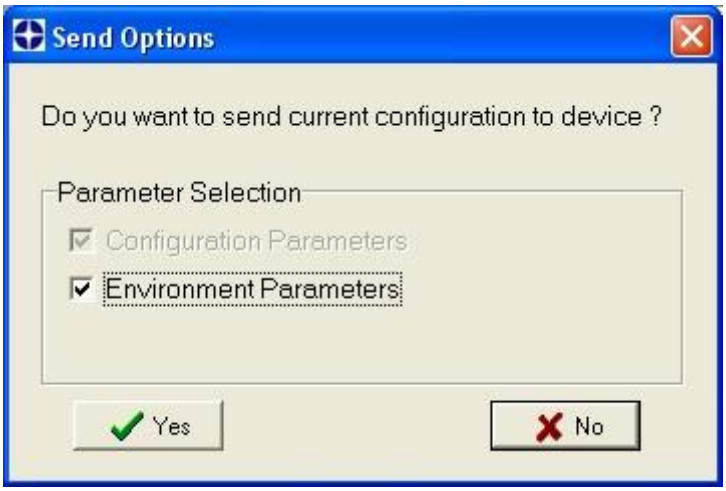


Environmental Parameters regard the device Identity and are not influenced by the "Send Default Configuration" and "Send Configuration" commands. This allows individual devices to be configured differently without losing their identity.

The following is a list of the Environmental Parameters:

MISCELLANEOUS
- Reader Name
- User Name
- Line Name

For device replacement it is necessary to send the previously saved configuration (both Configuration and Environmental parameters) to the new device. To do this select "Send Configuration with Options" from the Device Menu and check the Environmental Parameters checkbox:



In order to return a device to its absolute default parameters including Environmental parameters, the following "Send Default Configuration with Options" dialog must be used: