Matrix 410™
Software Configuration Parameter Guide

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Matrix 410™ Standard Application Program

Matrix 410™ Configuration

This manual refers to Application software version 6.56 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:

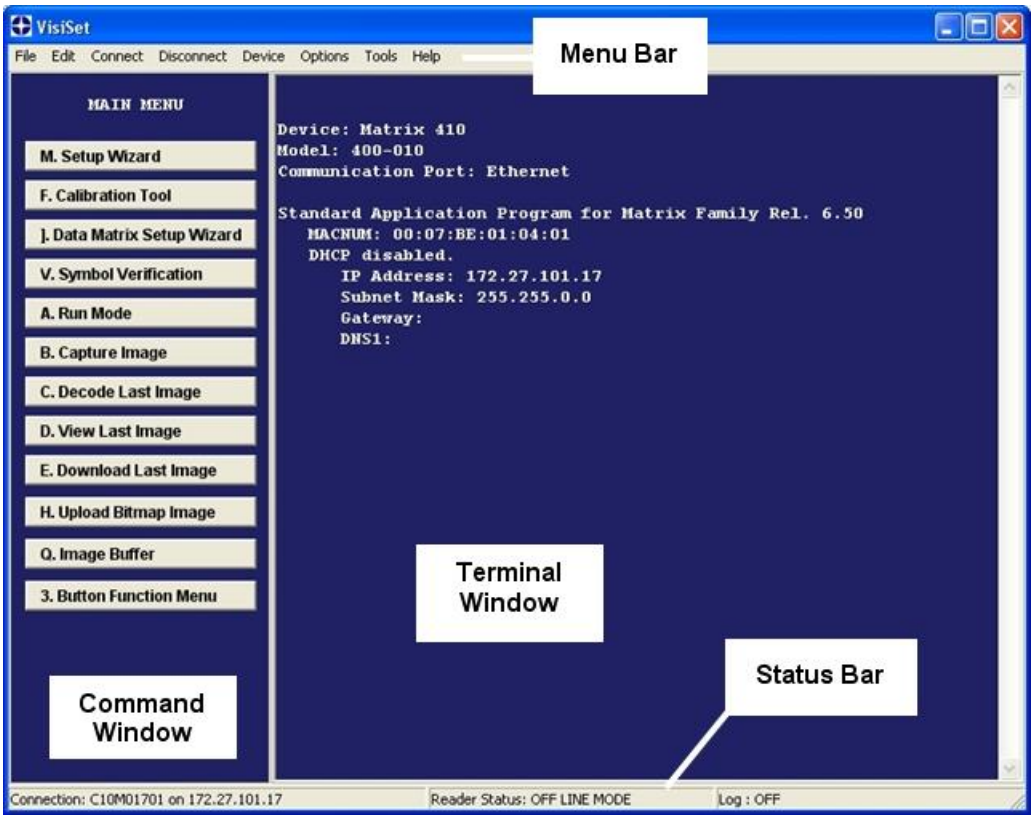
- **Bold** font and CAPITAL letters = name of a group of parameters (ex. **DATA FORMAT**)
- **Bold** and *Italic* font = parameter name (ex. ***Code Field Justification***)
- *Italic* font = parameter value/string (ex. *Disabled*)
- **Black** parameter names = User level parameters
- **Green** parameter 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 410™ reader and VisiSet™, the following screen is displayed:

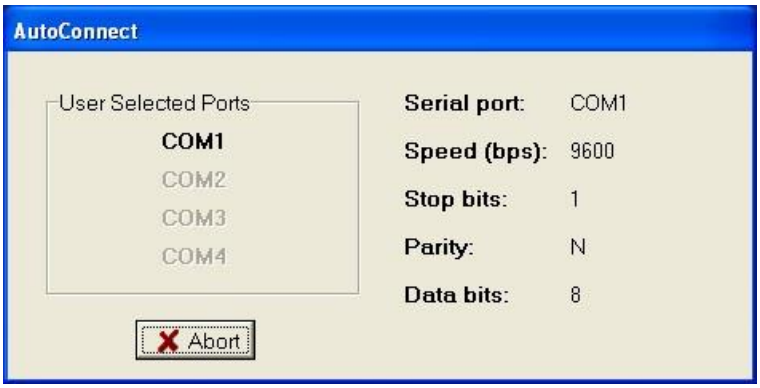


The program always displays the terminal screen on the right side and the VisiSet™ Main Menu on the left side.

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 410™ reader according to the communication parameters selected in the VisiSet™communication folder of the option menu.

  If *Serial Port* 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.

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

If *Ethernet* has been selected as communication channel within the Communication folder of the Options menu, the program automatically tries to connect to the defined IP Address. If no connection is performed, press the ESC button to stop the connection attempts.

NOTE

VisiSet™ can only connect to the Matrix 410™ reader using the on-board Ethernet (specific models) or Ethernet TCP/IP (BM2x0 / QL500). For other Industrial Ethernet protocols (Fieldbus), configuration through VisiSet™ must be accomplished through the serial port.

- The **Disconnect** item closes communication between Matrix 410™ and VisiSet™ and causes Matrix 410™ to enter Run Mode. If the program is connected via serial port, the auxiliary port is available for Local Echo communications towards the terminal.
- The **Device** menu allows you to select:

  while connected:

  Get Configuration From Temporary Memory will download the Matrix 410™ 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.

  External Memory Backup and **Restore** items if connected through a device having backup memory.

  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).

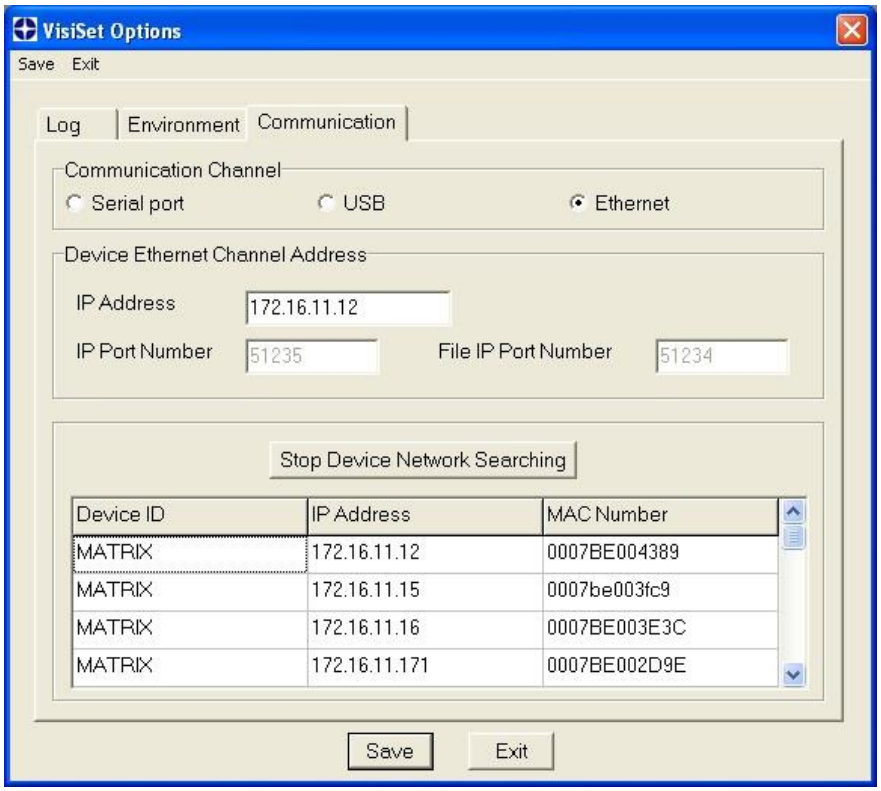
- The **Options** item opens a window where it is possible to select the **Log**, the **Environment** and the **Communication** folders.

  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, USB or Ethernet 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.

  If selecting *Ethernet*, it is necessary to align the IP Addressing parameters between the reader and the configuration PC before connecting to VisiSet. See Configuration Through Ethernet.

  Once the IP Addressing parameters are aligned you can easily find the reader by just clicking on the *Look For Devices On Network* button, and then selecting and saving the desired device as soon as it appears. Only Datalogic devices are visualized in the list. Any unknown devices refer to older version products. The IP Port numbers have fixed values.



- 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 auxiliary port whenever VisiSet™ is connected or disconnected. Then, a .bin file has to be loaded to complete the procedure.

  Upon Ethernet connection it is necessary that VisiSet™ is connected before loading the .bin file.

  The **Enter Loader** option (only for Serial connections), 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 Lighting System Part Number** option shows the part number of the Lighting System (Illuminator) previously saved in the connected reader's Flash memory by the Set Lighting System Part Number item.

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

  The **Set Lighting System Part Number** option is used to correctly associate the reader with the Lighting System (Illuminator) mounted to it. Select the specific Illuminator being used from the list, (or if not in the list select Other), then click OK to save it in the reader's Flash memory. Wait for the reader to reset!

  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 **Get Image Density (PPI)** option shows the PPI value previously saved through the calibration procedure (Setup Wizard or Calibration Tool).

  The **Reset Image Density (PPI)** option erases the PPI value previously saved through the calibration procedure.

  Get System Statistics opens the window where global counters register PackTrack, Encoder and Reading statistics. VisiSet™ must be in RUN Mode to use this tool.

Get PackTrack Array Statistics opens the window which shows the individual reading statistics for each reader in the PackTrack ID-NET network. VisiSet™ must be in RUN Mode to use this tool.

Decoder SW Restart performs a software restart. The reader is reset and disconnects from VisiSet™. When the reader is ready re-connect it.

Check Decoder Free Ram displays the amount of free memory available to application services such as Image Acquisition Buffer, Transfer Array Image Buffer and Image Buffer.

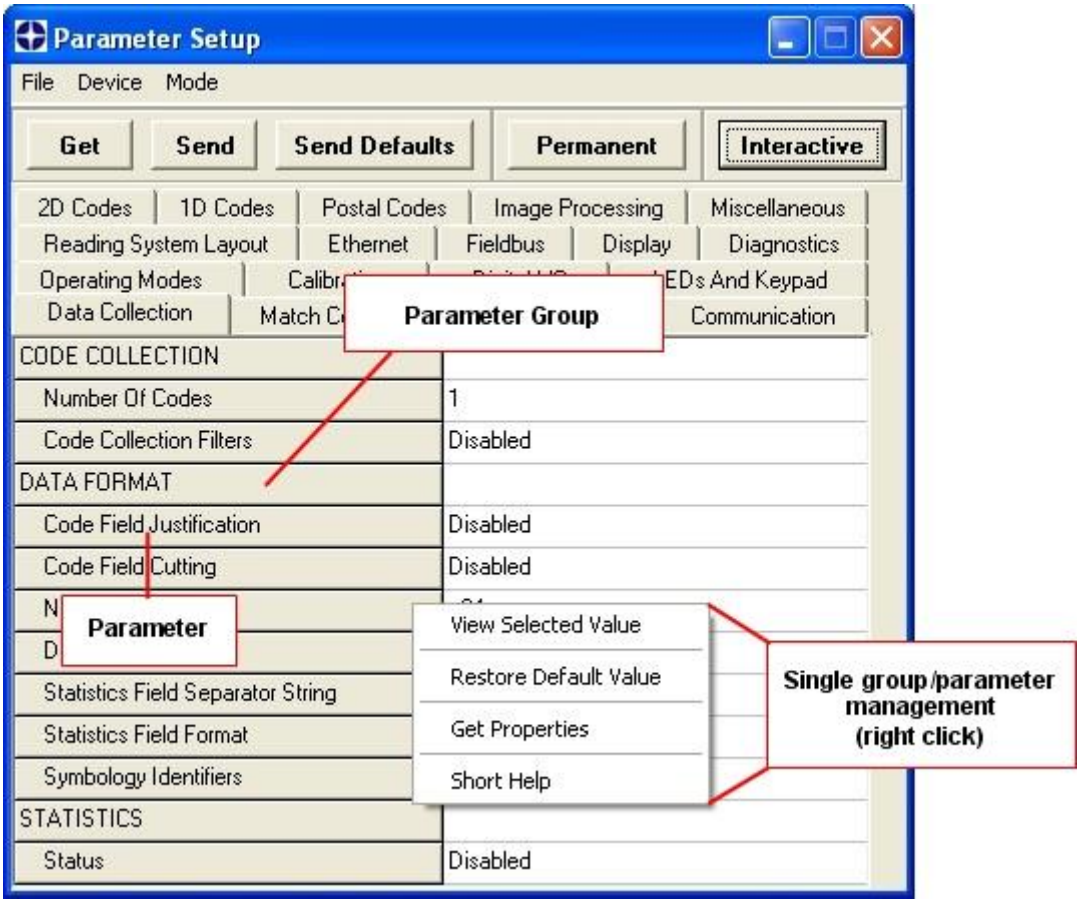
- The **Help** menu provides:

  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.

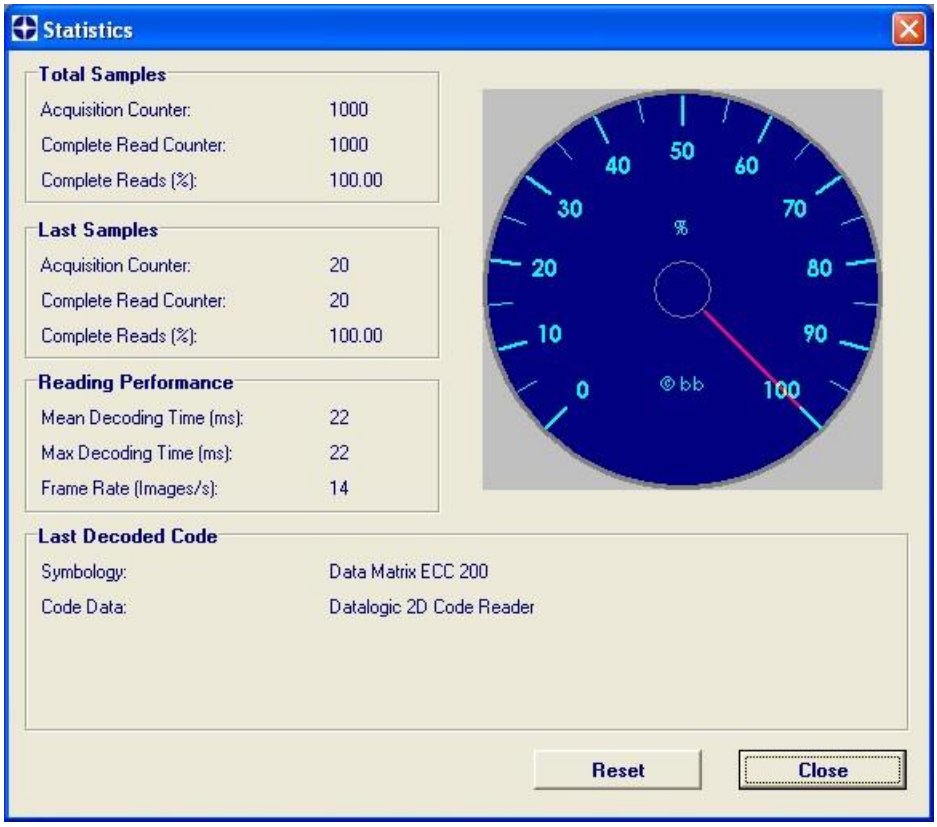
Statistics Window

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.

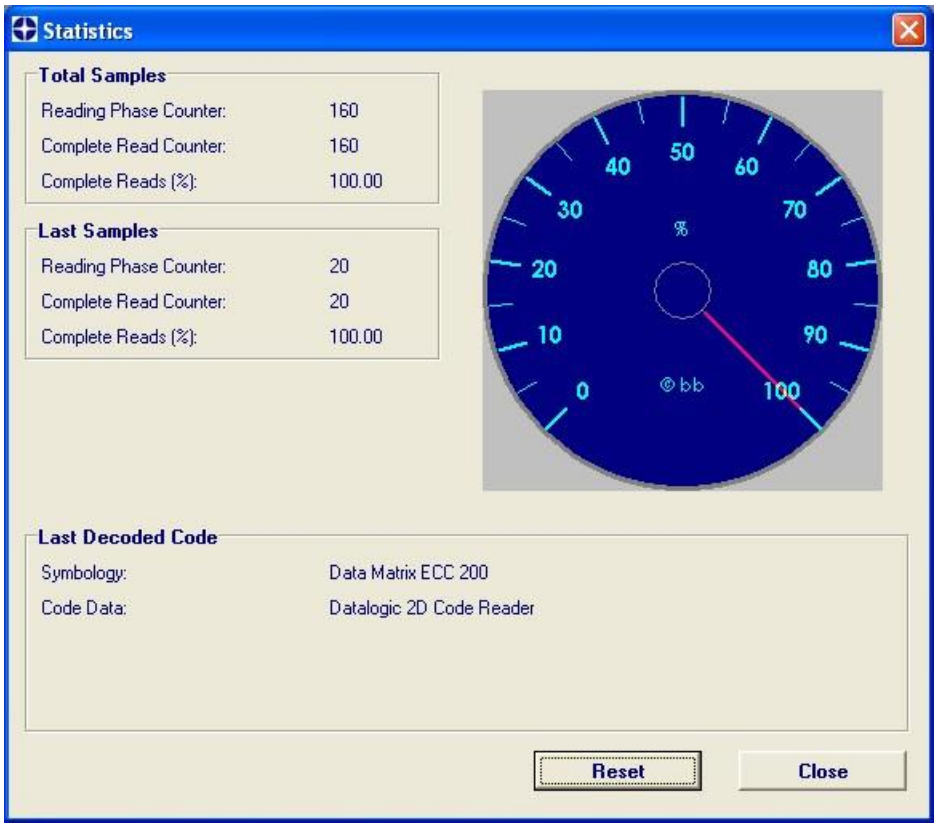
The **Last Decoded Code** area reports information about the symbology and the data regarding the last decoded code.

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.

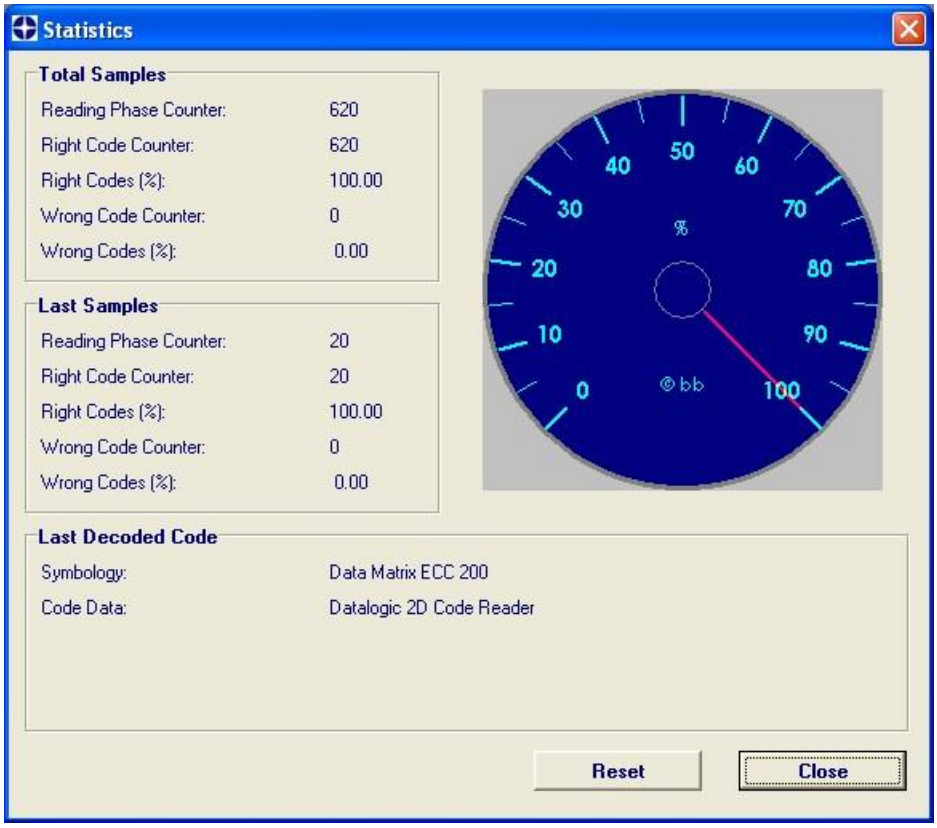
The **Last Decoded Code** area reports information about the symbology and the data regarding the last decoded code.

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 410™ for static reading or simple code reading applications can be accomplished by using the VisiSet™ Standard Standard Setup Wizard for easy setup.

Matrix 410™ can also be used for DPM applications which require specific complex parameter settings that can be automatically configured using the VisiSet™ Data Matrix 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	ID-NET™	Multiplexer Layout
Pass Through	RS232 Master/Slave	Ethernet Socket Layout
		CBX Gateway Fieldbus Layout

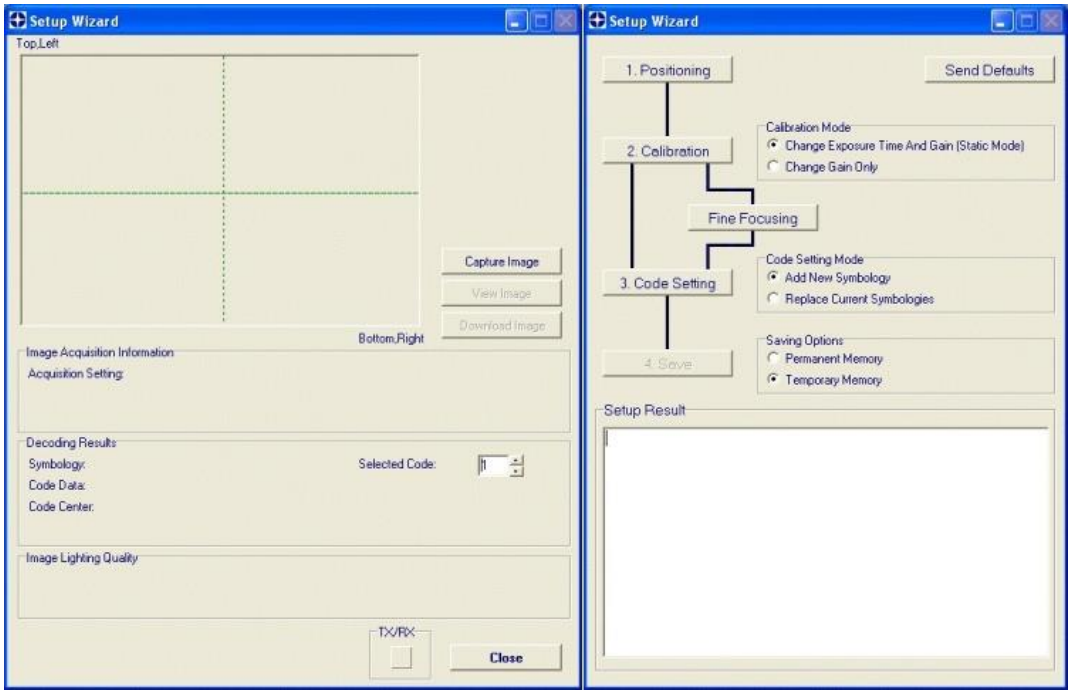
For details on using VisiSet™, see How to Use.

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

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

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

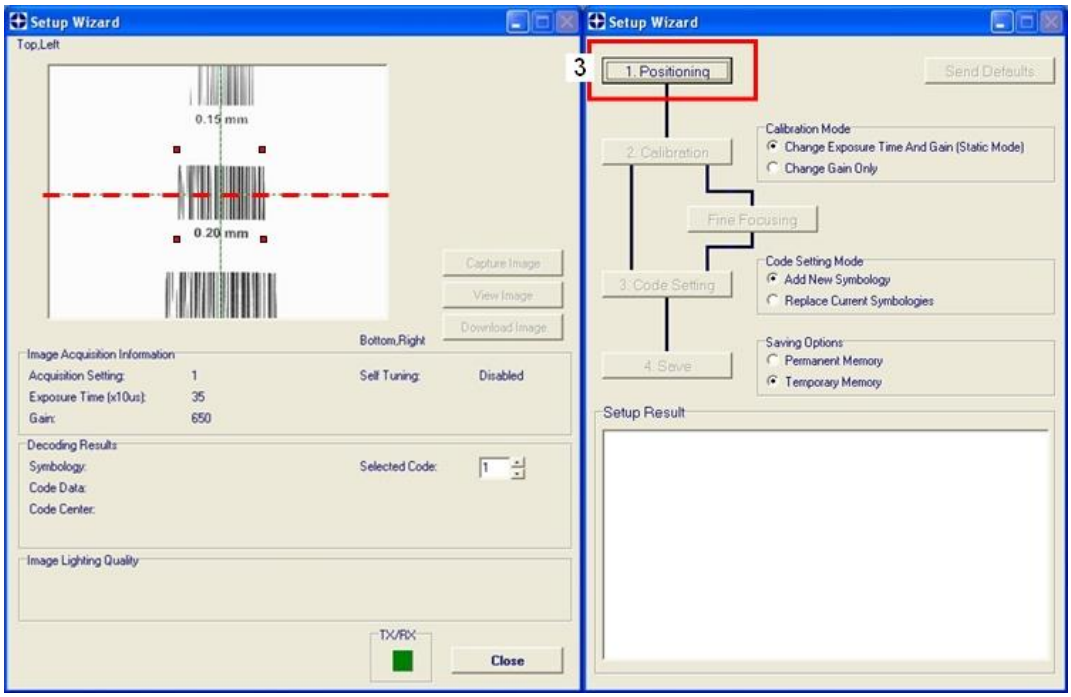


2. Remove the lens cover in order to focus the reader and loosen the two Locking Knobs on the lens.

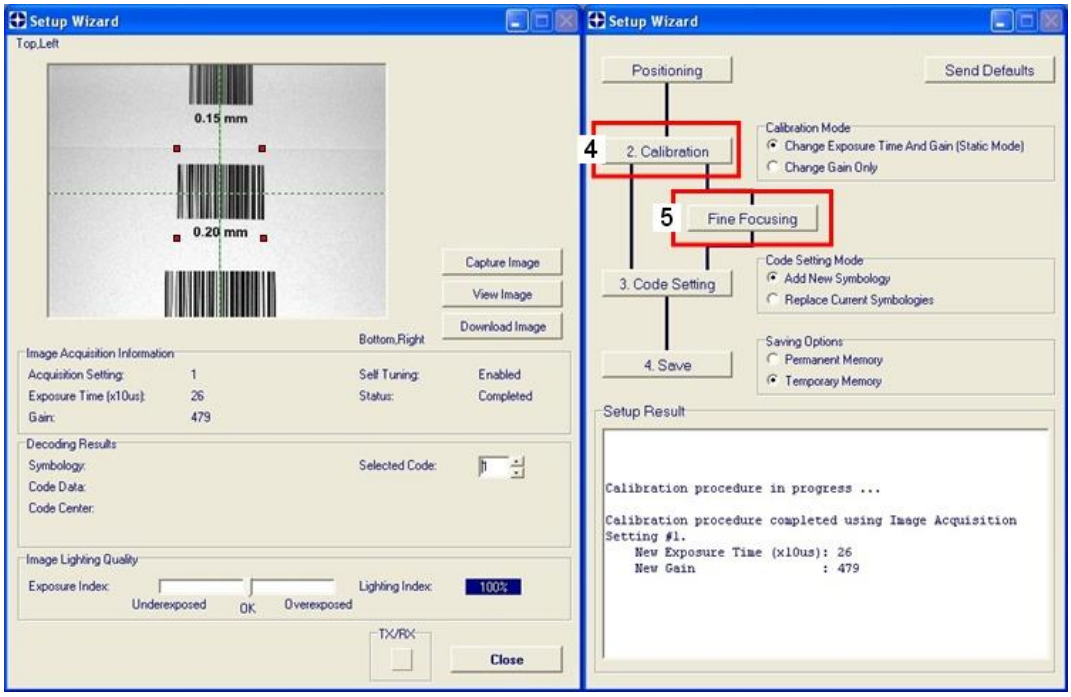
Adjust the Focus ring to the "Far position" and the Diaphragm ring to the "F4" number setting which is the preferred setting for installation.

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

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

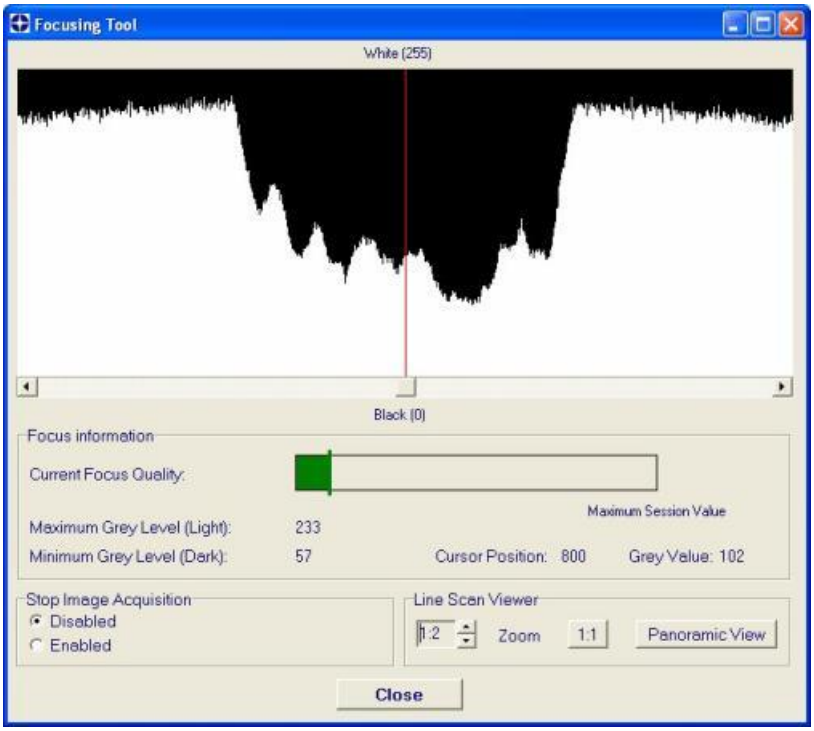


4. Select a Calibration Mode choice and press the "Calibrate" button. The reader flashes once acquiring the image and auto determines the best exposure and gain settings. If the code symbology is enabled by default, the code will also be decoded.



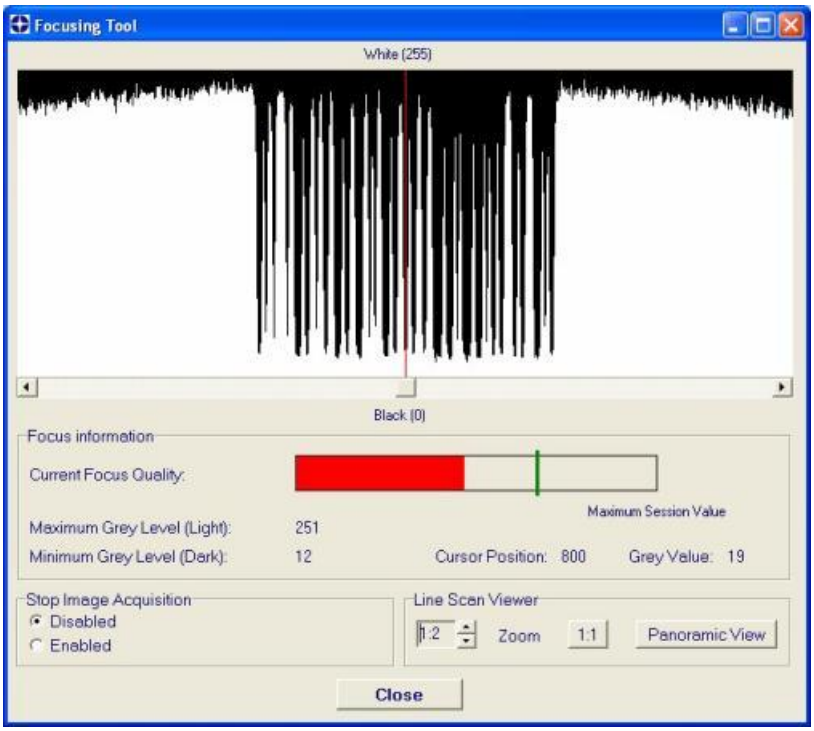
5. Press the "Fine Focusing" button to activate the Fine Focusing Tool.

The reader continuously acquires images and gives visual feedback on the focusing quality in the Focusing Tool window.

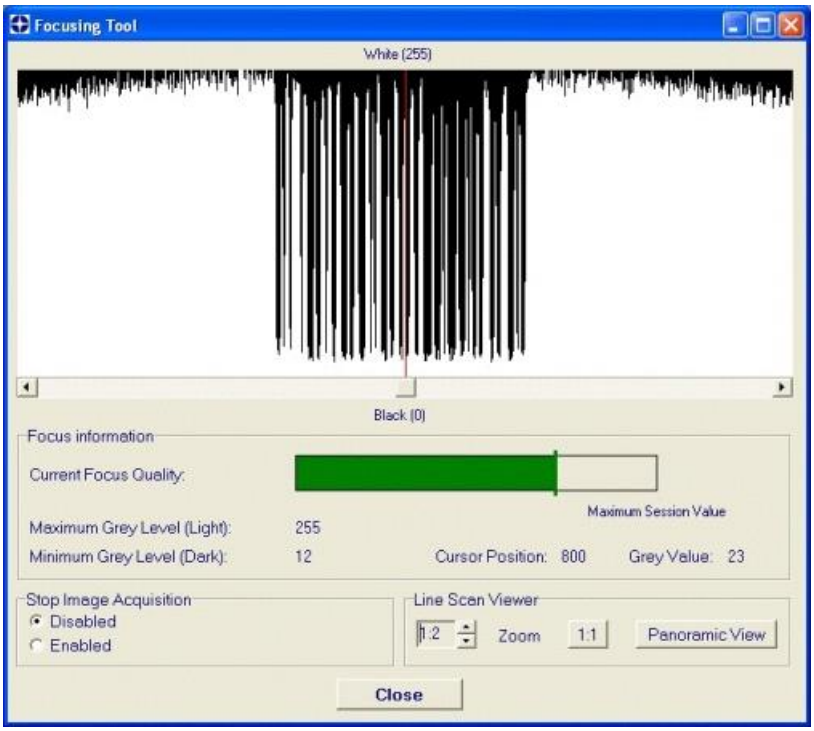


Rotate the Focusing ring on the lens. The Current Focus Quality Bar (green) together with the vertical optimal focus line (green) **increase together** until the optimal focus is reached; the vertical optimal focus line stops.

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



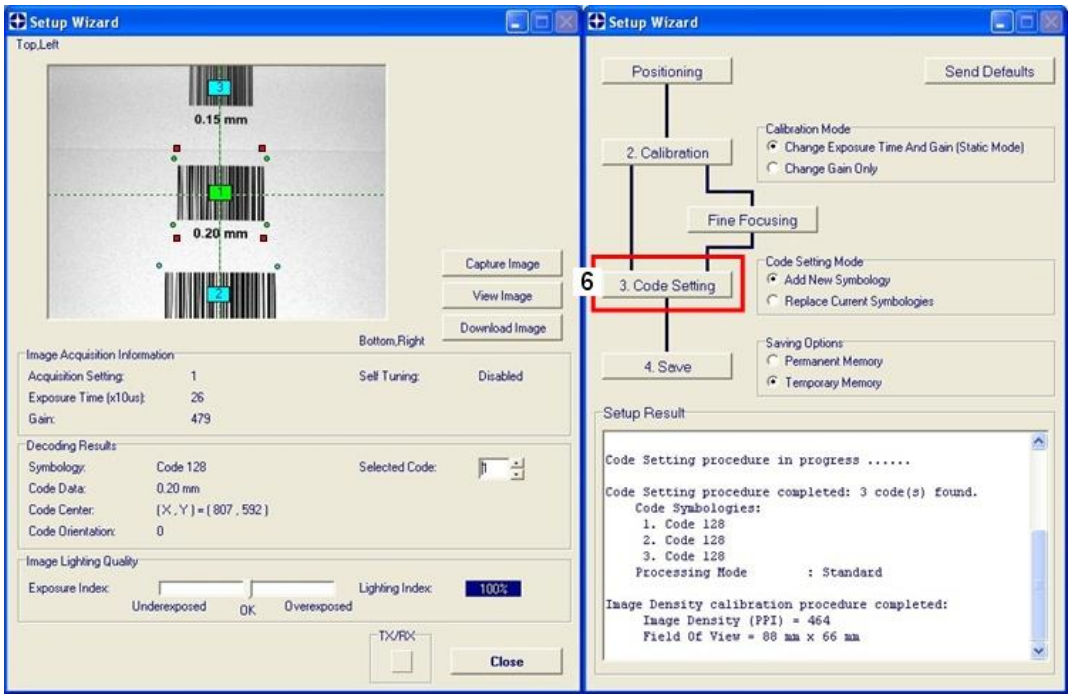
Rotate the Focusing ring in the opposite direction. The Current Focus Quality Bar (green) increases towards the vertical optimal focus line (green) until the optimal focus is reached; **the Current Focus Quality Bar touches the vertical optimal focus line** (indicating the best focus).



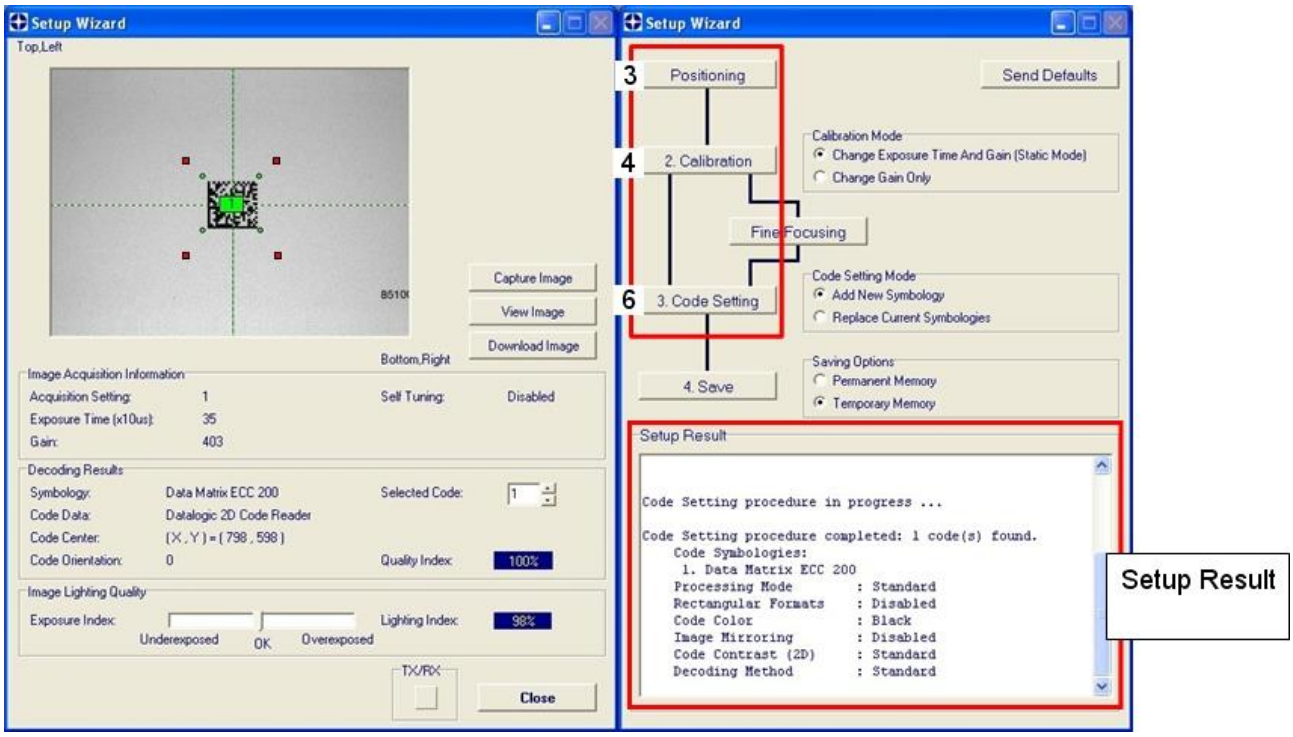
Tighten the Locking Knobs on the lens and press the "Close" button to return to the Setup Wizard.

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

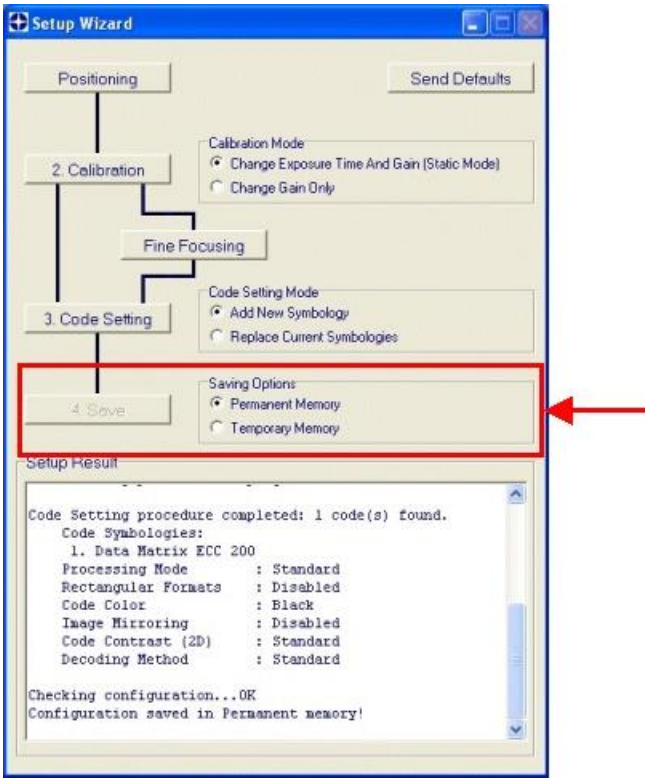
The Setup Result section of the Setup Wizard window shows the code type results and the image density calibration settings.



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



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



9. Close the 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.

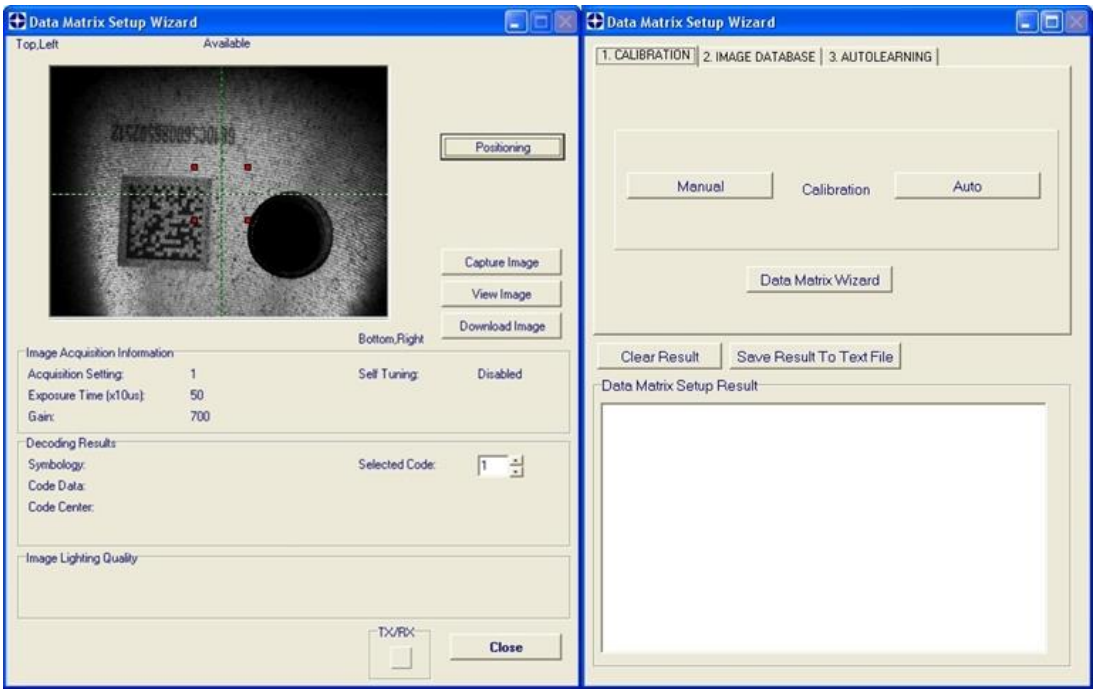
I. Run VisiSet™ and Connect to the Matrix reader.

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.

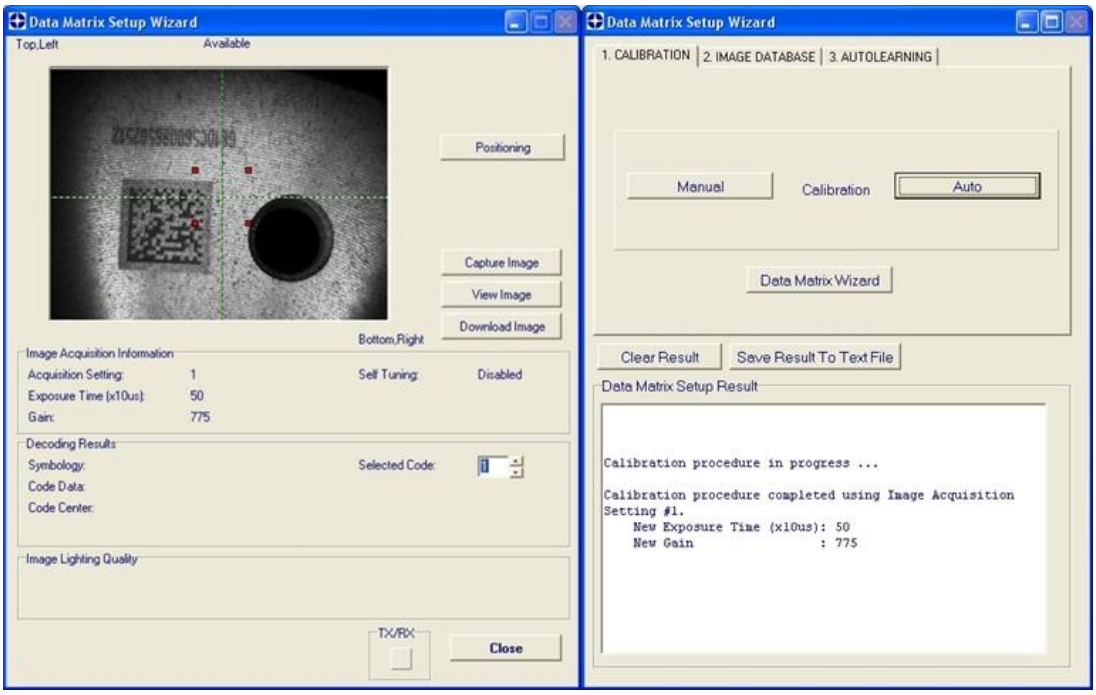
STEP 1. CALIBRATION

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, Internal Lighting Mode, and if using the LT-005 Internal Illuminator, Enabled LED Chains.

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

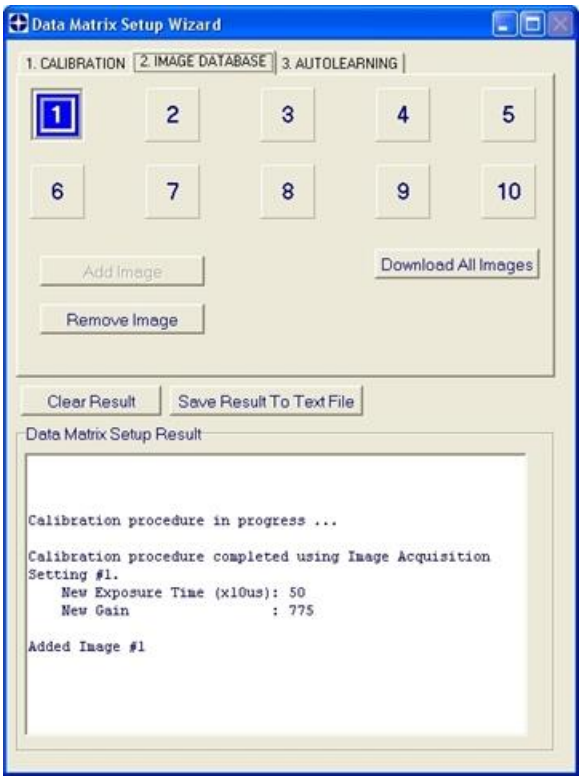
In this STEP you are supposed to create a database (up to 10 different images) representative of your application.

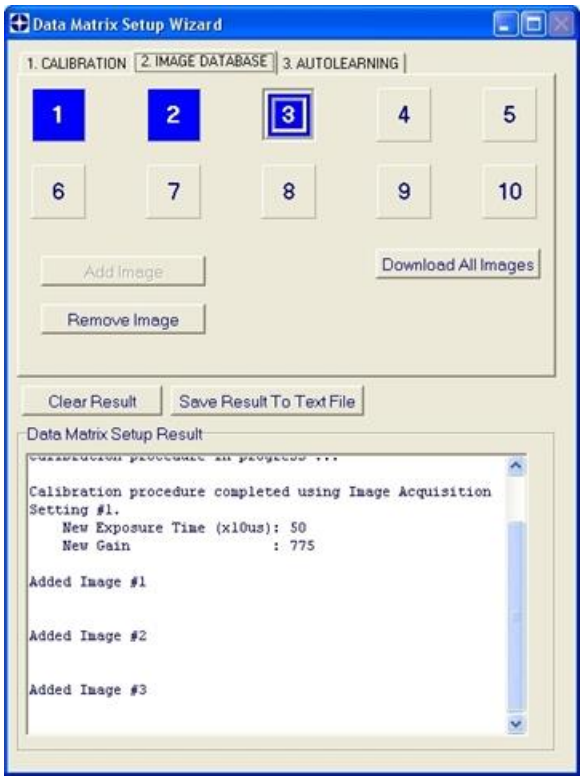
NOTE

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.

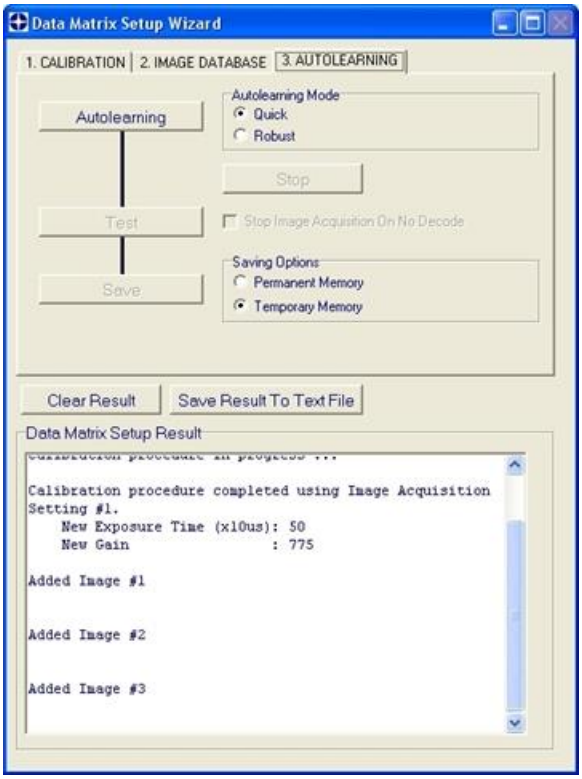
NOTE

If you choose to **Upload Image** files to populate the database, the image dimensions must be relevant to the reader being used in the application, and therefore must match the sensor capacity of the reader model. For example, do not upload and store a Matrix 410-600 image (1600x1200) to a free Image Place Holder on a Matrix 410-400 (1280x1024).

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.



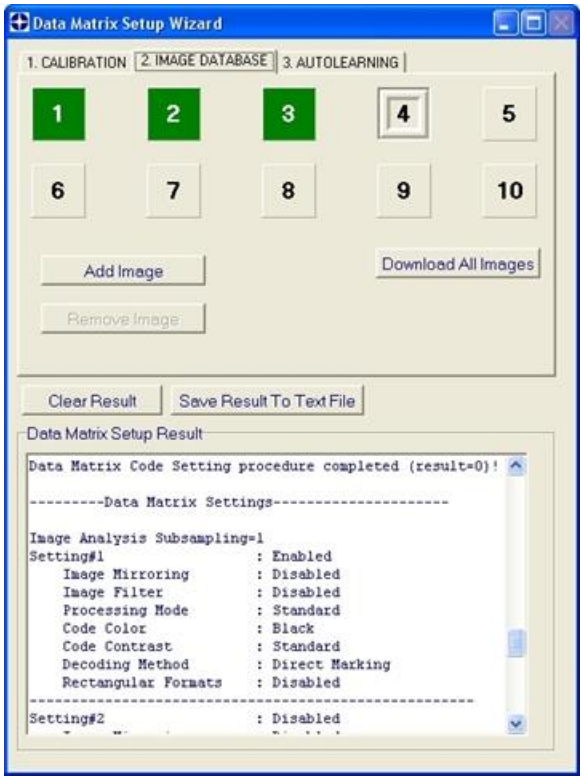
The Autolearning on each image is regulated by a timer. If the timer elapses before the Autolearning has terminated, the corresponding image is considered failed. You can choose the Quick or the Robust Autolearning mode. The two modes differ from the timeout associated with each image present in the 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.

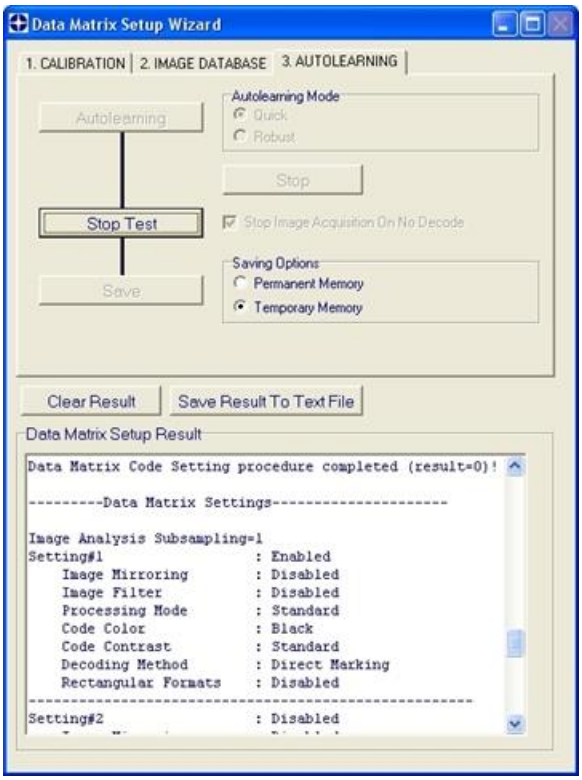
When the Autolearning ends, you can check the detailed output in the Data Matrix Setup Result window. The result is supplied for each image present in the IMAGE DATABASE.

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.

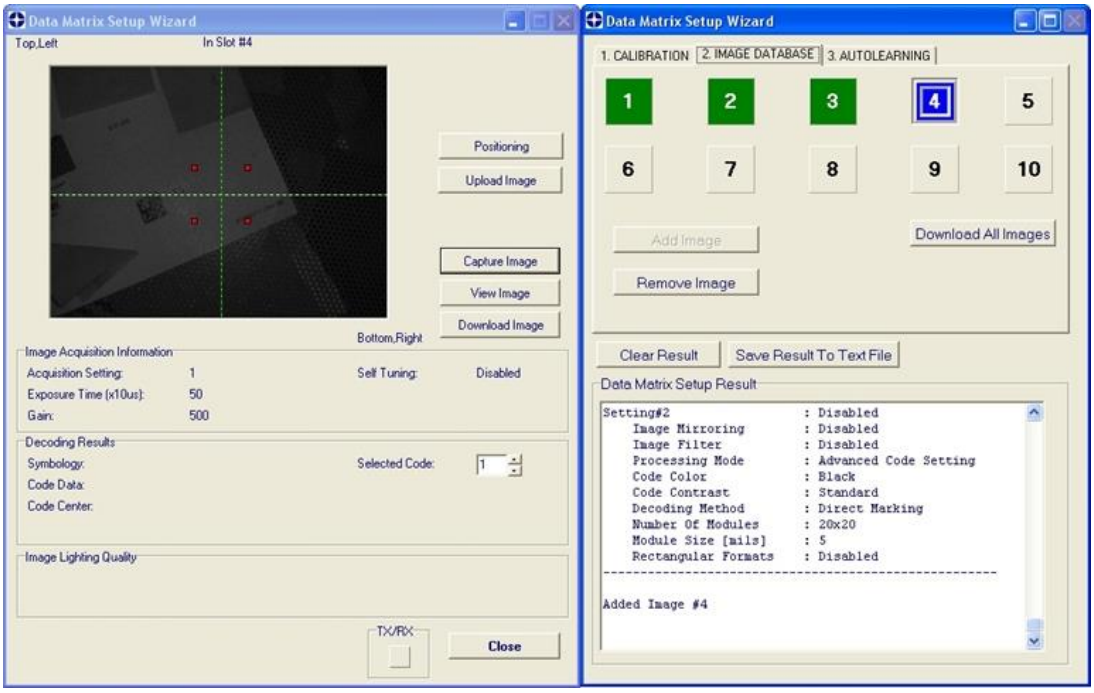


2. Test the selected Setting(s) using the **Test**/**Stop Test** button.



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.

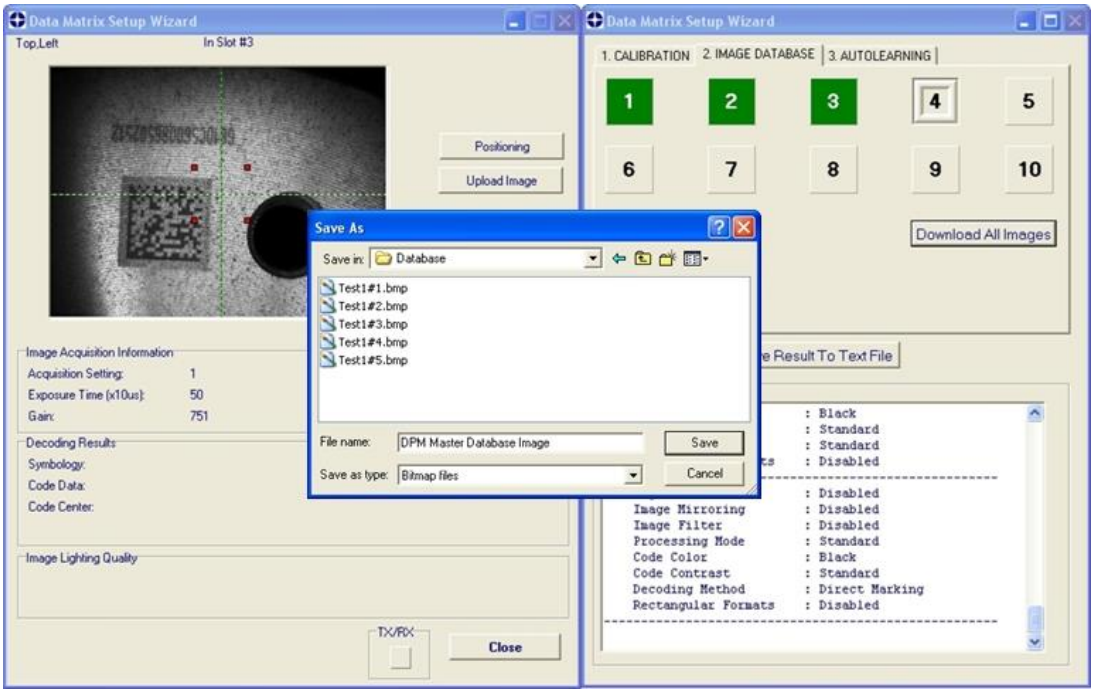


3. Save all the Settings(s) using the **Save** button. The Data Matrix Wizard now remains *Enabled* (Status parameter), allowing the Matrix reader to use the DATA MATRIX SETTING(S) while the corresponding parameters in their relative folders are ignored (and no longer visible when opening the Parameter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

PackTrack Setup Wizard

See the Application Note: "APN PackTrack Calibration Procedure for Matrix".

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*** (*External Trigger Leading Edge*, *External Trigger Trailing Edge*, *Main Port String*, *Aux. Port String*).

   If you use any digital input or output, select the **DIGITAL I/O** folder and configure the selectable parameters under ***External Trigger Group***, ***Input 2 Group***, ***Output 1 Group***,...

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*** = *External Trigger Leading Edge*) 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.

Normally the decoded data is transmitted on the RS232 auxiliary interface independently from the main interface selection, using Local Echo communication mode.

NOTE

If connected to your Terminal/Host, configure the **AUX PORT** serial port regarding ***Baud Rate***, ***Data Bits***, ***Stop Bits*** and ***Parity*** according to the requirements of your Terminal/Host.

To change the default configuration of the serial port:

- Select the **AUX PORT** folder and set the ***Communication Mode*** parameter to *Standard Mode*. This disables the output of decoded data on Aux. Port;
- Select the **MAIN PORT** folder and set the ***Data TX*** parameter to *Disabled*. This disables the output of decoded data on Main Port.

SEND THE CONFIGURATION TO THE READER (PERMANENT MEMORY)

Pass Through

The **default** configuration loaded by the connection to VisiSet™ and your reader can be easily modified for Pass Through reading.

1. Select the **AUX PORT** folder and set the ***Communication Mode*** parameter to *Pass Through*.

2. Configure the **MAIN PORT** and **AUX PORT** serial ports in the same way for all the devices in the pass through chain, regarding ***Baud Rate, Data Bits, Stop Bits*** and ***Parity***.

3. 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*** (*External Trigger Leading Edge*, *External Trigger Trailing Edge*, *Main Port String*, *Aux. Port String*).

If you use any digital input or output, select the **DIGITAL I/O** folder and configure the selectable parameters under ***External Trigger Group***, ***Input 2 Group***, ***Output 1 Group***,...

All relative ***Options*** to the various ***Operating Modes*** are conditioned so that only valid selections are available. ***Operating Mode*** that uses *Aux. Port String* or *Main Port String* is not valid for this layout.

4. 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* 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.

5. 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*** = *External Trigger Leading Edge*) 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).

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

7. Configure the ***Main Port*** and ***Aux Port*** message ***Terminator Strings*** on all the devices in the same way. At least one terminator character must be enabled.

If desired, use the ***Main Port*** message ***Header Strings*** to identify each device (different for each device).

NOTE

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

SEND THE CONFIGURATION TO THE READER (PERMANENT MEMORY)

ID-NET™ Layout

- SLAVES -

FOR THIS LAYOUT, SLAVE CONFIGURATION MUST BE PERFORMED SEPARATELY BEFORE PHYSICAL CONNECTION TO THE NETWORK.

Connect the Main, Auxiliary or Ethernet Interface of the **Slave** reader to the Host or a portable PC according to the signals given in the Reference manual.

The **default** configuration loaded by the connection to VisiSet™ and your reader can be easily modified by following the steps below:

1. Select the READING SYSTEM LAYOUT folder and from the ***Device Network Setting Group*** set the ***Topology Role*** parameter of the Slave reader (**Synchronized** or **Multidata**).

2. From the ***Device Network Setting Group*** set the ***Slave Address*** from *1-31*. Each reader must have a different address on the ID-NET™ network.

3. If necessary, from the ***Device Network Setting Group*** set the ***Network Baud Rate*** (*500 kbs* default).

4. Select the **OPERATING MODE** folder and set the ***Operating Mode*** parameter. For *Synchronized* layouts only *Phase Mode* can be used.

5. 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* 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.

6. 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*** = *External Trigger Leading Edge*) 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).

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

> **NOTE**
> The value defined for the ***Number of Codes*** parameter must correspond to the total number of codes read by all readers of the Master/Slave network.

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

SEND THE CONFIGURATION TO THE READER (PERMANENT MEMORY)

The Slave device is now Configured. Physically connect it to the Master/Slave network. Repeat these steps for each Slave reader.

> **NOTE**
> If using the CBX connection box equipped with a BM100 Backup module, you can perform Device Backup at each Slave (see External Memory Backup and Restore for details).

- MASTER -

The **Master** reader can be configured from the Host or a portable PC according to the signals given in the Reference Manual.

1. Select the READING SYSTEM LAYOUT folder and from the ***Device Network Setting Group*** set the ***Topology Role*** parameter of the Master reader (**Synchronized** or **Multidata**).

2. *Enable* the ***Status*** of each ***Expected Slave Device N***. If desired, set the related identification string from the ***Device Description*** parameter. Repeat this step for all expected slave devices.

3. If necessary, from the ***Device Network Setting Group*** set the ***Network Baud Rate*** (*500 kbs* default).

4. Select the **OPERATING MODE** folder and set the ***Operating Mode*** parameter. For *Synchronized* layouts only *Phase Mode* can be used.

5. 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* 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.

6. 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*** = *External Trigger Leading Edge*) 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).

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

> **NOTE**
> The value defined for the ***Number of Codes*** parameter must correspond to the total number of codes read by all readers of the Master/Slave network.

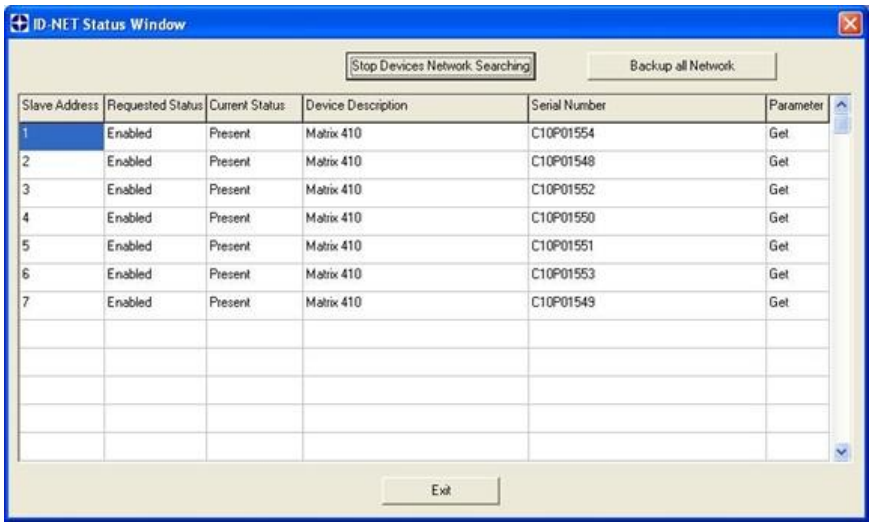
> **NOTE**
> The correct code type must be enabled and relative parameters configured in the **2D CODES**, **1D CODES**, and **POSTAL CODES** folders.

SAVE THE CONFIGURATION TO THE READER (PERMANENT MEMORY)

The Master device is now Configured. Physically connect it to the Master/Slave network.

> **NOTE**
> If using the CBX connection box equipped with a BM100 Backup module, you can perform Device Backup at each Slave (see External Memory Backup and Restore for details).

From the VisiSet™ Device Menu select "ID-NET™ Status Window" and click on the "Look For Devices On Network" button to check the status of the expected Slave devices within the ID-NET™ network.



The reader network is ready.

ID-NET™ Slave Management Through Master

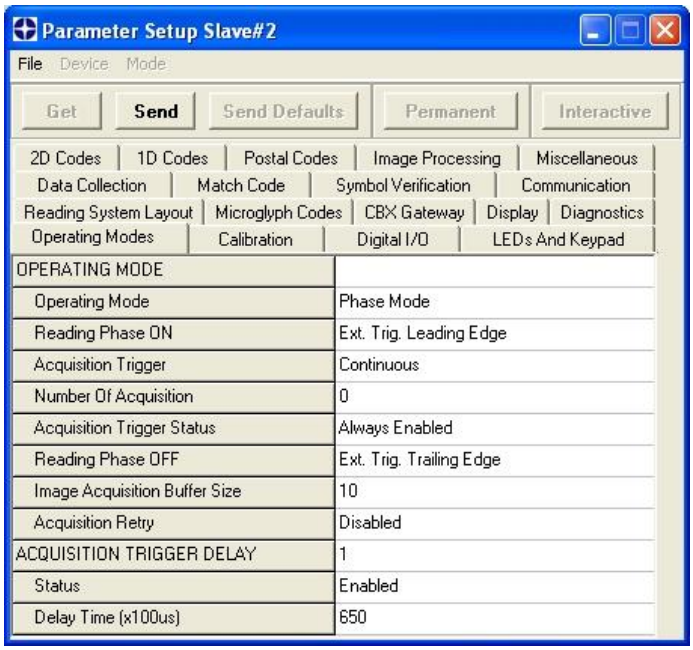
When an ID-NET™ layout has already been configured, it is possible to modify the configuration of any Slave from VisiSet™ through the Master. **This feature requires a minimum ID-NET™ Network Baud Rate of 57600**.

From the ID-NET Status Window it is possible to Get the parameter configuration of any slave listed when its Current Status is "Present". Double-click anywhere in the row of the specific slave listed in the window.

After some time, based on the Network Baud Rate, the Parameter Setup window is opened allowing complete configuration of the Slave.

From this window it is possible to:

- change any parameter (not in interactive mode)
- save the configuration to a file
- load a configuration from a file
- send the entire configuration to the slave



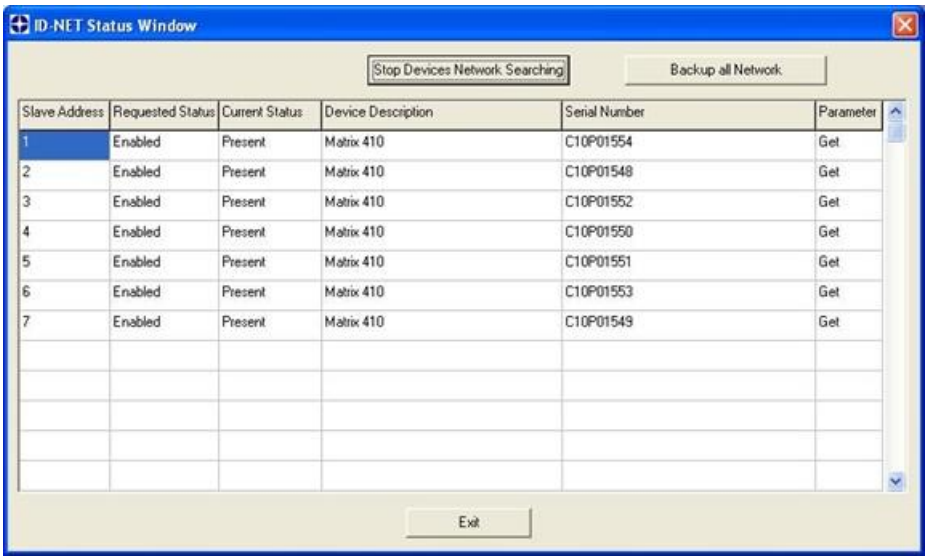
CAUTION

If a wrong configuration is set or if the Slave Reading System Layout parameters are changed, the slave could lose the network connection.

ID-NET™ Backup to File Through Master

The preferred Backup method for an ID-NET™ network is through the BM100 or BM150 since it allows an automatic Restore from memory (see External Memory Backup and Restore for details). However an alternative method allows backup to file from VisiSet™ though the Master. When an ID-NET™ layout has already been configured, it is possible to perform a backup of all the device configurations (Master + Slaves) to file on the VisiSet™ PC local hard disk.

Click the "Backup all Network" button in the ID-NET Status Window. The configurations of the Master and all the Slaves listed, (whose Current Status is "Present"), will be saved to a predefined directory on the VisiSet™ PC.



After some time, based on the Network Baud Rate, the following INFO window is displayed, notifying the user with the name of the folder where the configuration files have been stored. Each Matrix device will have its configuration files created in a sub-folder relative to its network address \Master, \Slave_1, \Slave_2, etc. These files are requested by VisiSet™ to manage the configuration offline through the Parameter Setup window.

In this case, Restore procedures require loading the configurations from file through VisiSet™ (individually).

RS232 Master/Slave Layouts

- SLAVE -

FOR THIS LAYOUT, SLAVE CONFIGURATION MUST BE PERFORMED SEPARATELY BEFORE PHYSICAL CONNECTION TO THE NETWORK.

Connect the Main or Auxiliary Serial Interface of the **Slave** reader to the Host or a portable PC according to the signals given in the Reference manual.

The **default** configuration loaded by the connection to VisiSet™ and your reader can be easily modified by following the steps below:

1. Set *Phase Mode* value for the ***Operating Mode*** parameter in the **OPERATING MODES** folder.

2. Select the **OPERATING MODE** folder and set the ***Device Assignment*** parameter to **Slave RS232** (**Type A** or **Type M**).

3. Configure the **MAIN PORT** and **AUX PORT** serial ports in the same way for all the **Slave** devices, regarding ***Baud Rate, Data Bits, Stop Bits*** and ***Parity***.

4. 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* 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.

NOTE

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

The Slave device is now Configured. Physically connect it to the Master/Slave network. Repeat these steps for each Slave reader.

For further details, see the Help On Line: Main Port and Aux Port parameter descriptions.

- MASTER -

The **Master** reader can be configured from the Host or a portable PC according to the signals given in the Reference Manual. See also the Compatibility Table.

1. Set *Phase Mode* value for the ***Operating Mode*** parameter in the **OPERATING MODES** folder.

2. Select the **OPERATING MODES** folder and set the ***Device Assignment*** to **Master RS232** (**Type A** or **Type M**).

3. From the **OPERATING MODES** folder, set the ***Nr. of Slaves*** (***Type A*** or ***Type M***) to the correct value for your layout **1-9**.

4. Configure the **AUX PORT** serial port in the same way as the **Slave** devices, regarding ***Baud Rate, Data Bits, Stop Bits*** and ***Parity***.

5. Configure the **MAIN PORT** serial port in the same way as the Host, regarding ***Baud Rate, Data Bits, Stop Bits*** and ***Parity***. (These settings can be different from the slave network.)

6. 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* 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.

7. 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*** = *External Trigger Leading Edge*) 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).

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

> **NOTE**
> The value defined for the ***Number of Codes*** parameter must correspond to the total number of codes read by all readers of the Master/Slave network.

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

SEND THE CONFIGURATION TO THE READER (PERMANENT MEMORY)

Compatibility:

The RS232 Master/Slave configuration allows the following types of readers to be connected together in the network according to the compatibility table below:

Master RS232 (Type A)	>	**Matrix 200/210, Matrix 400/410, Matrix-2000, DS2100A, DS2100N, DS2400A, DS2400N, DS4600A, DS6300, DS6400, DX6400**
Slave RS232 (Type A)	>	**Matrix 200/210, Matrix 400/410, Matrix-2000, DS2100A, DS2100N, DS2400A, DS2400N, DS4600A, DS6300, DS6400, DX6400**
Master RS232 (Type M)	>	**Matrix 200/210, Matrix 400/410, Matrix-2000**
Slave RS232 (Type M)	>	**Matrix 200/210, Matrix 400/410, Matrix-2000**

Multiplexer Layout

The **default** configuration loaded by the connection to VisiSet™ and your reader can be easily modified for Multiplexer layouts.

1. Select the **MAIN PORT** folder and set the ***Serial Interface Type*** to **RS485**.

2. Select the **MAIN PORT** folder and set the ***Communication Protocol*** to **MUX32**.

3. From the **MAIN PORT** folder, set the correct ***Baud Rate*** according to the Multidrop Network. The MUX32 protocol automatically sets the following parameters: ***Data bits*** =*8*, ***Stop Bit*** = *1*, ***No Parity***.

4. From the **MAIN PORT** folder, set the ***Multidrop Address*** according to the desired value **0-31**. Each reader must have a different Address on the Multidrop Network.

5. The ***Device Assignment*** parameter in the **OPERATING MODES** folder must be set to *Alone* (Default).

6. 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* 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.

7. 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*** = *External Trigger Leading Edge*) 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).

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

NOTE

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

SEND THE CONFIGURATION TO THE READER (PERMANENT MEMORY)

Ethernet Socket Layout

The **default** configuration loaded by the connection to VisiSet™ and your reader is ready to perform Ethernet Socket Reading.

1. Select the **ETHERNET** folder and configure the selectable parameters under **Ethernet System Group** to meet your requirements: ***Status*** (must be set to *Enabled*), ***DHCP Client***, ***IP Address***, ***Subnet Mask***, ...

2. Select the **ETHERNET** folder and configure the selectable parameters under **Data Socket Group** to meet requirements for your remote Terminal/Host: ***Status*** (must be set to *Enabled*), ***Protocol***, ***Port***, ***Type***, ...

Example:

If setting the reader to:
Ethernet System Group parameters: ***Status*** = *Enabled*, ***Protocol*** = *TCP*, ***Port*** = *51236*, ***Type*** = *Server*

It is possible to receive decoded data on a remote terminal/host through the TCP/IP socket. The port used for the Ethernet communication is 51236, while the IP Address corresponds to the one set in step 1 (***Ethernet System Group***, ***IP Address***).

3. 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***, ***Reading Phase ON*** or ***Reading Phase OFF*** (*External Trigger Leading Edge*, *External Trigger Trailing Edge*, *Main Port String*, *Aux. Port String*, ...).

If you use any digital input or output, select the **DIGITAL I/O** folder and configure the selectable parameters under ***External Trigger Group***, ***Input 2 Group***, ***Output 1***,...

4. 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* 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.

5. 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*** = *External Trigger Leading Edge*) 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).

6. 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.

SEND THE CONFIGURATION TO THE READER (PERMANENT MEMORY)

CBX Gateway Fieldbus Layout

The **default** configuration loaded by the connection to VisiSet™ and your reader can be easily modified for a CBX Gateway Fieldbus Layout.

1. Select the **CBX GATEWAY** folder and configure the correct ***Host Interface Type*** for your application. The ***Data Tx*** parameter is enabled by default in order to communicate with the Fieldbus Master.

2. From the **CBX GATEWAY** folder configure the selectable parameters under **Fieldbus**, and the relative fieldbus group (**Profibus**, **DeviceNet**, **CC-Link**, etc.) according to your application:
Master Input Area Size data size in bytes to send to the Fieldbus Master
Master Output Area Size data size in bytes to receive from the Fieldbus Master
Node Address the Slave node Fieldbus address
Data Flow Control or **Data Consistency** if your application requires it.

Example:

If setting the reader to:
CBX GATEWAY parameters: ***Host Interface Type*** = *Profibus*, ***Master Input Area Size*** = 32, ***Master Output Area Size*** = 8, ***Data Flow Control*** = *DAD*, ***Data Consistency*** = *disabled*

It is possible to send up to 29 data bytes to the Profibus Master, (the first 3 bytes are reserved for the DAD driver), and to receive up to 5 data bytes from the Master. Data Consistency control is not required in this example.

3. From the **CBX GATEWAY** folder enable selectable parameters under the **Digital I/O Conditioning** group according to your application:
Input echoing to Fieldbus Master
Output controlled by Fieldbus Master. (**DIGITAL I/O Output *Line Function***= *External Fieldbus*)

4. 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***, ***Reading Phase ON*** or ***Reading Phase OFF*** (*External Trigger Leading Edge*, *External Trigger Trailing Edge*, *Main Port String*, *Aux. Port String*, ...).

If you use any digital input or output, select the **DIGITAL I/O** folder and configure the selectable parameters under ***External Trigger Group***, ***Input 2 Group***, ***Output 1***,...

5. 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* 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.

6. 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*** = *External Trigger Leading Edge*) 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).

7. 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.

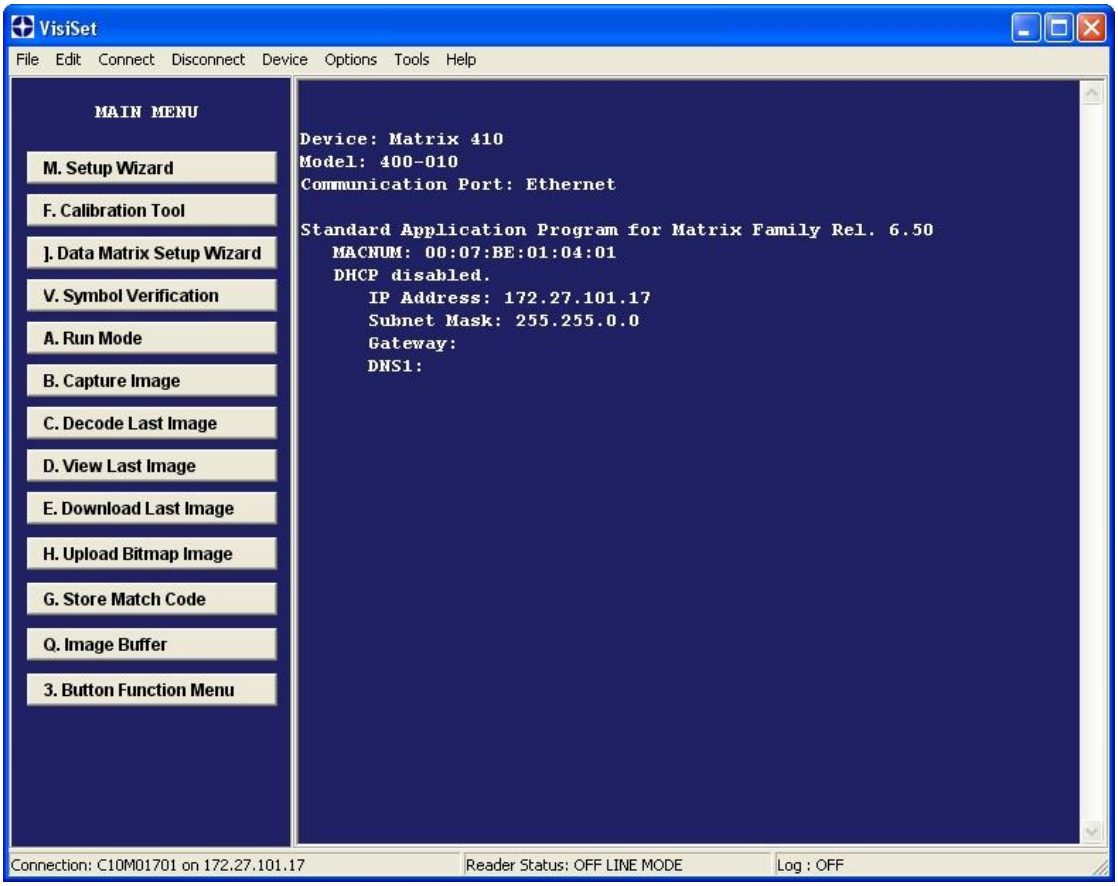
SEND THE CONFIGURATION TO THE READER (PERMANENT MEMORY)

Matrix Standard Application Program

A Standard Application Program is factory-loaded onto Matrix 410™. 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 410™ 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, if ***Local Echo on Aux Port*** is enabled, 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 410™ 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. This selection is available only after Capturing and Decoding an Image.

The **Image Buffer** command opens the Image Buffer Menu which allows managing multiple images in the Matrix 410™ 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 *(Focus)*, Function 3 *(Setup)* and Function 4 *(Learn)* LEDs of the X-PRESS™ multifunction key.

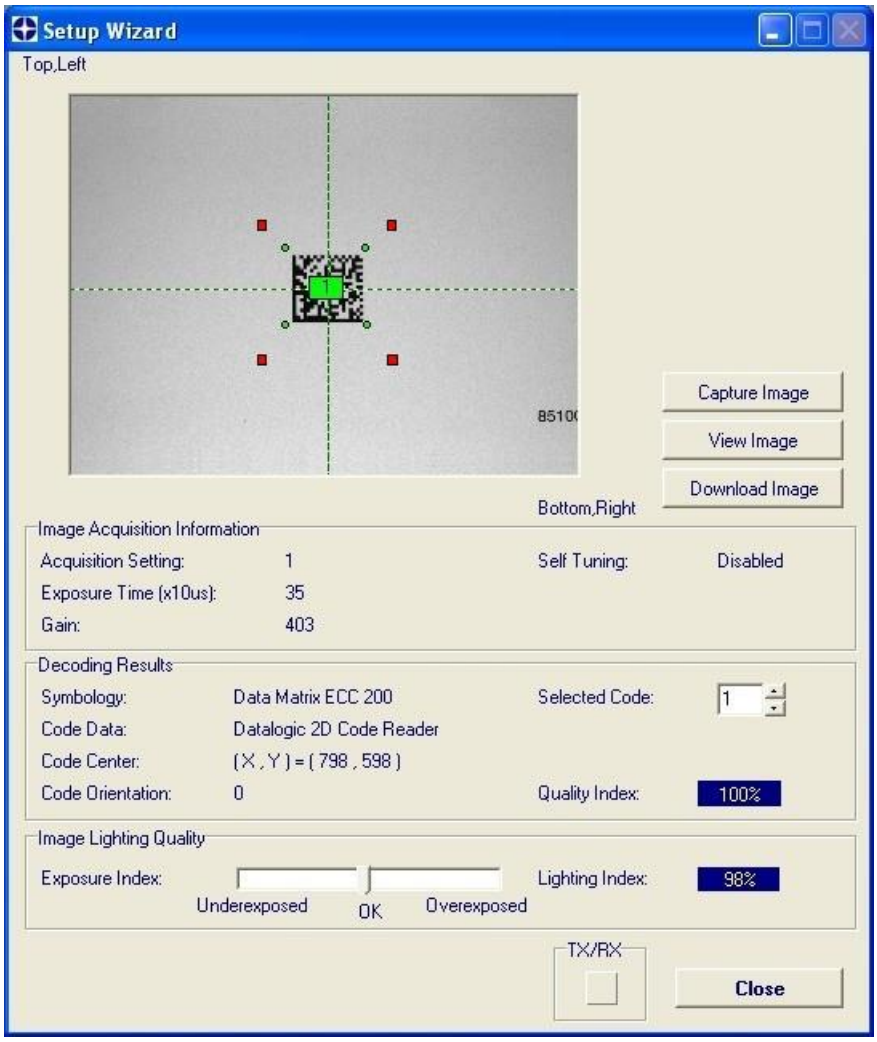
The status bar provides further information about the communication parameters of the current connection (reader/PC) on the left side, while on the right side it is possible to know if the Log option is on or off. Information about the reader status is available in the central part of the bar.

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

Setup Wizard Window

The Setup Wizard window appears (together 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.

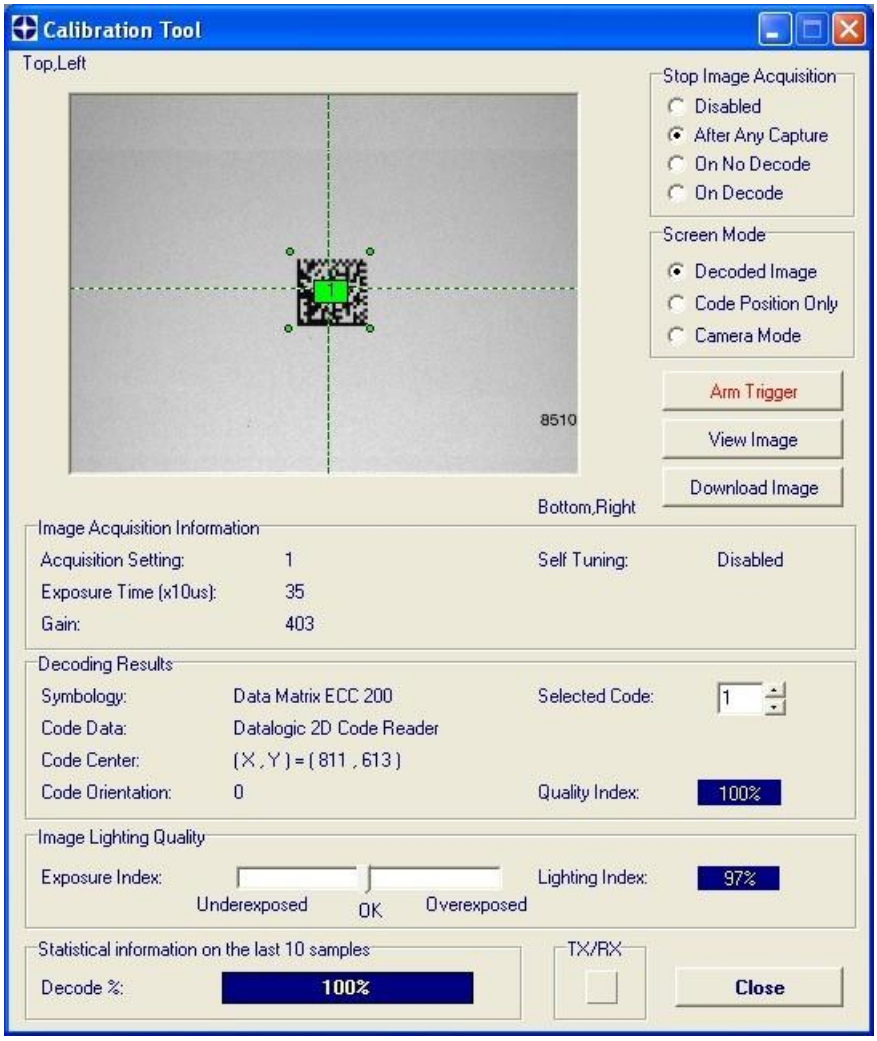
The **Image Lighting Quality** area displays the results of the Exposure Index and the Lighting Index. The **Lighting Index** reports a percentage (value ranging from 0 to 100) with 0 being an extremely low exposure, which would generally cause impaired decoding, and 100 being an excellent exposure.
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.

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.
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.

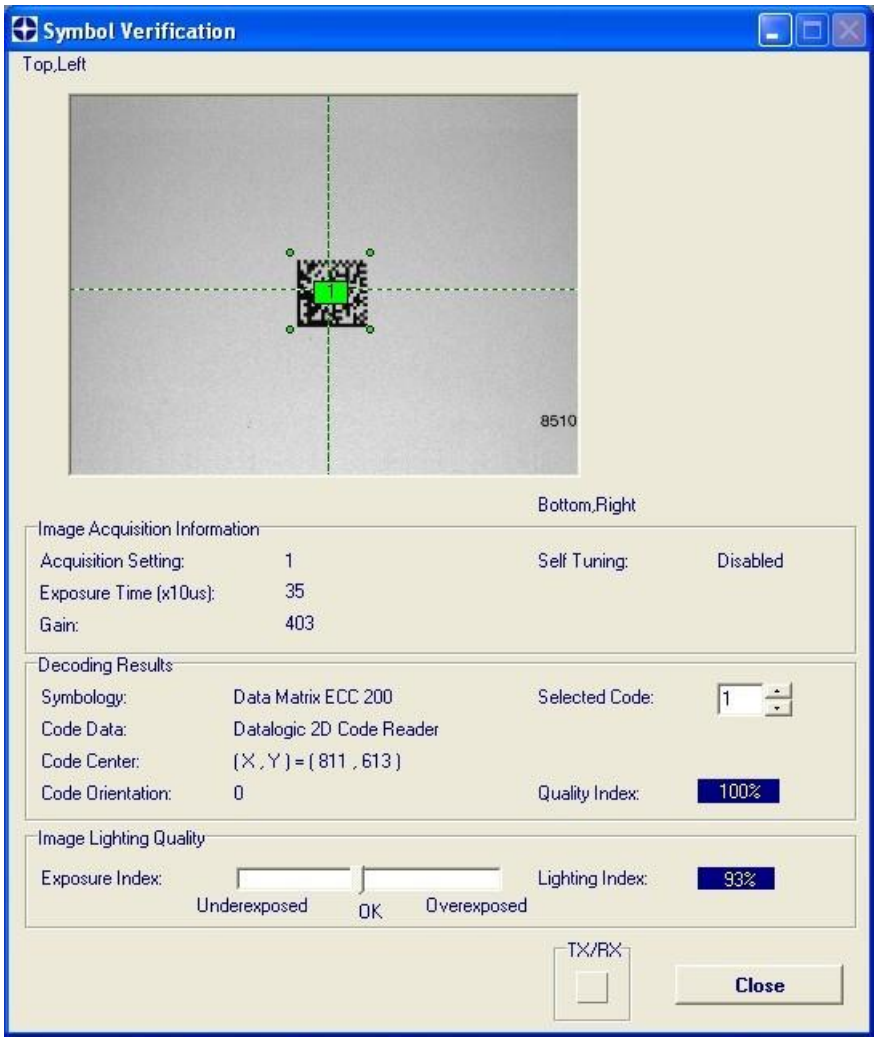
The **Statistical information on the last *n* samples** area reports the decoding percentage calculated on the last elaborated images.
The decoding percentage is increased by each image containing at least one decodable code.

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.

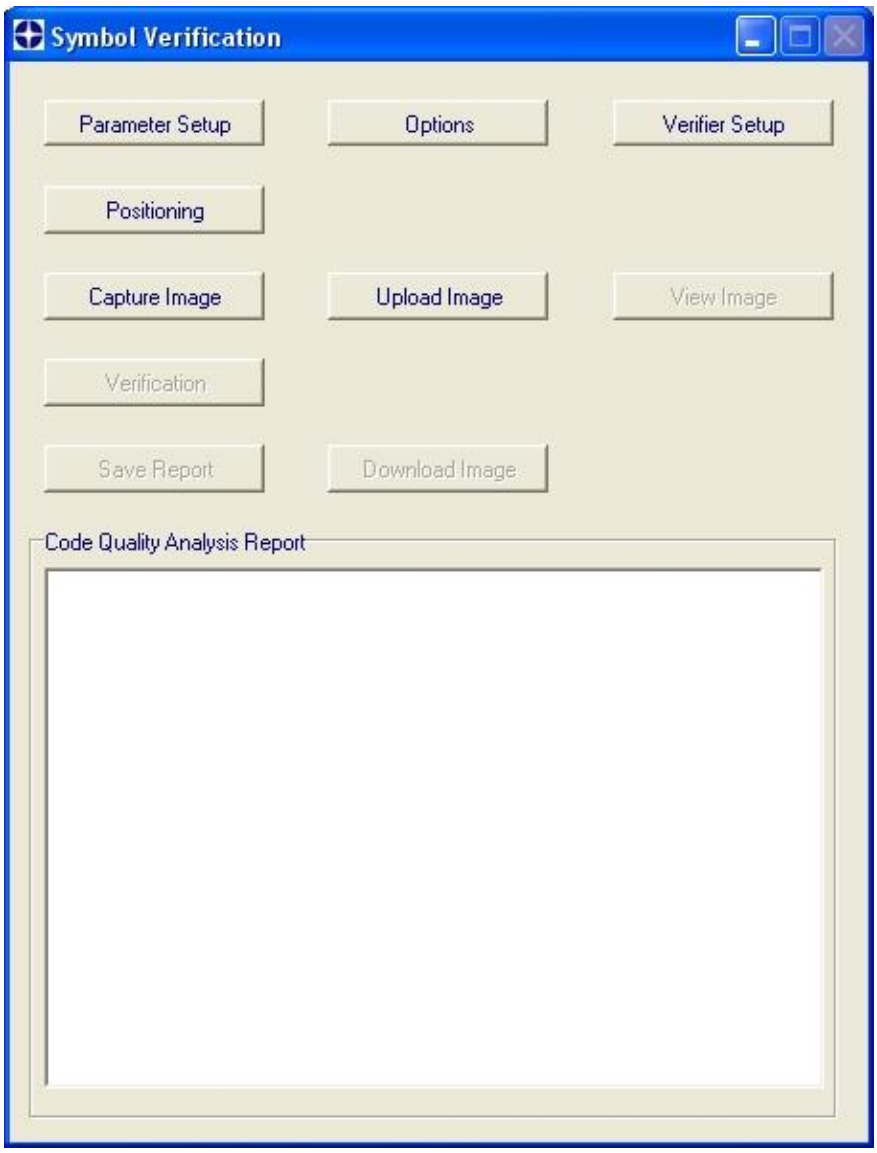
This area also displays the **Quality Index**, results. This index indicates the relative quality of the symbol image in a range from 0 to 100. Higher values indicate better symbols. Normally a symbol's quality should be assessed only as an average over many presentations of the symbol. Alternatively, 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.
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.

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.

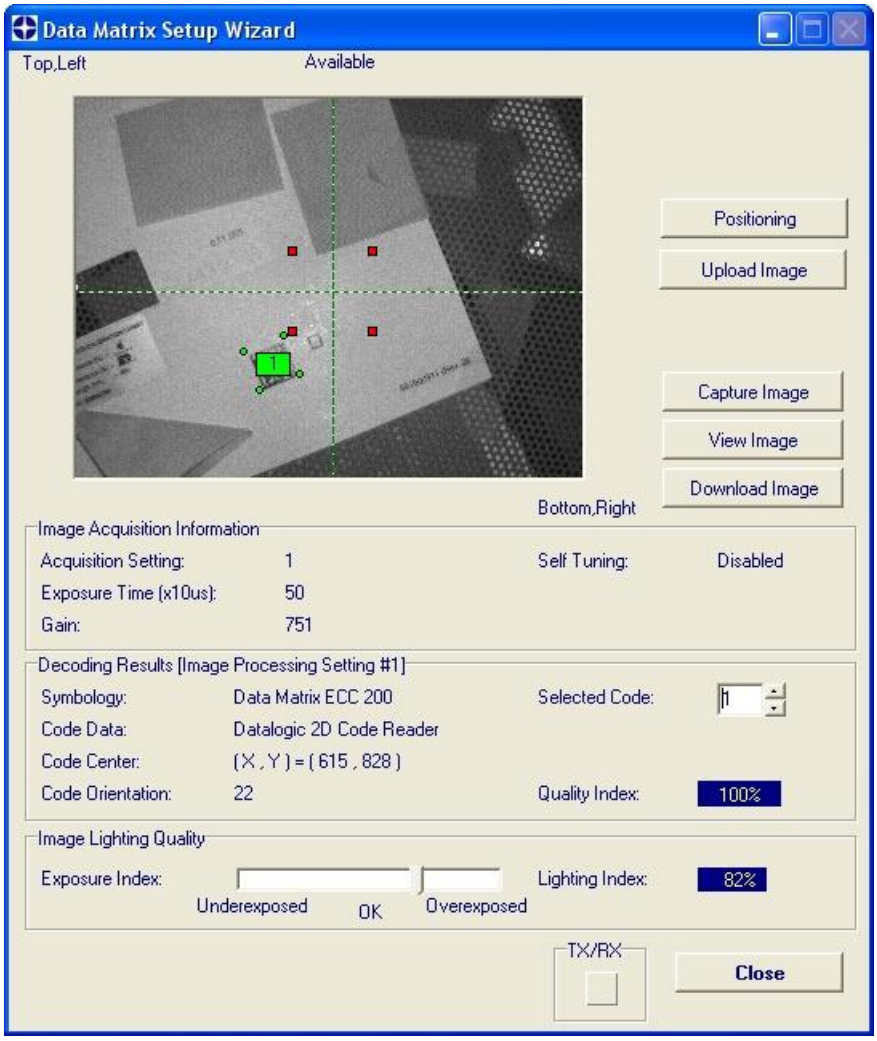
The **Save Report** button allows saving the Code Quality Analysis Report as a file to the path and in the format selected in the Symbol Verification Options window.

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 ***J***): 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 410™ 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 a single 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 410™ 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 410™ 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.

Run Mode Through Ethernet Image Socket or CBX Ethernet Image Socket

When in Run Mode, Matrix 410™ can be configured to download all images collected to a defined path and in a defined format.

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

The **CBX Ethernet Image Socket** parameters: **Image SubSampling**, **Image Format** and **JPG Quality** effect the collected images.

The Status parameter defines which images to download. If this parameter is disabled, no images will be downloaded.

See also Remote Monitoring.

Run Mode Through Ethernet Image FTP Client or CBX Ethernet Image FTP Client

When in Run Mode, Matrix 410™ can be configured to download all images collected to a defined path and in a defined format.

The **Ethernet Image FTP Client** parameters: **Image SubSampling**, **Image Format** and **JPG Quality** effect the collected images.

The **CBX Ethernet Image FTP Client** parameters: **Image SubSampling**, **Image Format** and **JPG Quality** effect the collected images.

The Status parameter defines which images to download. If this parameter is disabled, no images will be downloaded.

See also Remote Image Transfer.

Run Mode Through Dedicated Transfer Image FTP Client

When in Run Mode, Matrix 410™ can be configured to download all images collected to Datalogic WebSentinel™ (or other FTP server) for analysis. They are sent to a defined path and in a defined format always through the dedicated Transfer Image FTP Client.

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

The Status parameter enables image saving. If this parameter is disabled, no images will be downloaded. The Saving Event parameter defines which images to download.

Upload Image to Reader

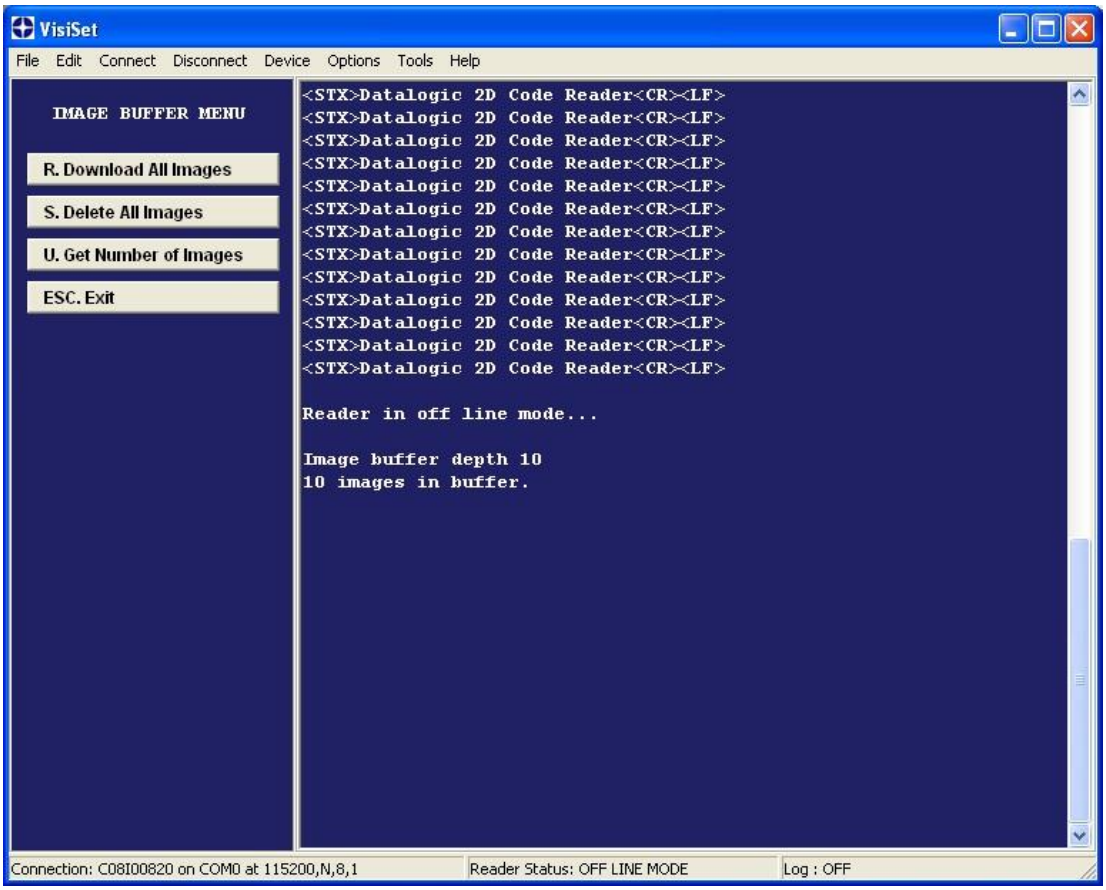
Through the VisiSet™ Main Menu (Offline Mode), the Upload Bitmap Image button allows sending a bitmap image from a file (.BMP) to the Matrix 410™ reader. The image is saved in a memory area where it can be Decoded, Viewed, and Downloaded to a file through the relative Main Menu command buttons.

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 410™ 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 410™ 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 410™ selected 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 selected interface(s): on the Main Port when **MAIN PORT *Data TX*** is *Enabled*, and on the **AUXILIARY PORT** when ***Communication Mode*** is set to *Local Echo*. For Ethernet models, information is transmitted on the Ethernet interface when **ETHERNET SYSTEM** and **DATA SOCKET *Status*** parameters are *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 410
- Symbology = Data Matrix ECC 200

OUTPUT MESSAGE:

<STX>DATALOGIC$$$MATRIX 410<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 410
- Symbology = Data Matrix ECC 200

OUTPUT MESSAGE:

<STX>WRONGMATRIX 410<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 410
- Symbology = Data Matrix ECC 200

OUTPUT MESSAGE:

<STX>MATRIX 410<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 410
- 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 for the given sensor 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.
- *PackTrack*. PackTrack™ is a patented operating mode for Datalogic Omni-Directional Reading Stations used to read and correctly assign codes read on different packs when placed in the Reading Area at the same time.

Energy Saving

This parameter is valid when the Internal Lighting Mode is *Continuous High Power* and the Operating Mode is *PackTrack* or *Phase Mode*.

For *Phase Mode*, when disabled, (default), the Internal Lighting System will remain on at all times - independent of the Reading Phase. In this case the blinking effect due to rapidly occurring reading phases is eliminated.
When enabled, the Internal Lighting System will remain on (in *Continuous High-Power Mode*) only during the active reading phase. Under this condition the advantages are less power consumption and heat reduction.

For *PackTrack Mode*, when disabled, (default), the Internal Lighting System will remain on at all times (in *Continuous High-Power Mode*) - independent of whether there are packs in the Tracking Area or not.
When enabled, the Internal Lighting System will remain on (in *Continuous High-Power Mode*) only when packs are present in the Tracking Area. Under this condition the advantages are less power consumption and heat reduction.

Acquisition Trigger

Sets the trigger event(s) that cause Matrix 410™ 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:

- *External Trigger Leading/Trailing Edge*. Once the external event has occurred, the image capture is delayed depending on the selected values for ***Debounce Filter*** and ***Delay Time*** (if at least one **ACQUISITION TRIGGER DELAY** is enabled).
- *(Serial) Port String* on either Main or Aux port. 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).
- *Ethernet String* on either the Matrix 410 x00-010 on-board Ethernet Data Socket or the CBX Gateway-BM2x0 Ethernet Data Socket. Once the string is received, the image capture is delayed according to the ***Delay Time*** value (if at least one **ACQUISITION TRIGGER DELAY** is enabled).
- *Ethernet IP Input Leading/Trailing Edge* on either the Matrix 410 x00-010 on-board Ethernet IP service or the CBX Gateway-BM2x0 Ethernet IP service. Once the external event has occurred, the image capture is delayed depending on the selected values for ***Delay Time*** (if at least one **ACQUISITION TRIGGER DELAY** is enabled). This external event occurs when the Ethernet IP Master sets (*Leading Edge*) / resets (*Trailing Edge*) **bit 6** in Byte 0 (LSB) of the Output Area.
- *Fieldbus String* on the External Fieldbus. Once the string is received, the image capture is delayed according to the ***Delay Time*** value (if at least one **ACQUISITION TRIGGER DELAY** is enabled).
- *Fieldbus Input Leading/Trailing Edge*. Once the external event has occurred, the image capture is delayed depending on the selected values for ***Delay Time*** (if at least one **ACQUISITION TRIGGER DELAY** is enabled). This external event occurs when the Fieldbus Master sets (*Leading Edge*) / resets (*Trailing Edge*) **bit 6** in Byte 0 (LSB) of the Output Area.

- *ID-NET String.* on the ID-NET™ Master, or Multidata-only Slave. Once the string is received, the image capture is delayed according to 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.
- *Input 2 Leading/Trailing Edge*. Once the external event has occurred, the image capture is delayed depending on the ***Debounce Filter*** value.
- *(Serial) Port String* on either Main or Aux port.
- *External Trigger Leading/Trailing Edge*. Once the external event has occurred, the image capture is delayed depending on the ***Debounce Filter*** value.
- *Ethernet String* on either the Matrix 410 x00-010 on-board Ethernet Data Socket or the CBX Gateway-BM2x0 Ethernet Data Socket. Once the string is received, the image capture is delayed according to the ***Delay Time*** value (if at least one **ACQUISITION TRIGGER DELAY** is enabled).
- *Ethernet IP Input Leading/Trailing Edge* on either the Matrix 410 x00-010 on-board Ethernet IP service or the CBX Gateway-BM2x0 Ethernet IP service. Once the external event has occurred, the image capture is delayed depending on the selected values for ***Delay Time*** (if at least one **ACQUISITION TRIGGER DELAY** is enabled). This external event occurs when the Ethernet IP Master sets (*Leading Edge*) / resets (*Trailing Edge*) **bit 6** in Byte 0 (LSB) of the Output Area.
- *Fieldbus String* on the External Fieldbus. Once the string is received, the image capture is delayed according to the ***Delay Time*** value (if at least one **ACQUISITION TRIGGER DELAY** is enabled).
- *Fieldbus Input Leading/Trailing Edge*. Once the external event has occurred, the image capture is delayed depending on the selected values for ***Delay Time*** (if at least one **ACQUISITION TRIGGER DELAY** is enabled).This external event occurs when the Fieldbus Master sets (*Leading Edge*) / resets (*Trailing Edge*) **bit 6** in Byte 0 (LSB) of the Output Area.
- *ID-NET String* on the ID-NET™ Master, or Multidata-only Slave. Once the string is received, the image capture is delayed according to the ***Delay Time*** value (if at least one ***ACQUISITION TRIGGER DELAY*** is enabled).

- PackTrack -
The possible options (which cannot be combined) 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.
- *Periodic* allows a continuous acquisition of images with the defined frequency. This allows reducing the acquisition rate (i.e. aligning it with the conveyor speed) to improve memory management for certain applications.

Acquisition Trigger Period (ms)

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

Acquisition Trigger Status

In Phase Mode, this parameter allows enabling/disabling the image capture during the reading phase according to the status of *Input 2.*

The possible options are:

- *Always Enabled.* Default mode, does not control the status of *Input 2.*
- *Enabled When Input 2 Open* allows acquiring images during the reading phase only when *Input 2* is open.
- *Enabled When Input 2 Closed* allows acquiring images during the reading phase only when *Input 2* is closed.

The status of *Input 2* depends on parameter Active State.

Reading Phase ON

Defines the event(s) starting the reading phase. It is possible to select multiple events so that any one of them will start 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.

- *External Trigger Leading/Trailing Edge*. Once the external event has occurred, the beginning of the reading phase is delayed depending on the ***Debounce Filter*** value.
- *Input 2 Leading/Trailing Edge*. Once the external event has occurred, the beginning of the reading phase is delayed depending on the ***Debounce Filter*** value.
- *(Serial) Port String* on either Main or Aux port.
- *Ethernet String* on either the Matrix 410 x00-010 on-board Ethernet Data Socket or the CBX Gateway-BM2x0 Ethernet Data Socket.
- *Ethernet IP Input Leading/Trailing Edge* on either the Matrix 410 x00-010 on-board Ethernet IP service or the CBX Gateway-BM2x0 Ethernet IP service. If selected, it allows the Ethernet IP Master to remotely start the reading phase by setting (*Leading Edge*) / resetting (*Trailing Edge*) **bit 7** (MSb) in Byte 0 (LSB) of the Output Area.
- *Fieldbus String* on the External Fieldbus.
- *Fieldbus Input Leading/Trailing Edge*. If selected, it allows the Fieldbus Master to remotely start the reading phase by setting (*Leading Edge*) / resetting (*Trailing Edge*) **bit 7** (MSb) in Byte 0 (LSB) of the Output Area.
- *ID-NET String* on the ID-NET™ Master, or Multidata-only Slave.

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.

- *External Trigger Leading/Trailing Edge*. Once the external event has occurred, the end of the reading phase is delayed depending on the ***Debounce Filter*** value.
- *Input 2 Leading/Trailing Edge*. Once the external event has occurred, the end of the reading phase is delayed depending on the ***Debounce Filter*** value.
- *(Serial) Port String* on either Main or Aux port.
- *Timeout*
- *Complete Read*. Once the Code Collection is completed, the end of the reading phase is automatically generated.
- *Ethernet String* on either the Matrix 410 x00-010 on-board Ethernet Data Socket or the CBX Gateway-BM2x0 Ethernet Data Socket.
- *Ethernet IP Input Leading/Trailing Edge* on either the Matrix 410 x00-010 on-board Ethernet IP service or the CBX Gateway-BM2x0 Ethernet IP service. If selected, it allows the Ethernet IP Master to remotely stop the reading phase by setting (*Leading Edge*) / resetting (*Trailing Edge*) **bit 7** (MSb) in Byte 0 (LSB) of the Output Area.
- *Fieldbus String* on the External Fieldbus.
- *Fieldbus Input Leading/Trailing Edge*. If selected, it allows the Fieldbus Master to remotely stop the reading phase by setting (*Leading Edge*) / resetting (*Trailing Edge*) **bit 7** (MSb) in Byte 0 (LSB) of the Output Area.
- *ID-NET String* on the ID-NET™ Master, or Multidata-only Slave.

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.

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.

PackTrack Setting

The **PACKTRACK SETTING** parameters allow managing the PackTrack Operating Mode. This Operating Mode is valid for stand-alone readers or Master/Slave SYNCHRONIZED multi-reader applications. For Master/Slave configurations, these parameters must be set for each individual reader, and must be identical, except for Lighting Delay (if necessary). For further information see the application note: PackTrack Calibration Procedure for Matrix.

Lighting Delay (x100µs)

This parameter allows de-synchronizing image illumination so that (if necessary) the illuminators of different readers in a Master/Slave configuration don't blind one another by illuminating at the same time. All the reader's can be set so that crossing illuminator lobes never acquire simultaneously. When a reader is not supposed to acquire, its electronic shutter is closed and it is completely "blind". In this way even if illumination of one reader crosses another reader's field of view, it does not disturb the acquisition.

The Master normally has its ***Lighting Delay*** value set to *0*. Individual slaves, usually only those who have crossing illuminator lobes, can be delayed by up to 10,000 ms in 100 µs increments.

Physical Encoder

It enables the encoder which is physically connected to the input selected in the ***Encoder Reference Signal*** parameter. For correct functioning, define the ***Encoder Step*** parameter (hundredths of a millimeter). The maximum allowable Encoder frequency is 2.2 kHz.

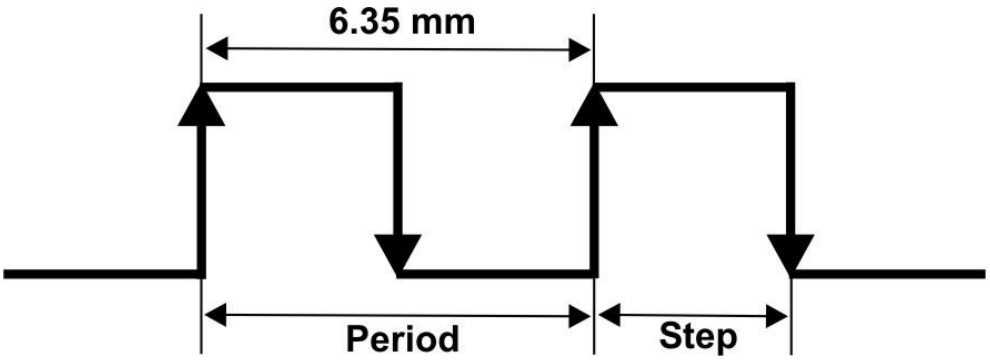
If disabled, the conveyor speed is supposed to be constant. Thus, it is only required to define the ***Conveyor Speed*** parameter.

Encoder Step (hundredths of mm)

It defines the distance (in hundredths of a millimeter) of a single step of the encoder.
Depending on the ***Encoder Reference Signal***, the Encoder Step signal refers either to the encoder single period (if only Leading **or** Trailing Edge is enabled), or to half the encoder period (if Leading **and** Trailing Edges are both enabled, each front is used). In this case the Single period value must be divided by two (see example).

Example

Encoder circumference = 305 mm
Periods per Revolution (PPR) = 48
Single period is 305/48 = 6.35 mm



- If *Encoder Reference Signal* = Leading **or** Trailing edge (single); *Encoder Step* is 6.35 mm (**635**)
- If *Encoder Reference Signal* = Leading **and** Trailing edges (both); *Encoder Step* is 6.35 /2 = 3.175 mm (**318**)

Encoder Reference Signal

Selects which Input and which edge(s) are used for the encoder signal. Typically Input 2 is used as the encoder input. If only one edge is used as the reference signal the Encoder Step parameter refers to the pulse period. If instead both edges are selected, then the Encoder Step parameter refers to half the pulse period. See *Encoder Step*.

NOTE

Both inputs (External Trigger and Input 2), are exclusive (only one or the other). It is not possible to select External Trigger input, if already used for the PS Line.

Max. Conveyor Speed (mm/sec)

This parameter indicates the maximum conveyor speed of the application. The possible values are from 500 to 4000 mm/s. The default setting is 2500.

It compares its value with the *Encoder Step* value and automatically **forces** the relative encoder input *Debouncing Filter* parameter to the maximum allowable value. See ***Debouncing Filter***.

NOTE

PackTrack™ supports conveyor speeds between 400 mm/s and 2500 mm/s including start/stop applications. For values outside this range, consult your Datalogic Technical Service Representative.

Conveyor Speed (mm/sec)

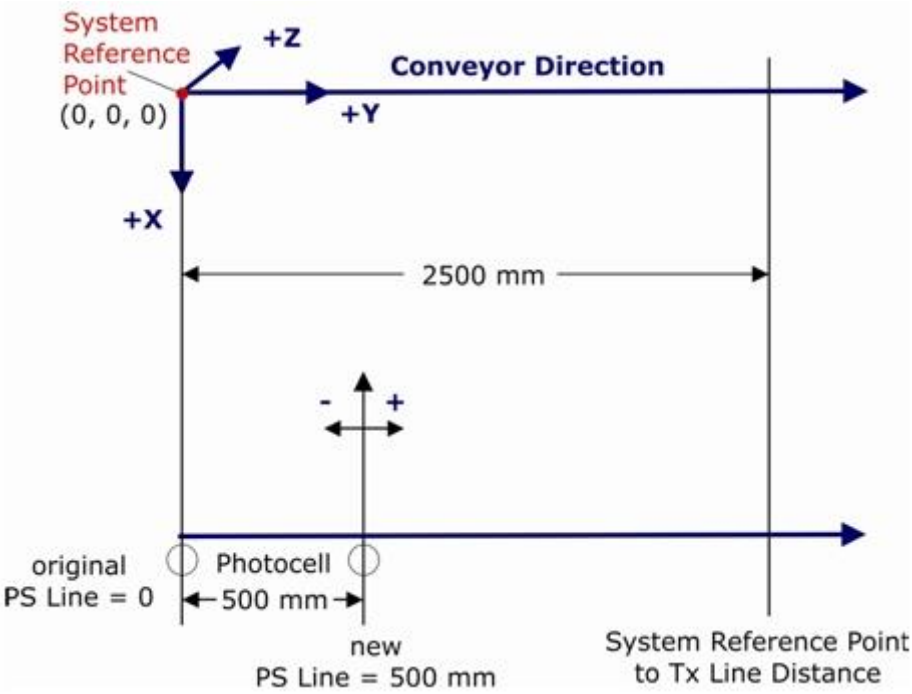
This parameter is available only when the Physical Encoder is disabled. It defines the constant speed of the conveyor in mm/sec.

PS Line

This parameter defines where the read signal Y coordinate (mm) is, in reference to the origin of coordinates used for PackTrack™ configuration (System Reference Point).

Normally the PS Line coincides with the PackTrack™ System Reference Point where X, Y, Z = 0.

If the presence sensor (external trigger) is moved, you must set the PS Line accordingly (see the figure below). This however has no effect on the PackTrack™ System Reference Point to Tx Line Distance.



PS Line Direction

When the ***PS Line*** value is different from 0, this parameter defines whether the PS Line coordinate is before (negative) or after (positive) the System Reference Point with respect to the conveyor direction. When the presence sensor is aligned to the System Reference Point (=0) the ***PS Line Direction*** is indifferent.

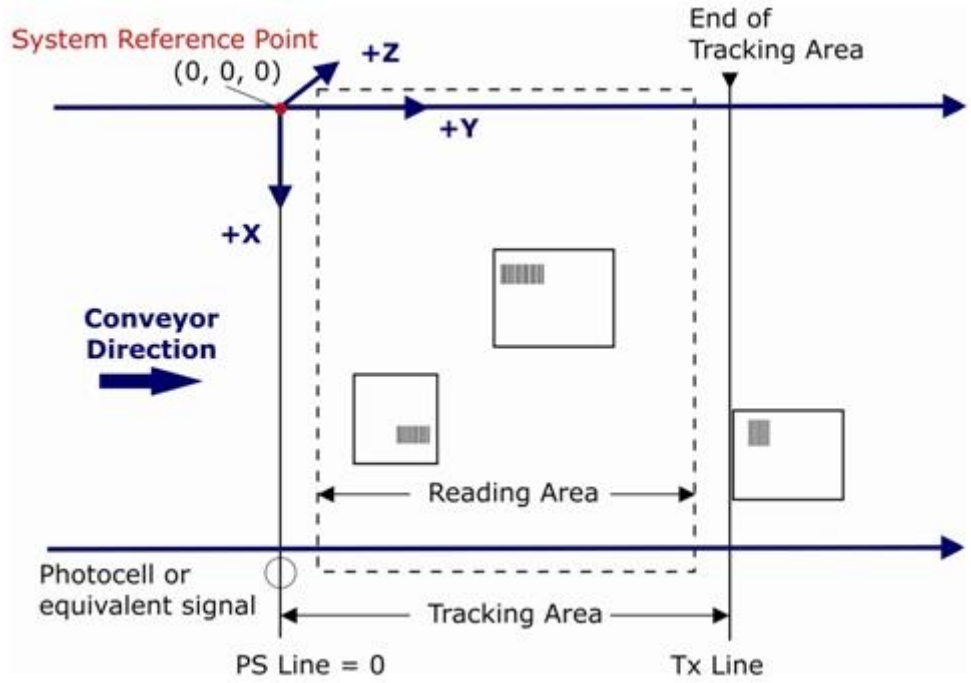
Presence Sensor Input

It defines the input to be used for the presence sensor. You can manage the level of the input signal from the **Digital I/O *Active State*** parameter.

> **NOTE**
>
> Both inputs (External Trigger and Input 2), are exclusive (only one or the other). It is not possible to select Input 2, if already used for the Physical Encoder.

Tx Line Distance

It defines the distance (mm) between the System Reference Point (X, Y, Z = 0) and TX line, which determines the tracking area.



Transmission Edge

This parameter is used by the reader as reference for data transmission.
A pack exits the Tracking Area and its message is transmitted either when its *Leading* edge reaches the Tx Line, or its *Trailing* edge leaves the Tx Line.

Selections: *Trailing*. The message is transmitted when the end of the pack leaves the Tx Line.

Leading. The message is transmitted when the beginning of the pack reaches the Tx Line.

Max. Number of Packs

It defines the maximum number (>2) of packs that can be managed within the reading area.

Minimum Distance Between Packs

It defines the minimum distance (mm) between consecutive packs. The possible values are from 0 to 3000 mm.
The default setting is 0 which means ignore any minimum distance error (all data is transmitted).

It is advised to use the value indicated in the PackTrack Setup Result during the PackTrack Setup Wizard calibration procedure. This value can be retrieved by running the PackTrack Setup Wizard and clicking the Get Calibration Info button.

In general, the smaller the distance between Far Plane (minimum height pack) and Near Plane (maximum height pack) which is application DOF, the closer the packs can be placed together.

Minimum Distance Error Behaviour

It defines the reader behaviour in case of a Minimum Distance Between Packs error:

Selections: *Compose*. Composes the read packs and transmits all data in a single message.

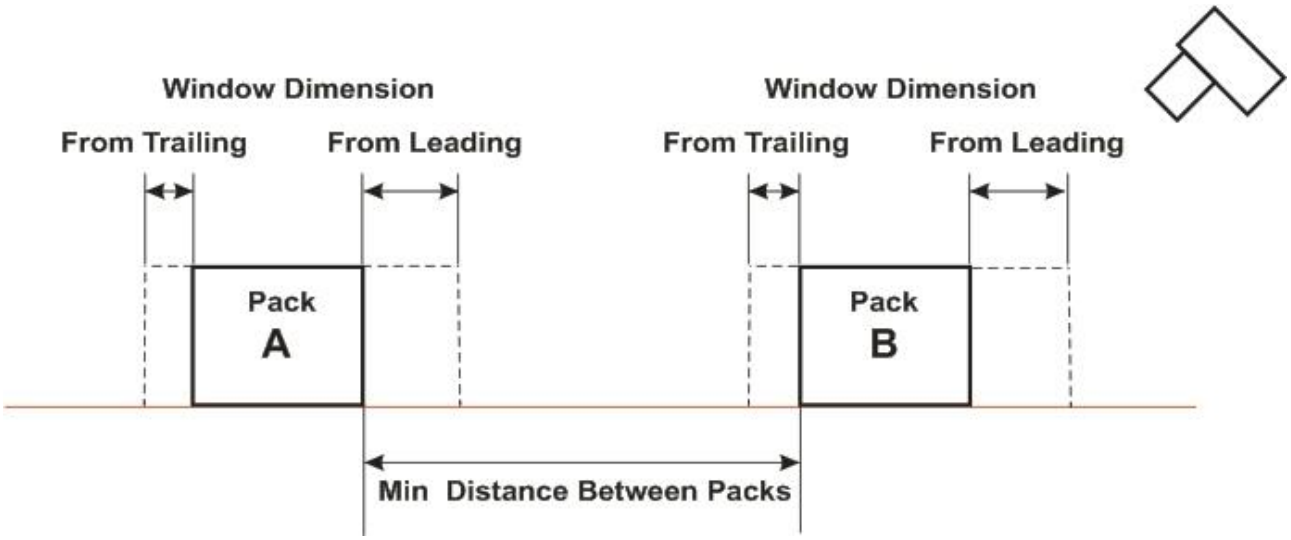
Discard Last. Discards the last received pack.

Minimum Pack Length

It defines the minimum length of a pack (mm). The possible values are from 0 to 5000 mm.
The default setting is 0 which means ignore any minimum pack length error (all data is transmitted).

Window

The measurement of a barcode position in absolute coordinates performed by the readers may be affected by a small error. PackTrack™ evaluation can fail in assigning the barcode for this reason. With the Window parameter, the Y coordinates that delimit the pack can be virtually extended to improve the assigning success rate (see the following figure). The ***Window*** is defined as the ***Window Dimension from Trailing*** + Pack Dimensions + ***Window Dimension from Leading***.



The sum of the Leading and Trailing Window dimensions **should be minimized** (less than the minimum distance between two consecutive packs) to correct small errors in pack assignment. The code will be assigned within the Window.

If the sum of the Leading and Trailing Window dimensions is **more** than the minimum distance between two consecutive packs, (therefore an overlapping error), a warning message appears and the window is set to the maximum value (Leading + Trailing = Minimum Distance Between Packs). The code will be assigned within the Window of the closest pack, however this can also produce assignment errors for particular applications.

Window Dimension From Leading (mm)

Specify a value between 0 and 250 mm to extend the leading edge of all packages. Normally this parameter is set equal to the trailing value so that the window extends the pack equally in both directions. In some cases, (i.e. low DOF) the extension is only necessary in one direction and therefore it can be different from the trailing edge value.

Window Dimension From Trailing (mm)

Specify a value between 0 and 250 mm to extend the trailing edge of all packages. Normally this parameter is set equal to the leading value so that the window extends the pack equally in both directions. In some cases, (i.e. low DOF) the extension is only necessary in one direction and therefore it can be different from the leading edge value.

Debug Message Tx

This parameter should not be used in normal conditions, but only when errors or problems occur during the system functioning in order to troubleshoot the PackTrack operating mode. Runtime logging will degrade the overall performance therefore after installation/commissioning it is strongly recommended to disable Debug Message Tx.

It selects the interface used to send debug information messages. The interface should be different from the output data interface or output data transmission should be disabled on the logging interface.

If disabled, no logging messages are sent.

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.

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* lighting 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.

- *Continuous High-Power*: the internal lighting system is turned on continuously at the **highest** power level. This option is useful if the LED array blinking (*Strobed* lighting mode) disturbs the operator. For other blinking considerations see the Energy Saving During Phase OFF parameter.

NOTE

For a given *Exposure Time*, the *Continuous High-Power* level provides the same lighting power (Lux) as the *Very High-Power Strobed* level.

If the *Continuous High-Power* level is used in combination with *One Shot* or *Phase Mode*, then a variable delay of up to 16.7 ms max must be considered in addition to the normal elapsing time between the trigger source and the instant of image capture.

CAUTION

To avoid damage to the devices, for **LT-010** and **LT-011** illuminators you must correctly associate the illuminator to the Matrix 410™ through the Set Lighting System Part Number from the VisiSet™ Tools menu. VisiSet™ will correctly manage the following settings for these illuminators:

- *High-Power Strobed* and *Continuous High-Power* selections are not allowed
- *Very High-Power Strobed* selection does not allow *Region Of Interest* windowing

Enabled LED Chains

This parameter is present only if a previous Set Lighting System Part Number has been performed setting the LT-005 internal lighting system. It enables the four possible quadrants of the LT-005 internal lighting system. It is possible to enable combinations of LED Chains (quadrants) that work together. To do this, from the pull down menu, hold down the CTRL key, select the desired quadrants with the mouse and press ENTER. The quadrants will be listed separated by a comma. Possible values are:

- *None*
- *Left*
- *Right*
- *Top*
- *Bottom*

Exposure Time (x *Step*)

It defines the time during which all pixels of the CCD or 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.

Output #N External Lighting Mode

When a Matrix 410™ Digital Output is used to control an External Lighting System, this parameter determines the operating mode of the external lighting system. Possible values are:

- *Disabled*: the Digital Output, and therefore the external lighting system, is off all the time;
- *Always On*: the Digital Output, and therefore the external lighting system, is on all the time;
- *Triggered*: the Digital Output, and therefore the external lighting system, is on only during the image capture (from Acquisition Trigger + any Acquisition Trigger Delay to the end of Exposure Time).

NOTE

An external lighting system has to be provided and controlled through one of the general purpose Outputs.

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.
In Matrix 410 600-0x0 models the frame rate is dependent on the number of lines (or rows) in the defined window.
In Matrix 410 400-0x0 models the smaller the window (number of rows and columns), the higher the frame rate.

NOTE

Region Of Interest (windowing) is not compatible with PackTrack Operating Mode. If these values are changed the operating mode will be forced to Phase Mode.

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 410™ main serial interface is available for:

- point-to-point connections: **RS232** or **RS485 full-duplex** (to be set via VisiSet™);
- multidrop connections: **RS485 half-duplex** (self-setting when MUX32 communication protocol is selected).

It can be used for parameter configuration through VisiSet™ and for output message on a terminal.
Refer to the Matrix 410™ Reference Manual for hardware setup of this interface.

Data TX

The possible selections are: *Disabled*, *Enabled*.

- *Disabled*: no data is transmitted on the main interface.
- *Enabled*: data is transmitted on the RS232 main interface independently from the auxiliary interface selection. For the description of this layout refer to the reader Reference Manual under "Typical Layouts".

Serial Interface Type

Allows selecting the interface type for a point-to-point connection. *RS485* full-duplex interface can be used for connections over longer distances than those acceptable for *RS232* communication or in electrically noisy environments.

Communication Protocol

Allows selecting the *MUX32*, for a multidrop connection with a Datalogic Multiplexer, *Siemens 3964* and *Siemens RK512* communication protocols. The *MUX32* selection sets automatically the *RS485* half-duplex interface. A ***Multidrop Address*** must be also selected.

Multidrop Address

Allows selecting the reader address in the multidrop network.

Baud Rate

Defines the serial communication speed.

Parity

Indicates the presence of a control bit in the character frame.

Data Bits

Indicates the number of bits composing the character.

Stop Bits

Indicates the number of stop bits in the character frame.

Handshake

Allows defining a control to protect the communication against data loss. The *XON\XOFF* handshake is available for both RS232 and RS485 point-to-point connections. On the other hand, *RTS/CTS* handshake is only available for RS232 connections.

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* is included in the ***Reading Phase ON*** 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

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

Siemens Protocol

The Siemens 3964/RK512 protocols are used to interface the Matrix 410™ with a PLC. The following physical connections are allowed:

- RS232
- RS485 full-duplex

The Siemens 3964 and RK512 automatically set the following parameters values:

- Data Bit = 8
- Stop Bit = 1

For 3964 protocol the following parameters must be set:

- Checksum
- Priority

For RK512 protocol the following parameters must be set:

- Checksum
- Priority
- Header bytes
- Fill Character
- Fill Position

Checksum

The Checksum parameter is a control byte of the communication protocol. It is the one that distinguishes the normal protocol from the R version of the Siemens protocol itself (3964 from 3963R, or RK512 from RK512R).

Priority

Priority is a parameter indicating the priority of the local node with the 3964 link.

Header Bytes

RK512 frame header is composed of 10 bytes. The values of bytes 5, 6, 9 and 10 must be defined.

Fill Character

Indicates the value of the filler byte added by RK512 protocol if an odd number of bytes has to be transmitted.

Fill Position

Indicates the position (at the beginning or at the end of the data packet) of the filler byte added by RK512 protocol if an odd number of bytes has to be transmitted.

Auxiliary Port

The Matrix 410™ auxiliary serial interface is available exclusively for RS232 point-to-point connections. It can be used for parameter configuration through VisiSet™ and for output message Local Echo on a terminal.
Refer to the Matrix 410™ Reference Manual for hardware setup of this interface.

NOTE

Any change to the auxiliary port parameters (baud rate, data bits, etc.) is effective as soon as the reader is disconnected from VisiSet™.

Communication Mode

The possible selections are: *Standard*, *Local Echo*, *Pass Through*.

- *Standard*: no data is transmitted on the auxiliary interface.
- *Local Echo*: data is transmitted on the RS232 auxiliary interface independently from the main interface selection. For the description of this layout refer to the reader Reference Manual under "Typical Layouts".
- *Pass Through*: allows passing independently collected data from the Aux port to either the Main serial port (RS232) or ID-NET network channel (MULTIDATA), depending on the network configuration. The reading phase of each reader is independent from the others in Pass Through Mode. For the description of these layouts refer to the reader Reference manual under "Typical Layouts".

Pass Through for RS232 configurations:
Two or more readers are connected to a single external serial interface. Each reader transmits the messages received by the auxiliary interface onto the main interface. All messages will be passed through this chain to the host. Applications can also be implemented to connect a device such as a hand-held reader to the Auxiliary port of the last reader in the chain for additional manual code reading capability.

When using Pass Through mode, follow these programming notes:

1. In the Reading System Layout folder, the Device Network Setting must be set to Alone or ID-NET; Topology Role = Other.
2. Enable One Shot, Continuous, or Phase Mode.
3. Program the serial ports in the same way regarding baud rate, data bits, stop bits and parity on all the devices in the pass through chain.
4. The message terminators on all the devices in Pass Through must be configured in the same way.
5. If desired, use the headers to identify each device.

Pass Through for ID-NET configurations:

For readers functioning in an ID-NET Multidata network, each reader can transmit data received by its auxiliary interface, for example from a hand-held reader, onto the ID-NET network.

When using Pass Through mode, follow these programming notes:

1. In the Reading System Layout folder, the Device Network Setting must be set to Alone or ID-NET; Topology Role = Master or Slave (Multidata).
2. Enable One Shot, Continuous, or Phase Mode.
3. The message terminators on all the devices in Pass Through must be configured in the same way.
4. If desired, use the headers to identify each device.

For both of these configurations the Master reader (or reader connected to the host) can communicate through a Fieldbus network using a Host Interface module inside a CBX connection box. The Host Interface Type parameter must be set to the desired Fieldbus type.

Search for Backup Memory at Startup

If enabled, at startup, the reader sends a message to recognize the presence of, and communicate with, the External Backup Memory (BM100 Backup Module or integrated QLM-Series accessories). If using the Backup Memory, this parameter must be enabled.

> **NOTE**
>
> Disable this parameter only if the Backup Memory is not used and the Host must not receive data at startup.

Baud Rate

Defines the serial communication speed.

Parity

Indicates the presence of a control bit in the character frame.

Data Bits

Defines the number of bits composing the character.

> **NOTE**
>
> Set this parameter to *8 bits* if the Backup Memory is used.

Stop Bits

Defines the number of stop bits in the character frame.

Handshake

Allows using the *XON\XOFF* handshake to protect the communication against data loss.

> **NOTE**
>
> Set this parameter to *None* if the Backup Memory is used.

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 *Aux Port String* is included in the ***Reading Phase ON*** 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

Acquisition Trigger String

Is available only when *Aux 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 *Aux 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

Reading System Layout

The Matrix 410™ can be used in a stand-alone, Master/Slave ID-NET™ network or in a RS232 Master/Slave configuration.

The Master/Slave layouts are used to collect data from several devices to build a multi-point or a multi-sided reading system.

Refer to the Reference Manual under "Typical Layouts" for the hardware setup.

The Device Network Setting selection and related parameters depend on the Topology Role defined for the current device. In particular:

Topology Role	Device Network Setting	Selectable Parameters
Master (SYNCHRONIZED)	Alone or ID-NET	
Slave (SYNCHRONIZED)	Alone or ID-NET	
Master (MULTIDATA)	Alone or ID-NET	
Slave (MULTIDATA)	Alone or ID-NET	
Other	Alone or ID-NET Master RS232 (Type A) Slave RS232 (Type A) Master RS232 (Type M) Slave RS232 (Type M)	 Number of Slaves (Type A) Number of Slaves (Type M)

Device Network Setting

Allows to configure the device according to the desired layout.
The Type A Master/Slave layout consists of Matrix 410™ reader(s) and other Datalogic reader models. It adopts a communication protocol allowing to transmit decoded data and the related code symbology identifier to the Master.

The Type M Master/Slave layout consists of Matrix 200™, Matrix 210™, Matrix 400™, Matrix 410™ or Matrix-2000™ readers only. The transmission relies on a more advanced protocol which passes the Master all information provided by the ***Data Packet Format*** parameter.

NOTE

The Master/Slave RS232 network setting is compatible only with Phase Mode Operating Mode.

The possible selections are:

- *Alone or ID-NET*: the reader is in a stand-alone configuration connected to a Host or utilizes an ID-NET™ network configuration.
- *Master RS232 (Type A)*: the Matrix 410™ reader is connected as a master in a master slave configuration where the slave readers are both Matrix 410™s working as slaves or other types of Datalogic readers.
- *Slave RS232 (Type A)*: the Matrix 410™ reader is connected as a slave in a master/slave configuration.
- *Master RS232 (Type M)*: the Matrix 410™ reader is connected as a master in a master slave configuration where the slave readers are only other Matrix 200™, Matrix 210™, Matrix 400™, Matrix 410™ or Matrix-2000™ readers.
- *Slave RS232 (Type M)*: the Matrix 410™ reader is connected as a slave in a master slave configuration consisting of other Matrix 200™, Matrix 210™, Matrix 400™, Matrix 410™ or Matrix-2000™ readers only.

NOTE

The RS232 Master and Slave readers connected within a network must share the same protocol type (Type A or Type M).

When the Device Network Setting is not "Alone or ID-NET", the following parameters regarding Master/Slave RS232 are available:

Number of Slaves

Allows to set the number of slaves (*1 to 9*) when the *Master RS232 (Type A or Type M)* has been selected.

Link Failure String

When *Master RS232 (Type A or Type M) or ID-NET™ Master (Synchronized)* Device Configurations are selected, the Link Failure String will be transmitted to the Host any time the connection with one or more devices within the Master/Slave network is interrupted and the ***Link Failure Timeout*** expires.

Link Failure Timeout (ms)

This timeout starts after the Reading Phase OFF event and if it expires before the data output message is sent, then the Link Failure String is sent.

Device Network Settings

This group allows to define the topology role of the local device within an ID-NET™ network.

SYNCHRONIZED: the Master SYNCHRONIZED/Slave SYNCHRONIZED configuration is the traditional ID-NET™ network configuration in which the Phase Mode or PackTrack Operating Mode is used.

MULTIDATA: The Master MULTIDATA/Slave MULTIDATA configuration is an ID-NET™ network configuration which allows the Slave devices to be configured differently and independently from the Master. In this way the Slave devices act as Stand Alone Devices which can send their data not only to their configured communication channels but also to the Master. The Master can be configured to send this data as a complete message to its configured communication channels with header, address and separators.

Topology Role

Defines the device topology role:

Other:	This selection allows Device Network Settings to support Master/Slave RS232 networks or Stand Alone applications.
Master SYNCHRONIZED:	The device is connected as an ID-NET™ Master in a master/slave synchronized configuration.
Slave SYNCHRONIZED:	The device is connected as an ID-NET™ Slave in a master/slave synchronized configuration.
Master MULTIDATA:	The device is connected as an ID-NET™ Master in a master/slave multidata configuration.
Slave MULTIDATA:	The device is connected as an ID-NET™ Slave in a master/slave multidata configuration.

NOTE

The ID-NET™ Master/Slave Synchronized topology role is compatible only with Phase Mode or PackTrack Operating Modes.

Slave Address

When setting the device topology role to Slave, it is necessary to define the ID-NET™slave address within the network (1..31).

Network Baud Rate (bps)

This parameter is available when the Alternative Device Network Settings parameter is set to Alone or ID-NET. It defines the baud rate for the ID-NET™ network.

Selections: from **19200** to **1Mb**.

Header String

When the device Topology Role is Slave (Multidata), this parameter 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

When the device Topology Role is Slave (Multidata), this parameter 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

When the device Topology Role is Master or Slave (Multidata), this parameter is available when *ID-NET String* is included in the ***Reading Phase ON*** 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

Acquisition Trigger String

When the device Topology Role is Master or Slave (Multidata), this parameter is available when *ID-NET 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

When the device Topology Role is Master or Slave (Multidata), this parameter is available when *ID-NET 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

Address TX

When the device Topology Role is Master (Multidata), this parameter allows the Slave address to be included before the Slave message together with its own Header and Separator strings.
The syntax of this message is:

<Slave Address Header>xx<Address Separator><Slave Header><Code1 [Code2....Coden]><Slave Terminator>

Address Header String

It defines the address Header string (up to 32 bytes) that will be transmitted as a block preceding the Slave Address.
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.

Address Separator String

It defines the separator string (up to 32 bytes) that will be inserted between the Slave Address and the Slave 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.

Example:
An example of a message coming from Slave 3 through the Master MULTIDATA device scanner is represented below:

<Slave Address Header>03<Address Separator><Slave Header><Code1 [Code2....Coden]><Slave Terminator>..

Link Failure String

When the device Topology Role is Master (Synchronized), the Link Failure String will be transmitted to the Host any time the connection with one or more devices within the ID-NET™ network is interrupted and the ***Link Failure Timeout*** expires.

Link Failure Timeout (ms)

This timeout starts after the Reading Phase OFF event and if it expires before the data output message is sent, then the Link Failure String is sent.

Expected Slave Device

This group is available only when the Topology Role parameter is set to Master (Synchronized) or Master (Multidata).
It allows defining the number of expected Slave devices, their label and description within ID-NET™ network.

Status

Allows to enable/disable the selected Slave device as expected within the ID-NET™ network.
The expected Slave device status is shown in the ID-NET™ Status Window.

Device Description

It defines an identification string for the selected Slave device within the ID-NET™ network.
The expected Slave device identification string is shown in the ID-NET™ Status Window.

Network Device Name

This is a read-only parameter. It uniquely identifies the Slave device within the ID-NET™ network and it overwrites the Device Description parameter when no value is assigned to it.
The expected Slave device identification string is shown in the ID-NET™ Status Window.

WebSentinel

The Datalogic WebSentinel™ supervisor software monitors the behaviour of multiple reader arrays in a plant. It collects data from the arrays through an Ethernet TCP/IP bus and computes the received information flow as visual onscreen information.

NOTE

Datalogic WebSentinel™ is compatible with Matrix 410™ only when Operating Mode is set to *One Shot* or *Phase Mode*.

Status

If enabled, it selects the Ethernet WebSentinel Agent. Once the Agent is enabled, it is possible to enable the WebSentinel Socket as the channel to be used by the reader for communication with the Datalogic WebSentinel™ plant array monitor.

- For Matrix 410 x00-010 models (On-Board Ethernet) the WebSentinel Socket is managed exclusively through the ETHERNET folder.
- For Matrix 410 x00-000 models (non-Ethernet, connected by means of a CBX500 and a BM2x0 Ethernet TCP/IP module) the WebSentinel Socket is managed through the CBX GATEWAY folder when the Host Interface Type is Ethernet TCP/IP.

Partial Read Is Treated As

This parameter is only available when the ***Number Of Codes*** parameter is > *1*. It defines how partial read conditions on the reader will be interpreted by WebSentinel. If set to *Good Read*, a partial read condition will be considered as a Good Read. If set to *No Read*, a partial read condition will be considered as a No Read.

Send Extended Parcel

Datalogic WebSentinel™ (sw 4.0.0 and later), allows navigation through the saved images sent to it by the Matrix 410™ through the TRANSFER ARRAY IMAGE feature. To do this each image must be associated with its reading phase. This parameter enables the transmission of such information to Datalogic WebSentinel™.

NOTE

If using an earlier version of Datalogic WebSentinel™ that does not support the Transfer Array Image feature, this parameter must be disabled.

Transfer Array Image

NOTE

The Transfer Array Image feature is only managed by Matrix 410™ On-Board Ethernet Models.

On Matrix arrays, images related to specific reading phases can be saved and transferred for further analysis from the Matrix array through its dedicated Transfer Image FTP Client to a PC which supplies an FTP server.

The typical application is to transfer these images to the Datalogic WebSentinel™. The Datalogic WebSentinel™ supervisor software monitors the behaviour of multiple reader arrays in a plant. It collects data from the arrays through an Ethernet TCP/IP bus and computes the received information flow as visual onscreen information.

NOTE

This feature is compatible with Matrix 410™ only when Operating Mode is set to *One Shot* or *Phase Mode*.

The Transfer Array Image feature toward Datalogic WebSentinel™ requires *enabling* the Send Extended Parcel parameter.

NOTE

The Transfer Array Image feature is time-consuming and can have a negative impact on reading performance if the following is not taken into consideration:

- Using the *On Demand* ***Method***, the Transfer Array Image command should be sent to the reader when it is not required to decode.
- Using the *Timeout* ***Method***, if there are images to transfer when the timeout expires, reading performance could be degraded. In this case the application should be evaluated to determine whether it can support such degradation.

Transfer Image Manager

Status

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

Method

Selects the Transfer Array Image method:

- *On Demand:* the images will be sent to the FTP server upon receiving a Transfer Array Image command. This selection is managed in Datalogic WebSentinel™ through the Download buttons in the Event Search tab, see the description in the Datalogic WebSentinal User's Manual. For other applications this command can be sent by a Host as described in the Note below.
- *Timeout:* cyclically, upon expiration of the **Timeout** parameter, all the images present in the Transfer Array Image buffer will be sent to the FTP server.

NOTE

All the images stored in the Transfer Array Image Buffer can be sent over the dedicated Transfer Image FTP Client if requested by the Host. To do this the Host must send the following command string over the Ethernet Data Socket channel:

<ESC> [T I <node> (hex values **1B 5B 54 49 xx**)

Where <node> (xx) = reader node address:

0 (hex 00) = download images from Master

1 to 31 (hex 01 to 1F) = download images from Slave xx

255 (hex FF) = download images from entire array

Timeout (sec)

Defines the timeout in seconds when **Method** is set to *Timeout*. The value can be set between 1 and 3600 seconds.

Saving Event

Select the saving event(s) as the criteria or filter for Transfer Array Image saving, (No Reads, Multiple Reads, Partial Reads, Good Reads).
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.

This parameter is only managed by a Matrix 410™ Stand Alone or Master Synchronized reader.

Image Stored Buffer Size

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

NOTE

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

- the number of slots configured (Image Acquisition Buffer Size); allocated memory not available to the Transfer Array Image Buffer.
- the remaining memory allocated to the application program, configuration and the number of images already allocated to the Image Buffer.
- the type of images collected (VGA or SXGA).

By decreasing the **Image Subsampling** value, a greater quantity of images can be saved to the Transfer Array 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 transmitted: 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.

Transfer Image FTP Client

Image Saving Path

Defines the sub-path/directory to which the saved image file will be transferred. The root path to this directory is assigned by the server administrator during setup.

> **NOTE**
>
> If the specified names contain spaces they must be included in quotation marks, (i.e.: "WebSentinel Array 1").

FTP Server Address

Defines the address of the FTP server to which the image will be transmitted.

User Name

Corresponds to the user name assigned by the server account to guarantee a safe communication.

Password

Corresponds to the password assigned by the server account to guarantee a safe communication.

Ethernet

Ethernet is the most popular physical layer LAN technology in use today and is available on-board for the Matrix 410 x00-010 models. It is the IEEE 802.3 series standard, based on the CSMA/CD access method that provides two or more stations to share a common cabling system. This access method, Carrier Sense Multiple Access with Collision Detection, is the basis for Ethernet systems providing a wide range of speed.
The design goals for Ethernet are to create a simply defined topology that makes efficient use of shared resources, that is easy to reconfigure and maintain and provides compatibility across many manufacturer and systems.
Ethernet supports many different network protocols; Datalogic readers support IP plus TCP or UDP over Ethernet and 802.3 frame format as Ethernet protocol low level. For details refer to "Internetworking with TCP/IP, vol. I", by Douglas E. Comer.

> **NOTE**
>
> It is not possible to set the Ethernet parameters when working in Interactive mode. They can be transmitted to the reader only when sending the whole configuration.

Ethernet System

The **ETHERNET SYSTEM** consists of a set of parameters, which manage the main system characteristics of the Ethernet communication.

> **NOTE**
>
> The IP, Subnet Mask, Gateway, and DNS1 addresses are dynamically and automatically set when using the DHCP client.

Status

Enables/disables the network interface card (NIC). If disabled, no Ethernet communication is allowed. When not using the Ethernet communication, it is advised to disable it, since it causes power consumption.

First Linkup Ignored

When enabled, this parameter ignores the first linkup message to avoid conflicts with the boot sequence of the reader.

DHCP Client

Enables/disables the Dynamic Host Configuration Protocol (DHCP) client. Consult your network administrator to verify the DHCP server availability within the network.

IP Address

It defines the Internet Protocol (IP) network address. Consult your network administrator to obtain a new address.

Subnet Mask Address

It defines the subnet mask address. Consult your network administrator to obtain a new address.

Gateway Address

It defines the gateway address. Consult your network administrator to obtain a new address.

DNS1 Address

It defines the address of the Primary Domain Name System (DNS). Consult your network administrator to obtain a new address.

Data Socket

It is a bidirectional communication channel available for Ethernet communication allowing to transmit and to receive **decoded** **data** only. For further details refer to the following bibliography:
- Internetworking with TCP/IP, vol. I (chap. 20), by Douglas E. Comer
- UNIX, network programming, by W. Richards Stevens

> **NOTE**
>
> Using the data socket to transfer decoding data may reduce the decoding rate. For this reason, it is advised to activate this communication channel only when strictly necessary.

Status

If enabled, it selects the Ethernet Data Socket as the channel to be used by the reader for transmitting and receiving data.

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 <INFO> 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

Protocol

It defines the protocol to be used for the Ethernet communication between TCP and UDP protocol.
For details refer to "Internetworking with TCP/IP, vol. I", by Douglas E. Comer.

Port

It defines the port number of the Data Socket, (default value is 51236). It must be different from the port numbers defined for the Image Socket and WebSentinel Socket.
For details refer to "Internetworking with TCP/IP, vol. I", by Douglas E. Comer.

Type

It defines the type of the socket:

- *Server*: the station waits for connections and can communicate with a maximum of 4 clients simultaneously.
- *Client*: the station tries a connection towards the server.

Client Connection Startup Time

If the Data Socket **Type** is *Client,* this parameter defines a delay (in seconds) between the client boot sequence and the first attempt to connect to the server. If the connection is not successful, further retries do not include this delay. If set to 0 there is no delay.

Server Address

This parameter is available only when the socket is configured as a Client. It defines the IP address of the server to which the client tries to connect.

Reading Phase ON String

Is available only when *Ethernet String* is included in the ***Reading Phase ON*** 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

Acquisition Trigger String

Is available only when *Ethernet 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

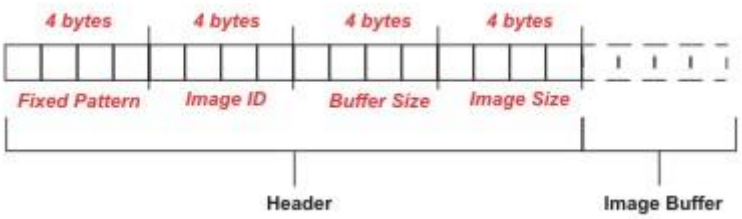
Is available only when *Ethernet String* is included in the ***Reading Phase OFF*** events. At least one valid character must be defined.
It is possible to select a sequence of characters in the range from *<1>* (*<SOH>*) to *<255>*.
Non-printable characters are written in decimal notation between the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

See also

ASCII Table

Image Socket

It is a bi-directional communication channel available for Ethernet communication allowing to transmit **images** only.
When transmitted, the image buffer is preceded by a header as shown in the following figure:



- a fixed 4-byte pattern: 0xab, 0xcd;0x12, 0x34;
- a 4-byte image identification number, which is a progressive number (in little-endian ordering);
- a 4-byte number giving the size of the image buffer (in little-endian ordering);
- a 4-byte number giving the size of the image, where the first 2 bytes indicate the image columns while the last 2 bytes indicate the image lines (in little-endian ordering).

For further details refer to the following bibliography:
- Internetworking with TCP/IP, vol. I (chap. 20), by Douglas E. Comer;
- UNIX, network programming, by W. Richards Stevens.

NOTE

Using the image socket to transfer images may reduce the decoding rate. For this reason, it is advised to activate this communication channel only when strictly necessary.

Status

If enabled, it selects the Ethernet Image Socket as the channel to be used by the reader for transmitting images:

- *Disabled*: the Ethernet Image Socket channel 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;
- *Enable On User Request*: runtime images are not transmitted. The last image saved in the Image Buffer (if enabled and present), is transmitted only when a request (Download Image command), is received from the Ethernet Data Socket.

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 transmitted: Bitmap (.bmp), Jpeg (.jpg) TIFF (.tif) or Binary (.raw) format.

JPG Quality (1-100)

Defines the compression quality of a jpeg image.

Protocol

It defines the protocol to be used for the Ethernet communication between TCP and UDP protocol.
For details refer to "Internetworking with TCP/IP, vol. I", by Douglas E. Comer.

Port

It defines the port number of the Image Socket, (default value is 51237). It must be different from the port numbers defined for the Data Socket and WebSentinel Socket.
For details refer to "Internetworking with TCP/IP, vol. I", by Douglas E. Comer.

Type

It defines the type of the socket:

- *Server*: the station waits for connections and can communicate with a maximum of 4 clients simultaneously.
- *Client*: the station tries a connection towards the server.

Server Address

This parameter is available only when the socket is configured as a Client. It defines the IP address of the server to which the client tries to connect.

WebSentinel Socket

NOTE

Datalogic WebSentinel™ is compatible with Matrix 410™ only when Operating Mode is set to *One Shot or Phase Mode.*

NOTE

This group of parameters is visible only when WebSentinel Status is *enabled*.

Status

If enabled, it selects the Ethernet WebSentinel Socket as the channel to be used by the reader for communication with the Datalogic WebSentinel™ plant array monitor.

Port

It defines the port number of the WebSentinel Socket, (default value is 51232). It must be different from the port numbers defined for the Data Socket and Image Socket.
For details refer to "Internetworking with TCP/IP, vol. I", by Douglas E. Comer.

Image FTP Client

It is a high-level protocol channel available for the Ethernet communication allowing Remote Image Transfer (transmitting **images** and saving them to a file on an FTP server).
For further details refer to the following bibliography:
- Internetworking with TCP/IP, vol. I (chap. 20), by Douglas E. Comer;
- UNIX, network programming, by W. Richards Stevens.

Status

If enabled, it selects the Ethernet FTP Client as the channel to be used by the reader for transmitting and saving images:

- *Disabled*: the Ethernet FTP Client channel 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 corresponds to 1/4 of the source);
- *1/16*:divides each image side by 4 (final image corresponds to 1/16 of the source);
- *1/64*:divides each image side by 8 (final image corresponds to 1/64 of the source);

Image Format

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

JPG Quality (1-100)

Defines the compression quality of a jpeg image.

FTP Server Address

Defines the address of the FTP server to which an image will be transmitted.

User Name

Corresponds to the user name assigned by the server account to guarantee a safe communication.

Password

Corresponds to the password assigned by the server account to guarantee a safe communication.

Image Saving Path

Defines the sub-path/directory to which the saved image file will be transferred. The root path to this directory is assigned by the server administrator.

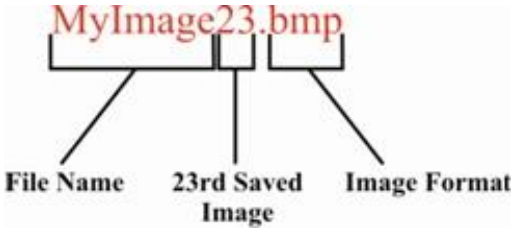
Image File Name

Defines the name to be assigned to the image file.

Max. Different Files To Save

Defines the maximum number of image files to be saved on the FTP server. During transmission, each image file will be identified by a progressive number included in a range from 0 to the defined number. The file format of each image is similar to the one given in the following example:

Image File Name:	MyImage
Max. Different Files To Save:	100
Image Format:	bmp



File Type

Defines the image file transmission mode between the FTP Client and server (binary or text format).

Ethernet/IP

(explicit messaging)
Ethernet/IP is a high-level industrial application layer protocol for industrial automation applications. Based on the standard TCP/IP protocol suite, it uses the traditional Ethernet hardware and software to define an application layer protocol for configuring, accessing and controlling industrial automation devices.

Status

This parameter enables the Ethernet/IP service and allows defining the Ethernet/IP settings.

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 <INFO> 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

Keep Read Item

It allows managing the last code read and placed in the output buffer towards the Ethernet/IP host.

Selection: **Keep Always** After the last code in the output buffer is read by the Ethernet/IP server manager (host), it remains in the output buffer.

Discard After Read After the last code in the output buffer is read by the Ethernet/IP server manager (host), it is deleted from the output buffer. In this way it will not be re-read by the same host (or any host) in case of a re-connection.

When there is more than one code in the output buffer, the Ethernet/IP protocol requires that each code read by the host be deleted and replaced by the next code in the output buffer.

Modbus TCP

This option determines the communication between the reader, or, in a multi-sided layout, between several readers and the Fieldbus network.

The Modbus Application Protocol-TCP/IP allows data transmission between the server and client. Both the reader and a Quantum family PLC (programmable logic controller) can be either server or client.

This protocol implements Function Code 16(10Hex), which allows copying the application format message into the registers of the Modicon PLC controller. The application format rules for the Modicon message are the same of the Standard protocol on the Serial Line (for example, header and terminators), but it is recommended not to use Headers and Terminators since the mechanism to bind information is already native on the Modicon protocol. Both the parameters managing respectively the PLC memory register address value and the number of registers can be modified (see Start Register and Number of Registers for details). This protocol also implements function code F03 (read holding register), and F06 (preset single register).

The following parameters allow enabling the communication through the on-board Ethernet interface to the Modbus TCP Fieldbus network.

Status

This parameter enables the Modbus TCP socket and allows setting the Modbus TCP parameters.

Type

It defines the type of the Modbus TCP socket:

Selection: **Server** The station waits for connection and can communicate with one single client at a time. If a second connection is opened by the same peer machine with an application socket of type server TCP, this new connection will be ignored.

Client The station tries a connection towards the server.

Server Address

This parameter is available only when the Modbus TCP socket is configured as a Client. It defines the IP address of the server to which the client tries to connect.

Start Register

It defines the "Starting Address" field of the Modbus TCP message. For details refer to "Modicon Modbus Protocol Reference Guide" by AEG Schneider Automation.

Number of Registers

It defines the maximum number of registers according to the maximum length of the message to be transmitted. The size of the message transmitted is constant, thus, it must be big enough to contain the largest barcode information. If the message is longer than the one expected, it will be truncated during transmission; if shorter, all unused characters will be filled with 0 binary. For details refer to "Modicon Modbus Protocol Reference Guide" by AEG Schneider Automation.

Profinet IO

PROFINET is the communication standard for automation of PROFIBUS & PROFINET International (PI).
Standardized in IEC 61158 and IEC 61784, it represents an open standard for industrial Ethernet.
PROFINET satisfies all requirements for automation technology: it is 100% Ethernet compatible according to IEEE standards, it allows data-intensive parameter assignment and extremely fast I/O data transmission.
In addition, PROFINET provides a direct interface to the IT level (TCP/IP).

Status

This parameter enables the PROFINET I/O socket and allows setting the Profinet I/O parameters.

Header String

This parameter signals the beginning of the Fieldbus message. It can be a string of up to 128 characters.

Selections: characters from **NUL** (00H) to **~** (7EH)

The Fieldbus Header String should be different from the Fieldbus Terminator String.

Terminator String

This parameter signals the end of the Fieldbus message. It can be a string of up to 128 characters.

Selections: characters from **NUL** (00H) to **~** (7EH)

The Fieldbus Header String should be different from the Fieldbus Terminator String.

Data Tx

If enabled, data from the reader will be transmitted on the Fieldbus network.

Master Input Area Size

It defines the size of the message command sent from the Matrix 410™ reader to the Profinet I/O Master. This Profinet I/O socket allows an input area size between **8** and **128** bytes.

Master Output Area Size

It defines the size of the message command sent to the Matrix 410™ reader from the Profinet I/O Master. This Profinet I/O socket allows an output area size between **8** and **128** bytes.

Data Flow Control

It implements a reliable transmission protocol between Profinet I/O Master (PLC) and Slave (Matrix 410™ reader) allowing specific functions such as Synchronization, Fragmentation/Reassembling and Data Consistency. For more details refer to the "DAD Driver" document on the Mini-DVD.

Selections: **Disable**
DAD Driver

Data Consistency

If enabled, it allows improving the overall communication robustness of the Profinet I/O network. For more details refer to the "DAD Driver" document on the Mini-DVD.

Station Name

This parameter is mandatory for the Profinet I/O interface. It is a string (max 240 characters) which identifies the node on the network as an alternative to the IP address. If this value is changed by the host application during runtime, a reset is required in order for changes to have effect.

The Name can be made up only of letters or numbers. The **.** (dot) and **-** (dash) characters can be used but not as the first or last character in the Name.

HTTP Server

The HTTP server is provided on Matrix 410 xxx-010 models. It allows a Remote Monitoring session to be started where a remote host can access an internal Web page for image monitoring. See the HTTP Server Web Page for details.

Status

Enables/disables the HTTP server on the reader.

NOTE

If working in Continuous Operating mode while the web page Monitor is running, you may have to Stop the Monitor in order to Connect/Disconnect VisiSet™ to/from the reader.

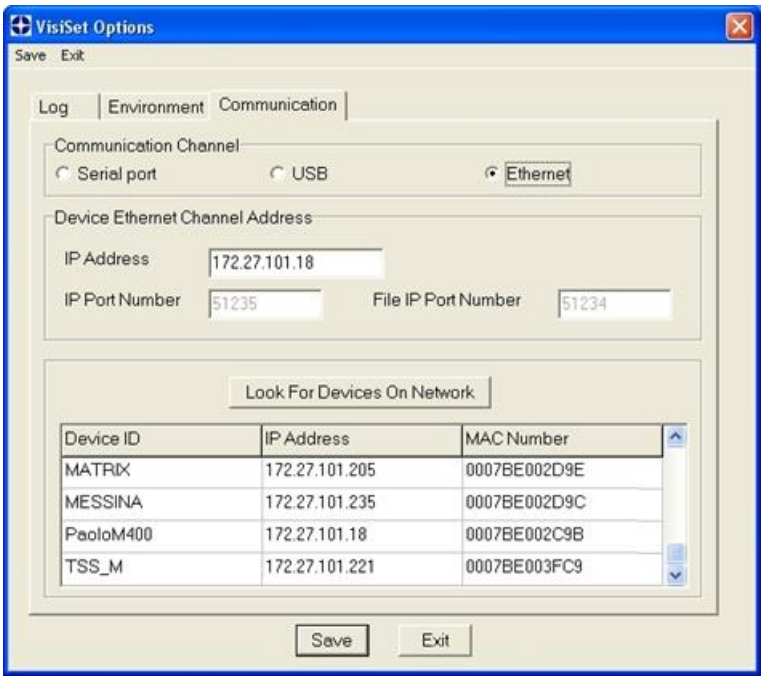
Socket Port

This is a read-only parameter that shows the port used by the image sending applet for remote monitoring. Default 51233.
This port must be open and must not be used by any other service.

GET IP Client

Product Name

Allows assigning an ASCII string for the product "Device ID" name. This string is shown in the Device ID column of the VisiSet Options>Communication>Ethernet window only if the device and VisiSet are directly on the same subnet without routing.



CBX Gateway

NOTE

Setting the following parameters via VisiSet™ interactive mode (or via Host Mode Programming) determines the Fieldbus board reset, independently from the channel used for configuration (i.e. even the Fieldbus channel itself).

READING SYSTEM LAYOUT --> Device Network Setting
DEVICE NETWORK SETTING --> Topology Role
OPERATING MODE --> Operating Mode
OPERATING MODE --> Reading Phase ON
OPERATING MODE --> Acquisition Trigger (in Phase Mode)
OPERATING MODE --> Acquisition Trigger (in One Shot)
OPERATING MODE --> Reading Phase OFF
OUTPUT1 --> Line Function
OUTPUT2 --> Line Function
OUTPUT3 --> Line Function (if present)
DEVICE NETWORK SETTING --> Address TX (Multidata Master only)
DEVICE NETWORK SETTING --> Address Header String (Multidata Master only)
DEVICE NETWORK SETTING --> Address Separator String (Multidata Master only)

Note that this event does NOT involve the Matrix device reset, only the Fieldbus board.

The involved Fieldbus boards are:

- BM3x0 Profibus Module or QLM600
- BM400 DeviceNet Module
- BM5x0 Ethernet/IP Module or QLM500
- BM600 CANopen Module
- BM7x0 Profinet Module or QLM700
- BM1100 CC-Link Module
- BM12x0 Modbus TCP Module

Host Interface

Host Interface Type

It allows selecting the Host Interface type for communication to/from the Fieldbus or the Ethernet TCP/IP network.

NOTE

When any Host Interface Type is selected, the Main Serial Interface is not available for communication and **must not** be electrically connected in the CBX connection box.

Selections:

- *None.* No Fieldbus Interface is selected. The Main Serial Interface is available for communication.
- *Profibus (BM3x0 or QLM600).* Enables the FIELDBUS and PROFIBUS groups to allow the Profibus interface parameters to be configured.
- *DeviceNet (BM4x0).* Enables the FIELDBUS and DEVICENET groups to allow the DeviceNet interface parameters to be configured.
- *Ethernet/IP (BM5x0 or QLM500).* Enables the FIELDBUS and ETHERNET/IP groups to allow the Ethernet/IP interface (Fieldbus) parameters to be configured. IP Addressing in the ETHERNET/IP group determines the method of address selection, either user defined (Static Assignment), DHCP or Remote Assignment.
- *CC-Link (BM11x0).* Enables the FIELDBUS and CC-LINK groups to allow the CC-Link interface parameters to be configured.
- *CANopen (BM6x0).* Enables the FIELDBUS and CANOPEN groups to allow the CANopen interface parameters to be configured.
- *Profinet IO (BM7x0 or QLM700).* Enables the FIELDBUS and PROFINET IO groups to allow the Profinet interface (Fieldbus) parameters to be configured. IP Addressing parameter in the PROFINET IO group determines the method of address selection, either user defined (Static Assignment), DHCP or Remote Assignment.
- *Modbus TCP (BM12x0).* Enables the FIELDBUS and MODBUS TCP groups to allow the Modbus TCP interface (Fieldbus) parameters to be configured. IP Addressing in the MODBUS TCP group determines the method of address selection, either user defined (Static Assignment), DHCP or Remote Assignment.
- *Ethernet TCP/IP (BM2x0 or QL500).* Enables the CBX ETHERNET group to allow the Ethernet TCP/IP parameters to be configured. The DHCP Client parameter in the CBX ETHERNET SYSTEM group determines the method of address selection, either user defined (service disabled) or DHCP (service enabled).

Fieldbus

Data Tx

If enabled (checked), data from the scanner will be transmitted on the Fieldbus network.

Reading Phase ON String

This parameter is available only when *Fieldbus String* is included in the **Reading Phase ON** 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

This parameter is available only when *Fieldbus 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

Acquisition Trigger String

This parameter is available only when *Fieldbus 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

Header String

This parameter signals the beginning of the Fieldbus message. It can be a string of up to 128 characters.

Selections: characters from **NUL** (00H) to **~** (7EH)

The Fieldbus Header String should be different from the Fieldbus Terminator String.

Terminator String

This parameter signals the end of the Fieldbus message. It can be a string of up to 128 characters.

Selections: characters from **NUL** (00H) to **~** (7EH)

The Fieldbus Header String should be different from the Fieldbus Terminator String.

Profibus|Devicenet|CC-Link|CANopen

NOTE

For further information regarding Fieldbus interfacing including downloadable support files, go to the HMS website at http://www.anybus.com, choose the link to the support page, select the Anybus-CompactCom product type and then your network type.

Baud Rate

This is a read-only parameter. The modules are set to use the automatic baud rate mechanism where the Fieldbus Master defines the speed of the connection. After connection, for some Fieldbus types, the actual speed of the Fieldbus will be displayed in this parameter.
For CC-Link Fieldbus, the Fieldbus Master does not set the network baud rate and therefore this parameter must be set manually according to the application specific network baud rate.

Max. Exchange Area Size (Input+Output)

This is a read-only parameter. It defines the (fixed) maximum size of the exchange area (total of both Input and Output Areas) available for messages between the Fieldbus Master and the Fieldbus module.

Selections:

Profibus	**152**
DeviceNet	**152**
CC-Link	**254**
CANopen	**152**

Master Input Area Size

It defines the size of the message command sent from the Fieldbus module to the Fieldbus Master.

Selections:

Profibus	a value in the range **8 - 144**
DeviceNet	a value in the range **8 - 144**
* CC-Link	a value in the range **2 - 126**
CANopen	a value in the range **8 - 144**

* For CC-Link Version 1, the Master Input Area Size must be less than or equal to 30.

Master Output Area Size

It defines the size of the message command sent to the Fieldbus module from the Fieldbus Master.

Selections:

Profibus	a value in the range **8 - 144**
DeviceNet	a value in the range **8 - 144**
* CC-Link	a value in the range **2 - 128**
CANopen	a value in the range **8 - 144**

* For CC-Link Version 1, the Master Output Area Size must be less than or equal to 32.

Node Address (MAC ID)

NOTE

When using the BM100 Backup and Restore Module with a CBX connection box, the BM100 Net Type and Address Selection hardware switch settings are read at power-up and override the software settings. For correct software configuration, make sure these switch settings are compatible with your application.

The Media Access Control Identifier (MAC ID) is an integer identification value assigned to each node of the Fieldbus network. The defined value distinguishes a node from all other nodes on the same link.

Selections:

(1) Profibus	a value in the range **0 - 126**
(2) DeviceNet	a value in the range **0 - 64**
(3) CC-Link	a value in the range **1 - 64**
(4) CANopen	a value in the range **1 - 128**

(1) For Profibus, the Node Address 126 forces the SSA (Set Station Address) service which allows the Fieldbus Master to assign the slave node address. It is no longer possible to visualize the new address from the slave node after the Master sets it.

(2) For DeviceNet, the Node Address 64 allows the Fieldbus Master to assign the slave node address. It is possible to visualize the new address from the slave node after the Master sets it.

(3) The range of valid addresses for CC-Link depends on the assigned Input/Output Area Size as follows:
If the Input Area is greater than 6 or the Output Area is greater than 8, the max Node Address is 63.
If the Input Area is greater than 14 or the Output Area is greater than 16, the max Node Address is 62.
If the Input Area is greater than 22 or the Output Area is greater than 24, the max Node Address is 61.

(4) For CANopen, the Node Address 128 forces the LSS (Layer Setting Service) which allows the Fieldbus Master to assign the baud rate and address, but it is no longer possible to visualize the new address value from the slave node.

Data Flow Control

It implements a reliable transmission protocol between Fieldbus Master (PLC) and Slave (Fieldbus module) allowing specific functionalities such as Synchronization, Fragmentation/Reassembling and Data Consistency. For more details refer to the "DAD / DPD Driver" document on the Mini-DVD.

Selections: **Disable**
DAD Driver
DPD Driver

Data Consistency

If checked (enabled), it allows improving the overall communication robustness of the Fieldbus network. For more details refer to the "DAD / DPD Driver" document on the Mini-DVD.

Version

This parameter appears only if the Fieldbus type is CC-Link. It indicates the software version of the CC-Link controller. The possible values are Version **1** or **2**.

Stations

This is a read-only parameter that appears only if the Fieldbus type is CC-Link. It indicates how many logical stations are assigned to the physical slave.

Cycles

This is a read-only parameter that appears only if the Fieldbus type is CC-Link. It indicates the number of cycles the CC-Link Fieldbus Master must perform on the logical stations in order to manage the Exchange Areas.

Ethernet/IP|Profinet IO|Modbus TCP

NOTE

For further information regarding Fieldbus interfacing including downloadable support files, go to the HMS website at http://www.anybus.com, choose the link to the support page, select the Anybus-CompactCom product type and then your network type.

Baud Rate

This is a read-only parameter. The modules are set to use the automatic baud rate mechanism where the Fieldbus Master defines the speed of the connection. After connection, for some Fieldbus types, the actual speed of the Fieldbus will be displayed in this parameter.
For CC-Link Fieldbus, the Fieldbus Master does not set the network baud rate and therefore this parameter must be set manually according to the application specific network baud rate.

Max. Exchange Area Size (Input+Output)

This is a read-only parameter. It defines the (fixed) maximum size of the exchange area (total of both Input and Output Areas) available for messages between the Fieldbus Master and the Fieldbus module.

Selections:

Ethernet/IP	**152**
Profinet IO	**64**
Modbus TCP	**152**

Master Input Area Size

It defines the size of the message command sent from the Fieldbus module to the Fieldbus Master.

Selections:

Ethernet/IP	a value in the range **8 - 144**
Profinet IO	a value in the range **8 - 56**
Modbus TCP	a value in the range **8 - 144**

Master Output Area Size

It defines the size of the message command sent to the Fieldbus module from the Fieldbus Master.

Selections:

Ethernet/IP	a value in the range **8 - 144**
Profinet IO	a value in the range **8 - 56**
Modbus TCP	a value in the range **8 - 144**

Data Flow Control

It implements a reliable transmission protocol between Fieldbus Master (PLC) and Slave (Fieldbus module) allowing specific functionalities such as Synchronization, Fragmentation/Reassembling and Data Consistency. For more details refer to the "DAD / DPD Driver" document on the Mini-DVD.

Selections: **Disable**
DAD Driver
DPD Driver

Data Consistency

If checked (enabled), it allows improving the overall communication robustness of the Fieldbus network. For more details refer to the "DAD / DPD Driver" document on the Mini-DVD.

Process Active Timeout (ms)

This value specifies how long the module shall stay in the "PROCESS_ACTIVE"-state after receiving a Modbus TCP request. The valid values are in the range from **0** to **65535** ms. The default value is 0 = timeout disabled.

Connection Timeout (s)

This setting specifies how long a Modbus TCP connection may be idle before it is closed by the module.
The valid values are in the range from **0** to **65535** seconds, default = 60 seconds. 0 = timeout disabled.

MAC Address

This is a read-only parameter, which displays the address of the network interface card (NIC).

IP Addressing

Selections:

- *Static Assignment* - the IP Address can be set manually through the IP Address, Subnet Mask and Gateway Address parameters.
- *DHCP* - the IP address is assigned by a DHCP server when getting the reader configuration. In this case the IP address parameters are read-only and display the DHCP assigned address.
- *Remote Assignment* - the IP address is assigned by a remote network device (PC) using the IPConfig address configuration application available on the Mini-DVD. In this case the IP address parameters are read-only and display the remotely assigned address.

(Assigned) IP Address

If the IP Addressing parameter is set to Static Assignment, the Internet Protocol (IP) network Address can be defined manually. Consult your network administrator to obtain a new address. For other IP Addressing selections, this parameter is read-only.

(Assigned) Subnet Mask

If the IP Addressing parameter is set to Static Assignment, the Subnet Mask can be defined manually. Consult your network administrator to obtain a new address. For other IP Addressing selections, this parameter is read-only.

(Assigned) Gateway Address

If the IP Addressing parameter is set to Static Assignment, the Gateway Address can be defined manually. Consult your network administrator to obtain a new address. For other IP Addressing selections, this parameter is read-only.

Station Name

This parameter is meaningful and mandatory only for the Profinet interface. It is a string (max 240 characters) which identifies the node on the network as an alternative to the IP address. If this value is changed by the host application during runtime, a reset is required in order for changes to have effect.

The Name can be made up only of letters or numbers. The **.** (dot) and **-** (dash) characters can be used but not as the first or last character in the Name.

Digital I/O Conditioning

NOTE

Byte 0 of the Input/Output Areas is reserved for Digital I/O Conditioning parameters. If any of the following parameters are enabled, the DAD or DPD Driver starts at Byte 1 (second byte) of the Input/Output Areas. For details about the DAD or DPD Driver, refer to the "DAD / DPD Driver" document on the Mini-DVD.

NOTE

Digital I/O Conditioning is NOT available for the Fieldbus network managed under the Ethernet TCP/IP Services branch (BM2x0 and QL500 Modbus TCP).

Input 1 Echo (External Trigger)

If enabled, the reader Input 1 (External Trigger) status is echoed to the Fieldbus Master via bit 0 in Byte 0 (LSB) of the Input Area.

Input 2 Echo

If enabled, the reader Input 2 status is echoed to the Fieldbus Master via bit 1 in Byte 0 (LSB) of the Input Area.

Phase Echo

If enabled, the Reading Phase status is echoed to the Fieldbus Master via bit 7 in Byte 0 (LSB) of the Input Area. This is valid only when working in *Phase Mode* and **Reading Phase ON/OFF** = *Fieldbus Input Leading/Trailing Edge.*

Output 1

This parameter is available only if the reader Output 1 Line Function is set to *External Fieldbus*. When enabled, it allows the Fieldbus Master to drive the reader Output 1 via bit 0 in Byte 0 (LSB) of the Output Area.

Output 2

This parameter is available only if the reader Output 2 Line Function is set to *External Fieldbus*. When enabled, it allows the Fieldbus Master to drive the reader Output 2 via bit 1 in Byte 0 (LSB) of the Output Area.

Ethernet TCP/IP

CBX Ethernet System

Status

Enables/disables the network interface card (NIC). If disabled, no Ethernet communication is allowed. When not using the Ethernet communication, it is advised to disable it, since it causes power consumption.

DHCP Client

Enables/disables the Dynamic Host Configuration Protocol (DHCP) client. Consult your network administrator to verify the DHCP server availability within the network.

IP Address

It defines the Internet Protocol (IP) network address. Consult your network administrator to obtain a new address.

Subnet Mask Address

It defines the subnet mask address. Consult your network administrator to obtain a new address.

Gateway Address

It defines the gateway address. Consult your network administrator to obtain a new address.

CBX Ethernet Data Socket

It is a bidirectional communication channel available for Ethernet communication allowing to transmit and to receive **decoded data** only. For further details refer to the following bibliography:
- Internetworking with TCP/IP, vol. I (chap. 20), by Douglas E. Comer
- UNIX, network programming, by W. Richards Stevens

NOTE

Using the data socket to transfer decoding data may reduce the decoding rate. For this reason, it is advised to activate this communication channel only when strictly necessary.

Status

If enabled, it selects the Ethernet Data Socket as the channel to be used by the reader for transmitting and receiving data.

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 <INFO> 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

Protocol

It defines the protocol to be used for the Ethernet communication between TCP and UDP protocol.
For details refer to "Internetworking with TCP/IP, vol. I", by Douglas E. Comer.

Port

It defines the port number of the CBX Ethernet Data Socket, (default value is 51236). It must be different from the port numbers defined for the CBX Ethernet Image Socket and CBX Ethernet WebSentinel Socket.
For details refer to "Internetworking with TCP/IP, vol. I", by Douglas E. Comer.

Type

It defines the type of the socket:

- *Server*: the station waits for connections and can communicate with a maximum of 4 clients simultaneously.
- *Client*: the station tries a connection towards the server.

Server Address

This parameter is available only when the socket is configured as a Client. It defines the IP address of the server to which the client tries to connect.

Reading Phase ON String

Is available only when *Ethernet String* is included in the ***Reading Phase ON*** 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

Acquisition Trigger String

Is available only when *Ethernet 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

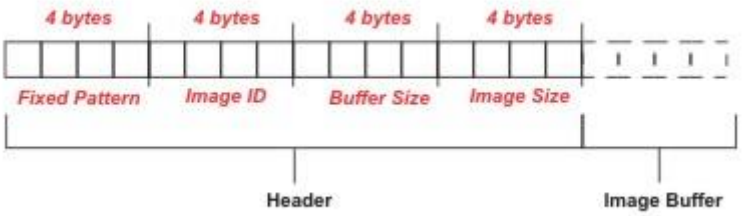
Is available only when *Ethernet String* is included in the ***Reading Phase OFF*** events. At least one valid character must be defined.
It is possible to select a sequence of characters in the range from *<1>* (*<SOH>*) to *<255>*.
Non-printable characters are written in decimal notation between the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

See also

ASCII Table

CBX Ethernet Image Socket

It is a bi-directional communication channel available for Ethernet communication allowing to transmit **images** only. When transmitted, the image buffer is preceded by a header as shown in the following figure:



- a fixed 4-byte pattern: 0xab, 0xcd;0x12, 0x34;
- a 4-byte image identification number, which is a progressive number (in little-endian ordering);
- a 4-byte number giving the size of the image buffer (in little-endian ordering);
- a 4-byte number giving the size of the image, where the first 2 bytes indicate the image columns while the last 2 bytes indicate the image lines (in little-endian ordering).

For further details refer to the following bibliography:
- Internetworking with TCP/IP, vol. I (chap. 20), by Douglas E. Comer;
- UNIX, network programming, by W. Richards Stevens.

NOTE

Using the image socket to transfer images may reduce the decoding rate. For this reason, it is advised to activate this communication channel only when strictly necessary.

Status

If enabled, it selects the Ethernet Image Socket as the channel to be used by the reader for transmitting images:

- *Disabled*: the Ethernet Image Socket channel 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.
- *Enable On User Request*: runtime images are not transmitted. The last image saved in the Image Buffer (if enabled and present), is transmitted only when a request (Download Image command), is received from the CBX Ethernet Data Socket.

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 transmitted: Bitmap (.bmp), Jpeg (.jpg) TIFF (.tif) or Binary (.raw) format.

JPG Quality (1-100)

Defines the compression quality of a jpeg image.

Protocol

It defines the protocol to be used for the Ethernet communication between TCP and UDP protocol.
For details refer to "Internetworking with TCP/IP, vol. I", by Douglas E. Comer.

Port

It defines the port number of the CBX Ethernet Image Socket, (default value is 51237). It must be different from the port numbers defined for the CBX Ethernet Data Socket and CBX Ethernet WebSentinel Socket.
For details refer to "Internetworking with TCP/IP, vol. I", by Douglas E. Comer.

Type

It defines the type of the socket:

- *Server*: the station waits for connections and can communicate with a maximum of 4 clients simultaneously.
- *Client*: the station tries a connection towards the server.

Server Address

This parameter is available only when the socket is configured as a Client. It defines the IP address of the server to which the client tries to connect.

CBX Ethernet WebSentinel Socket

NOTE

This group of parameters is only available on Matrix 410 x00-000 models (non-Ethernet, connected by means of a CBX500 and a BM2x0 Ethernet TCP/IP module).

NOTE

Datalogic WebSentinel™ is compatible with Matrix 410™ only when Operating Mode is set to *One Shot* or *Phase Mode*.

NOTE

This group of parameters is visible only when WebSentinel Status is *enabled*.

Status

If enabled, it selects the Ethernet WebSentinel Socket as the channel to be used by the reader for communication with the Datalogic WebSentinel™ plant array monitor.

Port

It defines the port number of the CBX Ethernet WebSentinel Socket, (default value is 51232). It must be different from the port numbers defined for the CBX Ethernet Data Socket and CBX Ethernet Image Socket.
For details refer to "Internetworking with TCP/IP, vol. I", by Douglas E. Comer.

CBX Ethernet Image FTP Client

It is a high-level protocol channel available for the Ethernet communication allowing Remote Image Transfer (transmitting **images** and saving them to a file on an FTP server).
For further details refer to the following bibliography:
- Internetworking with TCP/IP, vol. I (chap. 20), by Douglas E. Comer;
- UNIX, network programming, by W. Richards Stevens.

Status

If enabled, it selects the Ethernet FTP Client as the channel to be used by the reader for transmitting and saving images:

- *Disabled*: the Ethernet FTP Client channel 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 corresponds to 1/4 of the source);
- *1/16*:divides each image side by 4 (final image corresponds to 1/16 of the source);
- *1/64*:divides each image side by 8 (final image corresponds to 1/64 of the source);

Image Format

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

JPG Quality (1-100)

Defines the compression quality of a jpeg image.

FTP Server Address

Defines the address of the FTP server to which an image will be transmitted.

User Name

Corresponds to the user name assigned by the server account to guarantee a safe communication.

Password

Corresponds to the password assigned by the server account to guarantee a safe communication.

Image Saving Path

Defines the sub-path/directory to which the saved image file will be transferred. The root path to this directory is assigned by the server administrator.

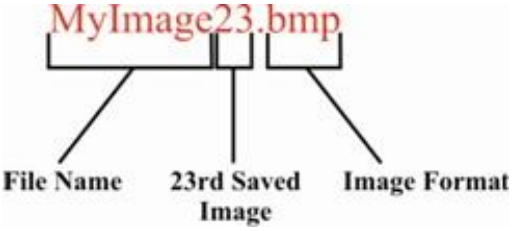
Image File Name

Defines the name to be assigned to the image file.

Max. Different Files To Save

Defines the maximum number of image files to be saved on the FTP server. During transmission, each image file will be identified by a progressive number included in a range from 0 to the defined number. The file format of each image is similar to the one given in the following example:

Image File Name:	MyImage
Max. Different Files To Save:	100
Image Format:	bmp



File Type

Defines the image file transmission mode between the FTP Client and server (binary or text format).

CBX Ethernet Modbus TCP

This option determines the communication between the reader, or, in a multi-sided layout, between several readers and the Fieldbus network.

The Modbus Application Protocol-TCP/IP allows data transmission between the server and client. Both the reader and a Quantum family PLC (programmable logic controller) can be either server or client.

This protocol implements Function Code 16(10Hex), which allows copying the application format message into the registers of the Modicon PLC controller. The application format rules for the Modicon message are the same of the Standard protocol on the Serial Line (for example, header and terminators), but it is recommended not to use Headers and Terminators since the mechanism to bind information is already native on the Modicon protocol. Both the parameters managing respectively the PLC memory register address value and the number of registers can be modified (see Start Register and Number of Registers for details). This protocol also implements function code F03 (read holding register), and F06 (preset single register).

The following parameters allow enabling the communication through the CBX Gateway to the Modbus TCP Fieldbus network.

> **NOTE**
>
> This feature is only available when BM2x0/QL500 are running SW Release 2.02.01 or later.

Status

This parameter enables the Modbus TCP socket and allows setting the Modbus TCP parameters.

Type

It defines the type of the Modbus TCP socket:

Selection: **Server** The station waits for connection and can communicate with one single client at a time. If a second connection is opened by the same peer machine with an application socket of type server TCP, this new connection will be ignored.

Client The station tries a connection towards the server.

Server Address

This parameter is available only when the Modbus TCP socket is configured as a Client. It defines the IP address of the server to which the client tries to connect.

Start Register

It defines the "Starting Address" field of the Modbus TCP message. For details refer to "Modicon Modbus Protocol Reference Guide" by AEG Schneider Automation.

Number of Registers

It defines the maximum number of registers according to the maximum length of the message to be transmitted. The size of the message transmitted is constant, thus, it must be big enough to contain the largest barcode information. If the message is longer than the one expected, it will be truncated during transmission; if shorter, all unused characters will be filled with 0 binary. For details refer to "Modicon Modbus Protocol Reference Guide" by AEG Schneider Automation.

CBX Ethernet GET IP Client

Product Name

Allows assigning an ASCII string for the product "Device ID" name. This string is shown in the Device ID column of the VisiSet Options>Communication>Ethernet window only if the device and VisiSet are directly on the same subnet without routing.

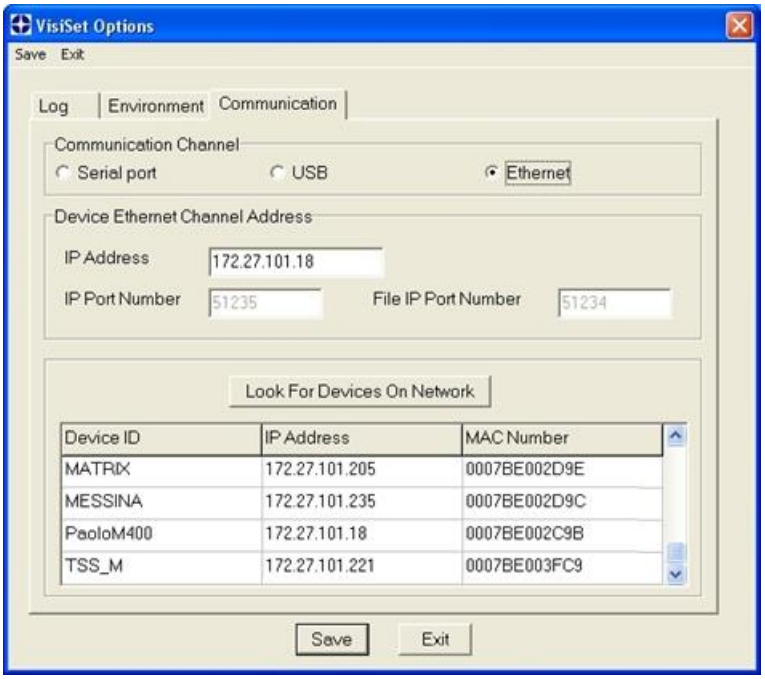


Image Processing

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 at run-time which can be included in the output message, see **DATA FORMAT**.

This parameter is automatically and independently enabled when opening the Standard Setup Wizard, Calibration Tool, Data Matrix Setup Wizard and Symbol Verification windows.

NOTE

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

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).

Cluster Builder

Enables a pre-processing algorithm designed to localize 1D and 2D codes in an image. This can reduce processing time in T&L and Tires Applications. This algorithm divides the image into blocks and assigns a score for likely areas containing code(s). The interested areas are grouped into clusters and the decoding is then performed only on these areas, thus saving time by not decoding the entire image.

NOTE

This parameter is effective in applications where the images are uniform and have a low noise level (not grainy).

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 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.

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 X-PRESS™ Autolearning function.

> **NOTE**
>
> If X-PRESS™ *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.

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.

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 smaller 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

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 410™ 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 410™ 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 410™ 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 Examples 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

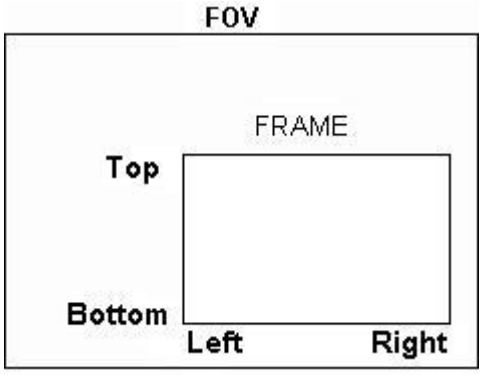
It allows selecting the symbology to be collected.

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

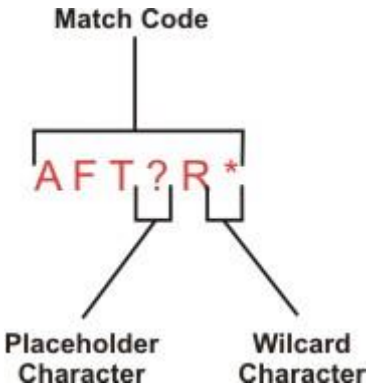
This character is placed within the ***Match Code***. All characters following the defined one are accepted as matching characters.

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 data 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

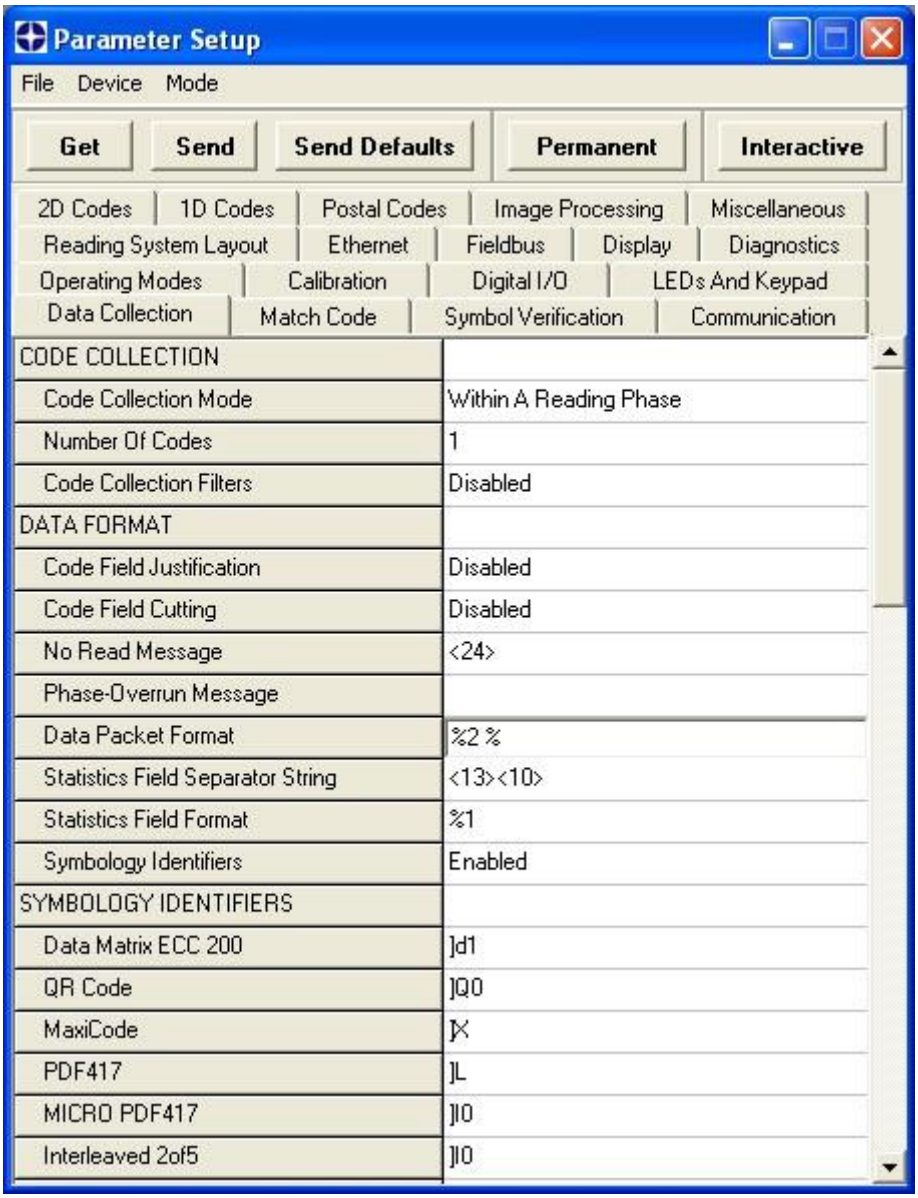
Number of Codes

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.



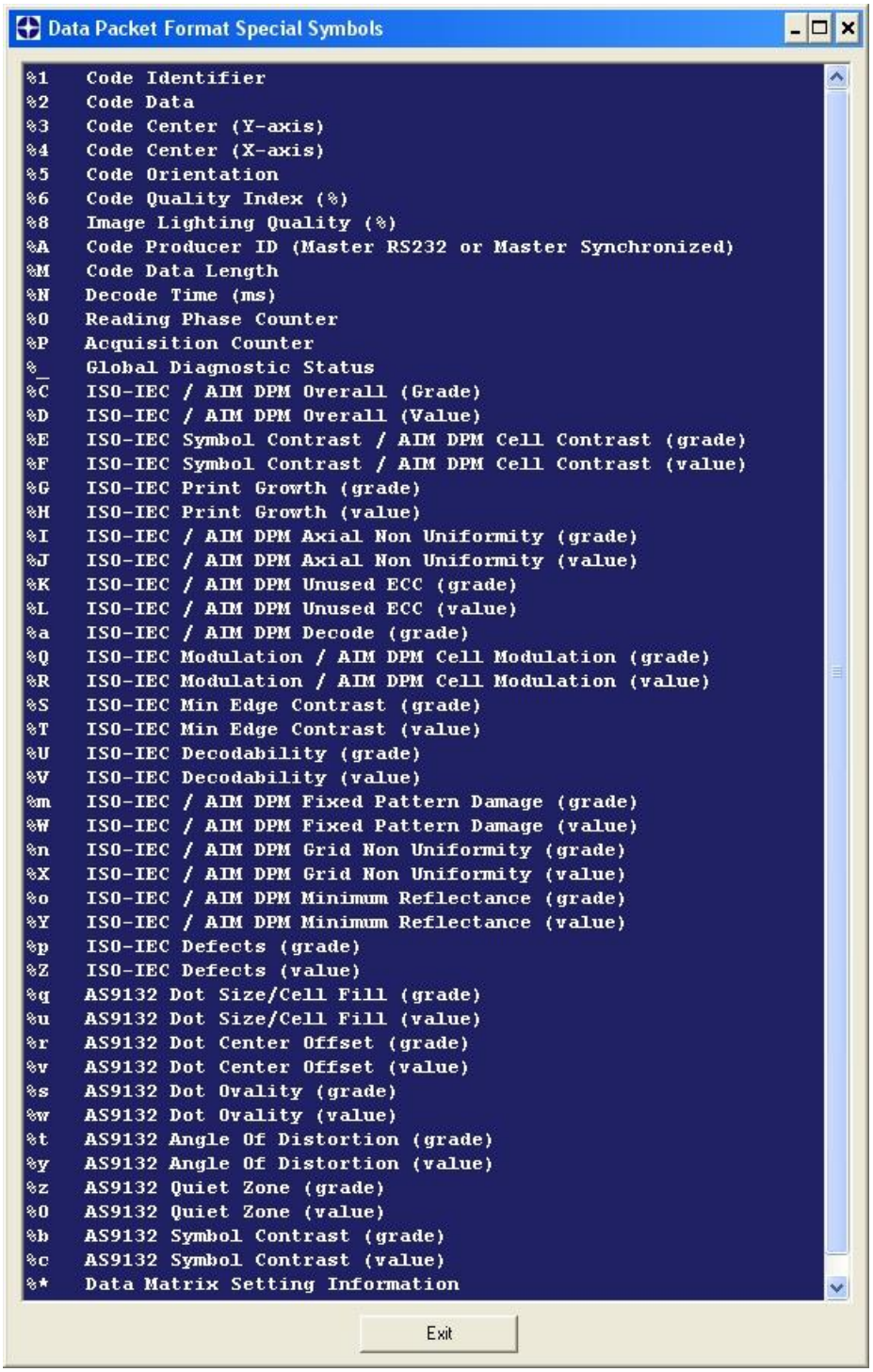
Several code-related fields can be included in the Data Packet Format as special symbols:

- 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

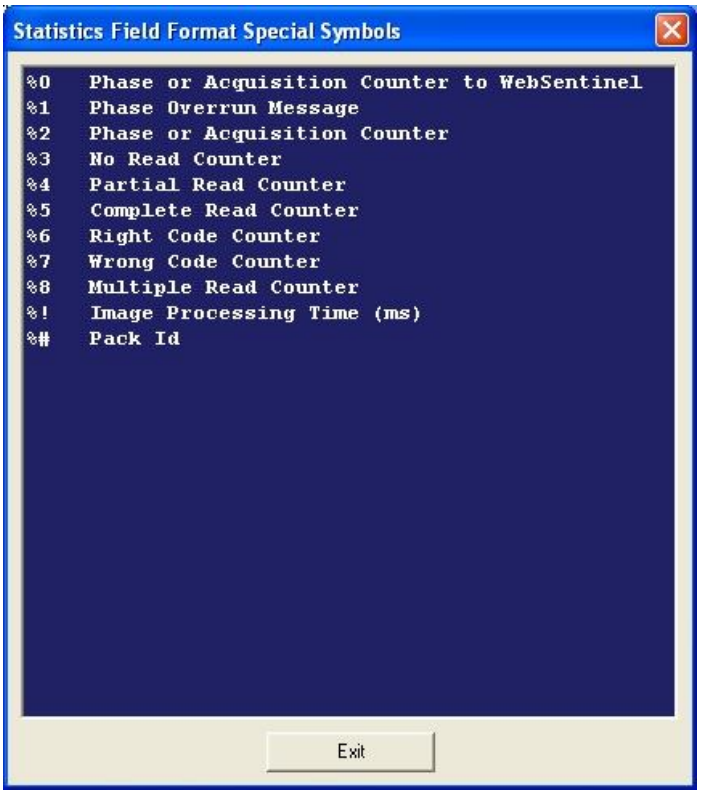
Standard Message Format

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

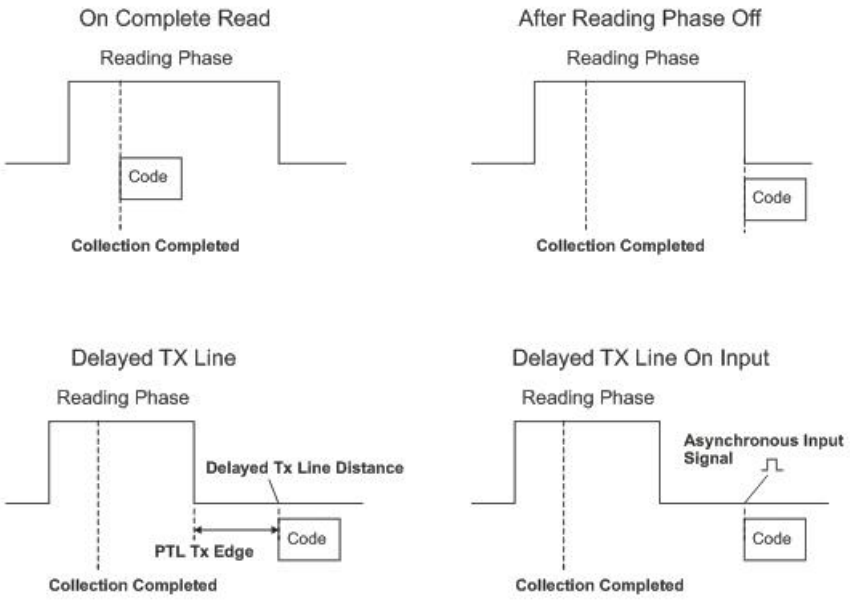
When a **Partial Read** event occurs and this parameter is enabled, the read codes are formatted in the output message as described in Standard Message Format. If disabled, the output message format corresponds to **No Read**.

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 ***PTL Transmission Edge*** plus the Delayed Tx Line Distance.
Delayed Tx Line On Input. The output message is transmitted upon receiving an asynchronous Reference Input Signal. It is the responsibility of the application which manages this signal to assure the validity of the message transmission.



> **NOTE**
> ***Delayed TX Line*** and ***Delayed TX Line On Input*** selections are used to manage the **PTL** (Programmable Transmission Line) feature. This feature is available only when the system is configured according to the following conditions:
>
> Device Network Setting = *Alone or ID-NET*
>
> Topology Role = *Master ID-NET Synchronized* or *Master RS232 Type A* or *Master RS232 Type M*.
>
> Operating Mode is set to *Phase Mode*
>
> ***M***essage Tx Selection is set to either *Delayed Tx Line* or *Delayed Tx Line On Input*.

Reference Input Signal

This parameter is available only when Message Tx Selection is set to either *Delayed Tx Line* or *Delayed Tx Line On Input*.

When ***Message Tx Selection*** is set to *Delayed Tx Line*, it selects which Input and which edge(s) are used for the ***Physical Encoder*** signal. Typically Input 2 is used as the encoder input. If only one edge is used as the reference signal the ***Encoder Step*** parameter refers to the pulse period. If instead both edges are selected, then the ***Encoder Step*** parameter refers to half the pulse period. See ***Encoder Step***.

It is possible to enable both edges of the selected input. To do this, from the pull down menu, hold down the CTRL key, select the desired Input Edges with the mouse and press ENTER. The Edges will be listed separated by a comma. Possible values are:

Selections: *External Trigger Leading Edge*
External Trigger Trailing Edge
Input 2 Leading Edge
Input 2 Trailing Edge

When ***Message Tx Selection*** is set to *Delayed Tx Line On Input*, it selects which digital input will be used for the **asynchronous reference signal**. Selecting both edges is not meaningful in this case.

NOTE

Both inputs (External Trigger and Input 2), are exclusive (only one or the other). It is not possible to select External Trigger input, if already used for the PS Line.

The following parameters are available only when Message Tx Selection is set to *Delayed Tx Line*.

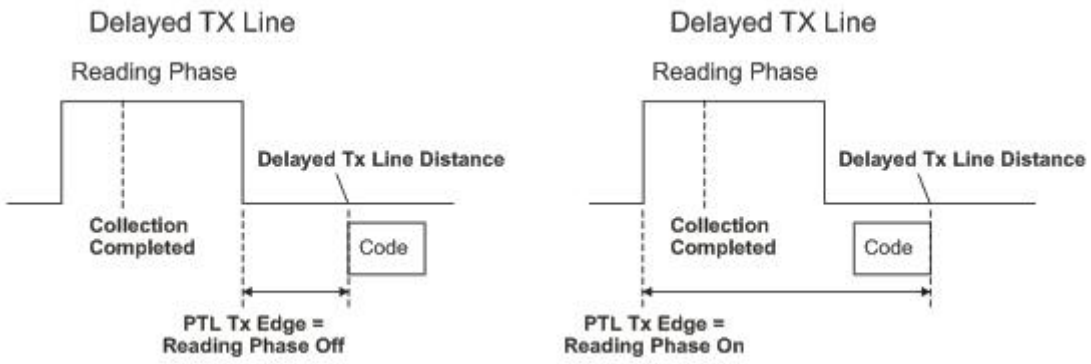
PTL Transmission Edge

This parameter is used by the reader as reference for the Delayed Tx Line.

Selections:	*Reading Phase Off*	The message is transmitted at the Delayed Tx Line Distance referenced to the Reading Phase Off signal.
	Reading Phase On	The message is transmitted at the Delayed Tx Line Distance referenced to the Reading Phase On signal.

Most commonly, this corresponds to the Presence Sensor (External Trigger Input) acting as the Reading Phase On/Off signal. Therefore:

- when set to *Reading Phase Off*, transmission takes place when the end of the pack leaves the Delayed Tx Line.
- when set to *Reading Phase On*, transmission takes place when the beginning of the pack reaches the Delayed Tx Line.



Physical Encoder

It enables the physical encoder which is connected to the input selected in the ***Reference Input Signal*** parameter. For correct functioning, define the ***Encoder Step*** parameter (hundredths of a millimeter). The maximum allowable Encoder frequency is 2.2 kHz.

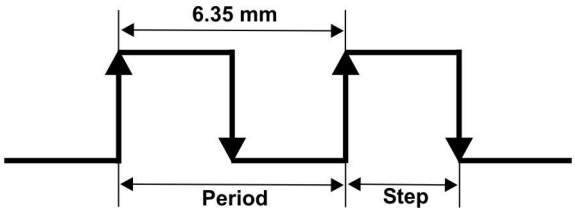
If *Disabled*, the conveyor speed is supposed to be constant. Thus, it is only required to define the Conveyor Speed parameter.

Encoder Step (hundredths of mm)

This parameter is available only when the Physical Encoder is set to *Enabled*.
It defines the distance (in hundredths of a millimeter) of a single step of the encoder.
Depending on the ***Reference Input Signal***, the ***Encoder Step*** signal refers either to the encoder single period (if only *Leading* **or** *Trailing* Edge is enabled), or to half the encoder period (if *Leading* **and** *Trailing* Edges are both enabled, each front is used). In this case the Single period value must be divided by two (see example).
Range: from 1 to 10000.

Example

Encoder circumference = 305 mm
Periods per Revolution (PPR) = 48
Single period is 305/48 = 6.35 mm



- If *Reference Input Signal* = Leading **or** Trailing edge (single); *Encoder Step* is 6.35 mm (**635**)
- If *Reference Input Signal* = Leading **and** Trailing edges (both); *Encoder Step* is 6.35 /2 = 3.175 mm (**318**)

Max. Conveyor Speed (mm/sec)

This parameter indicates the maximum conveyor speed of the application. The possible values are from 500 to 10000 mm/s. The default setting is 3000.

It compares its value with the *Encoder Step* value and automatically **forces** the relative encoder input *Debouncing Filter* parameter to the maximum allowable value. See ***Debouncing Filter***.

Conveyor Speed (mm/sec)

This parameter is available only when the Physical Encoder is *Disabled*. It defines the constant speed of the conveyor in mm/sec.
Range: from 50 to 10000.

Delayed Tx Line Distance (mm)

It defines the distance in mm (delay) from the ***PTL Transmission Edge*** to the Delayed TX Line.
Range: from 100 to 20000.

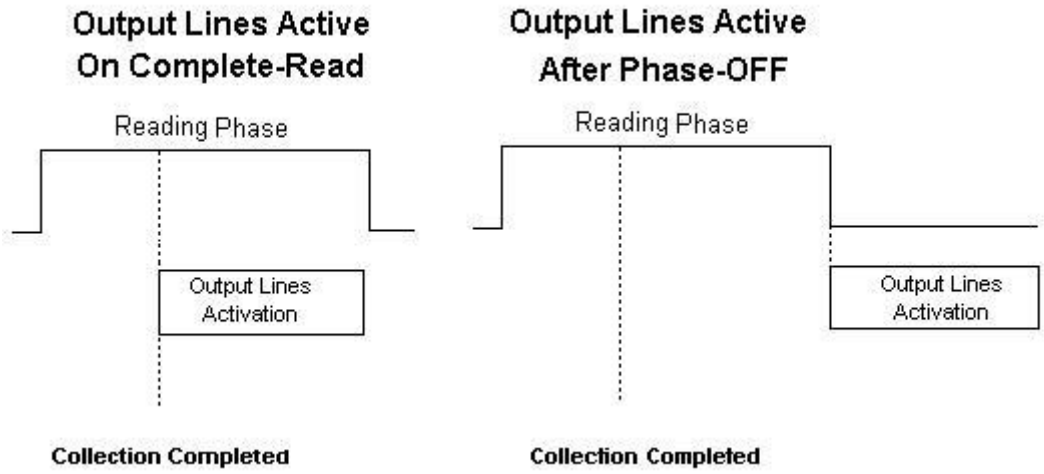
NOTE

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.

Output Lines Activation

Selects the activation of the output lines as soon as the collection is completed or after ***Reading Phase OFF***.



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.

Digital I/O

External Trigger

Active State

Allows the selection of the idle/active state of the input.
Refer to the Matrix 410™ Reference Manual for hardware setup of this input.
By setting *Open* the input is active when there is no current flowing through pins I1A-B (External Trigger).
By setting *Close* the input is active when current flows through pins I1A-B (External Trigger).

Debounce Filter

Sets the maximum duration of the pulses which are rejected by the anti-disturbance filter. Pulses exceeding this limit are recognized as valid commands.

NOTE

This parameter influences the reader response time, if the input is used as ***Acquisition Trigger*** or ***Reading Phase ON***.

Input 2

Active State

Allows the selection of the idle/active state of the input.
Refer to the Matrix 410™ Reference Manual for hardware setup of this input.
By setting *Open* the input is active when there is no current flowing through pins I2A-B.
By setting *Close* the input is active when current flows through pins I2A-B.

Debounce Filter

Sets the maximum duration of the pulses which are rejected by the anti-disturbance filter. Pulses exceeding this limit are recognized as valid commands.

NOTE

This parameter influences the reader response time, if the input is used as ***Reading Phase ON***.

Output 1

Line Function

Defines the output 1 function. The possible selections are:

- *Standard*: the reader drives the output line depending on the activation/deactivation events.
- *External Lighting System*: The output line can be used to control an external lighting system.
- *External Fieldbus*: the external Fieldbus Master drives the output line.
- *External Host Command*: the external Host has exclusive control of the output and drives the line using a special command.

Line State

Allows the selection of the idle/active state of the output.
Refer to the Matrix 410™ Reference Manual for hardware setup of this output.
Each output can be represented with a NPN transistor; this transistor acts like a switch: so, when the transistor is OFF, it acts like an OPEN switch. On the contrary, when the transistor is ON, it acts like a CLOSED switch.
By setting *Normally Open* the idle state of the output line is open, that is, the NPN transistor is OFF (like an open switch). When the output is activated, the transistor goes ON (like a closed switch).
By setting *Normally Closed* the idle state of the output line is closed, that is, the NPN transistor is ON (like a closed switch).When the output is activated, the transistor goes OFF (like an open switch).

Activation Events

Defines the event(s) which will activate the output. Among the available activating event selections, several Standard Code Quality Parameters are listed. If selected, the codes read must meet or exceed these Standards in order to avoid output activation, see the Code Quality Standards Reference Table below.
The possible selections are:

- *None*
- *Complete Read*
- *Partial Read*
- *No Read*
- *Acquisition Trigger*
- *Phase ON*
- *Phase OFF*
- *Run Mode*
- *Host Control Mode*
- *Code Quality Standards (see table below)*
- *Multiple Read*

If Match Code is enabled the possible selections are:

- *None*
- *Right Code*
- *Wrong Code*
- *No Read*
- *Acquisition Trigger*
- *Phase ON*
- *Phase OFF*
- *Run Mode*
- *Host Control Mode*
- *Code Quality Standards (see table below)*

It is possible to select more than one event so that any one of them will cause the output 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 *None* the output is always in idle state.

Code Quality Standards	ISO-IEC 16022-18004	ISO-IEC 15415	ISO-IEC 15416	AIM DPM	AS9132
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					•

Additional Activation Events

Defines the event(s) which will activate the output in OR with the events selected in the Activation Events parameter. This parameter is valid only when Line Function is *Standard*.
Possible selections are:

- *None*: selecting *None* (no Additional Activation Events), only the events selected in the Activation Events parameter will activate the output.
- *External Host Command*: when *External Host Command* is selected, it is possible to activate the output through a special host command. In this case the output will be deactivated by the selected ***Deactivation Events***.
- OCR Read: valid when at least one ***Code Collection Filter*** is enabled to collect an OCR code symbology (OCR OCV). The output is activated if the Data Collection result determines an OCR code satisfying the Code Collection Filter.
- 2D Read: valid when at least one ***Code Collection Filter*** is enabled to collect a 2D code symbology (Data Matrix, QR code, etc.). The output is activated if the Data Collection result determines a 2D code satisfying the Code Collection Filter.

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(s) selected in ***Activation Events***, under which the output will be activated. A code presented to the reader which has at least one of the selected code quality parameter grades lower than that specified in this parameter will activate the output. The valid activation events for this standard are:

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

Refer to example 1 for further details.

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(s) selected in ***Activation Events***, under which the output will be activated. A code presented to the reader which has at least one of the selected code quality parameter grades lower than that specified in this parameter will activate the output. The valid activation events for this standard are:

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

Refer to example 1 for further details.

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(s) selected in ***Activation Events***, under which the output will be activated. A code presented to the reader which has at least one of the selected code quality parameter grades lower than that specified in this parameter will activate the output. The valid activation events for this standard are:

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

Refer to example 1 for further details.

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(s) selected in ***Activation Events***, under which the output will be activated. A code presented to the reader which has at least one of the selected code quality parameter grades lower than that specified in this parameter will activate the output. The valid activation events for this standard are:

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

Refer to example 1 for further details.

Number of Events

Defines the number of activation events which must occur within the last #n reading phases to activate the output.
Refer to example 1 for further details.

Number of Reading Phases

Defines the number of reading phases during which the selected ***Activation Events*** are examined.
Refer to example 1 for further details.

Deactivation Events

Defines the event(s) deactivating the output. It is possible to select more than one event so that any one of them will cause the output deactivation. 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 *None* the output remains in active state after the first activation.

Deactivation Timeout (ms)

Indicates the maximum duration of the output pulse whenever *Timeout* is included in the output ***Deactivation Events***.

Activate on any Diagnostic Error

If this parameter is enabled, the output will activate when a diagnostic error message is sent, independent from the event counter parameter. This parameter has priority over all other activation, deactivation, and timeout events.

Deactivate when all Diagnostic Errors Recovered

If this parameters is enabled, the output will deactivate when there are no more diagnostic error messages to send.

NOTE

The following parameters are only available when Operating Mode = *Phase Mode* and the reader is not Slave Synchronized nor Slave RS232.

Activate On Trend Analysis

If this parameter is enabled, the output will activate when the reading percentage, defined in the ***Reading Rate Threshold*** parameter, is not reached. This parameter has priority over all other activation, deactivation, and timeout events except ***Activate on any Diagnostics Error***, which has priority over all events.

Reading Rate Threshold (%)

Sets the Complete Read or Right Code percentage that serves as the threshold for the output Trend Analysis Activation/Deactivation event.
If set to 0, the output is never activated.
Range: 0 to 100 percent

Pulsed Output Activation Period (sec)

Defines the activation period of the output line, measured in seconds, when Trend Analysis is active.
If set to 0, the output activation is constant. All other values set a period in which the output signal alternates on/off (pulses).
Range: 0 to 180 seconds

Deactivate When Trend Recovered

If this parameter is enabled, the output will deactivate when the reading percentage, defined in the ***Reading Rate Threshold*** parameter, has been equalled or exceeded.

Output 2

Line Function

Defines the output 2 function. The possible selections are:

- *Standard*: the reader drives the output line depending on the activation/deactivation events.
- *External Lighting System*: The output line can be used to control an external lighting system.
- *External Fieldbus*: the external Fieldbus Master drives the output line.
- *External Host Command:* the external Host has exclusive control of the output and drives the line using a special command.

Line State

Allows the selection of the idle/active state of the output.
Refer to the Matrix 410™ Reference Manual for hardware setup of this output.
Each output can be represented with a NPN transistor; this transistor acts like a switch: so, when the transistor is OFF, it acts like an OPEN switch. On the contrary, when the transistor is ON, it acts like a CLOSED switch.
By setting *Normally Open* the idle state of the output line is open, that is, the NPN transistor is OFF (like an open switch). When the output is activated, the transistor goes ON (like a closed switch).
By setting *Normally Closed* the idle state of the output line is closed, that is, the NPN transistor is ON (like a closed switch).When the output is activated, the transistor goes OFF (like an open switch).

Activation Events

Defines the event(s) which will activate the output. Among the available activating event selections, several Standard Code Quality Parameters are listed. If selected, the codes read must meet or exceed these Standards in order to avoid output activation, see the Code Quality Standards Reference Table below.
The possible selections are:

- *None*
- *Complete Read*
- *Partial Read*
- *No Read*
- *Acquisition Trigger*
- *Phase ON*
- *Phase OFF*
- *Run Mode*
- *Host Control Mode*
- *Code Quality Standards (see table below)*
- *Multiple Read*

If Match Code is enabled the possible selections are:

- *None*
- *Right Code*
- *Wrong Code*
- *No Read*
- *Acquisition Trigger*
- *Phase ON*
- *Phase OFF*
- *Run Mode*
- *Host Control Mode*
- *Code Quality Standards (see table below)*

It is possible to select more than one event so that any one of them will cause the output 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 *None* the output is always in idle state.

Code Quality Standards	ISO-IEC 16022-18004	ISO-IEC 15415	ISO-IEC 15416	AIM DPM	AS9132
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					•

Additional Activation Events

Defines the event(s) which will activate the output in OR with the events selected in the Activation Events parameter. This parameter is valid only when Line Function is *Standard*.
Possible selections are:

- *None*: selecting *None* (no Additional Activation Events), only the events selected in the Activation Events parameter will activate the output.
- *External Host Command*: when *External Host Command* is selected, it is possible to activate the output through a special host command. In this case the output will be deactivated by the selected ***Deactivation Events***.
- OCR Read: valid when at least one ***Code Collection Filter*** is enabled to collect an OCR code symbology (OCR OCV). The output is activated if the Data Collection result determines an OCR code satisfying the Code Collection Filter.
- 2D Read: valid when at least one ***Code Collection Filter*** is enabled to collect a 2D code symbology (Data Matrix, QR code, etc.). The output is activated if the Data Collection result determines a 2D code satisfying the Code Collection Filter.

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(s) selected in ***Activation Events***, under which the output will be activated. A code presented to the reader which has at least one of the selected code quality parameter grades lower than that specified in this parameter will activate the output. The valid activation events for this standard are:

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

Refer to example 1 for further details.

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(s) selected in ***Activation Events***, under which the output will be activated. A code presented to the reader which has at least one of the selected code quality parameter grades lower than that specified in this parameter will activate the output. The valid activation events for this standard are:

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

Refer to example 1 for further details.

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(s) selected in ***Activation Events***, under which the output will be activated. A code presented to the reader which has at least one of the selected code quality parameter grades lower than that specified in this parameter will activate the output. The valid activation events for this standard are:

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

Refer to example 1 for further details.

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(s) selected in ***Activation Events***, under which the output will be activated. A code presented to the reader which has at least one of the selected code quality parameter grades lower than that specified in this parameter will activate the output. The valid activation events for this standard are:

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

Refer to example 1 for further details.

Number of Events

Defines the number of activation events which must occur within the last #n reading phases to activate the output.
Refer to example 1 for further details.

Number of Reading Phases

Defines the number of reading phases during which the selected ***Activation Events*** are examined.
Refer to example 1 for further details.

Deactivation Events

Defines the event(s) deactivating the output. It is possible to select more than one event so that any one of them will cause the output deactivation. 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 *None* the output remains in active state after the first activation.

Deactivation Timeout (ms)

Indicates the maximum duration of the output pulse whenever *Timeout* is included in the output ***Deactivation Events***.

Activate on any Diagnostic Error

If this parameter is enabled, the output will activate when a diagnostic error message is sent, independent from the event counter parameter. This parameter has priority over all other activation, deactivation, and timeout events.

Deactivate when all Diagnostic Errors Recovered

If this parameters is enabled, the output will deactivate when there are no more diagnostic error messages to send.

NOTE

The following parameters are only available when Operating Mode = *Phase Mode* and the reader is not Slave Synchronized nor Slave RS232.

Activate On Trend Analysis

If this parameter is enabled, the output will activate when the reading percentage, defined in the ***Reading Rate Threshold*** parameter, is not reached. This parameter has priority over all other activation, deactivation, and timeout events except ***Activate on any Diagnostics Error***, which has priority over all events.

Reading Rate Threshold (%)

Sets the Complete Read or Right Code percentage that serves as the threshold for the output Trend Analysis Activation/Deactivation event.
If set to 0, the output is never activated.
Range: 0 to 100 percent

Pulsed Output Activation Period (sec)

Defines the activation period of the output line, measured in seconds, when Trend Analysis is active.
If set to 0, the output activation is constant. All other values set a period in which the output signal alternates on/off (pulses).
Range: 0 to 180 seconds

Deactivate When Trend Recovered

If this parameter is enabled, the output will deactivate when the reading percentage, defined in the ***Reading Rate Threshold*** parameter, has been equalled or exceeded.

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 using one of the reader inputs in Run Mode. First it is necessary to set at least one input in the ***Store Input*** command. Then, each time the selected input(s) are activated at the beginning of a data collection, the first read code is stored in the first position of the database.
  In *One Shot* mode it is required to keep the selected Input active while supplying the ***Acquisition Trigger*** (Setup time = 0; Hold time = 20 ms). On the other hand, in *Phase Mode* it is required to keep the selected Input active while supplying the ***Reading Phase ON*** command (Setup time = 0; Hold time = 20 ms).

> **NOTE**
> The ***Store Input*** procedure allows updating only the first match code of the database.

- 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.

Store Input

It defines the digital input used to automatically store the Match Code (*External Trigger* or *Input 2*) See the above description. By selecting *None* the Input will not be used to Store The Match Code.

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 Store Input or 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.

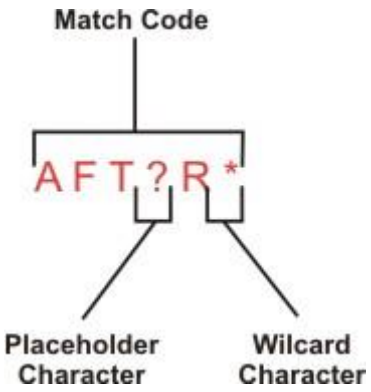
Wildcard Character

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 and its configuration 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.

Lens Type & S/N

Add the optical Lens Type and Serial Number to the reader information.

Internal Lighting System & S/N

Add the internal Lighting System Type and Serial Number to the reader information.

Diaphragm Aperture

Add the optical Lens Diaphragm Aperture to the reader information.

Focus Distance (mm)

Add the optical Lens Focus Distance (in mm) 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.

The *Decoded but Not Collected* event is a misread event in a **CODE COLLECTION**, that is, at least one code in the image meets all the **CODE FILTER SETTING** requirements except the code content (***Match Code***).

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, configuration and the number of images already allocated to the Transfer Array Image Buffer.
- the type of images collected (VGA or SXGA).

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.

NOTE

The Last Image stored in the Image Buffer can be sent over the Image Socket channel, (if enabled and set as Client with UDP protocol). To do this the Host must send the following command string over the Data Socket channel:

<ESC> [Z (hex values **1B 5B 5A**)

The Reader will answer, on the same Data Socket channel with one of the following strings:

<ESC>W1<CR><LF> (hex values **1B 57 31 0D 0A**) In case of error (image NOT present in the Image Buffer or Image Buffer not enabled)

<ESC>K<CR><LF> (hex values **1B 4B 0D 0A**) In case of image present in the Image Buffer

VisiSet Image Saving

Download Event

In Run Mode, allows saving an image to a file through the VisiSet™ program by using the VisiSet™ communication channel (serial or Image Socket).

- *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 to which 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 subsampling 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 following windows where it is visualized decreases: Standard Setup Wizard, Calibration Tool, Symbol Verification, Data Matrix Setup Wizard.

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 *(Focus)*, 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. This also disables the Backup and Restore feature using either the BM100 button or the BM150 menu.

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 Diamonds™ optical 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.
- *Enable DHCP*: releasing the button at this position starts the procedure to automatically enable the on board Ethernet (if disabled), enable DHCP Client, and assign an IP address to the Matrix 410™ Ethernet reader. For Serial models it automatically enables the CBX Gateway Host Interface Type to Ethernet TCP/IP (BM2x0 or QL500), enables CBX Ethernet System DHCP Client, and assigns an IP address to the CBX Gateway Host Interface module.
- *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 410™ Reference Manual for Bar Graph details.
- *Focus/Locate (Focus)*: releasing the button at this position allows activating/deactivating the Blue Diamonds™ optical system, which is used in the focus and positioning procedures.
- *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 Diamonds™ optical 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.
- *Enable DHCP*: releasing the button at this position starts the procedure to automatically enable the on board Ethernet (if disabled), enable DHCP Client, and assign an IP address to the Matrix 410™ Ethernet reader. For Serial models it automatically enables the CBX Gateway Host Interface Type to Ethernet TCP/IP (BM2x0 or QL500), enables CBX Ethernet System DHCP Client, and assigns an IP address to the CBX Gateway Host Interface module.
- *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 410™ Reference Manual for Bar Graph details.
- *Focus/Locate (Focus)*: releasing the button at this position allows activating/deactivating the Blue Diamonds™ optical system, which is used in the focus and positioning procedures.
- *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 Diamonds™ optical 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.
- *Enable DHCP*: releasing the button at this position starts the procedure to automatically enable the on board Ethernet (if disabled), enable DHCP Client, and assign an IP address to the Matrix 410™ Ethernet reader. For Serial models it automatically enables the CBX Gateway Host Interface Type to Ethernet TCP/IP (BM2x0 or QL500), enables CBX Ethernet System DHCP Client, and assigns an IP address to the CBX Gateway Host Interface module.
- *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 410™ Reference Manual for Bar Graph details.
- *Focus/Locate (Focus)*: releasing the button at this position allows activating/deactivating the Blue Diamonds™ optical system, which is used in the focus and positioning procedures.
- *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 Diamonds™ optical 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.
- *Enable DHCP*: releasing the button at this position starts the procedure to automatically enable the on board Ethernet (if disabled), enable DHCP Client, and assign an IP address to the Matrix 410™ Ethernet reader. For Serial models it automatically enables the CBX Gateway Host Interface Type to Ethernet TCP/IP (BM2x0 or QL500), enables CBX Ethernet System DHCP Client, and assigns an IP address to the CBX Gateway Host Interface module.
- *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 410™ Reference Manual for Bar Graph details.
- *Focus/Locate (Focus)*: releasing the button at this position allows activating/deactivating the Blue Diamonds™ optical system, which is used in the focus and positioning procedures.
- *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 Serial Port (COM) RX*: the reader is receiving on the Main Serial COM port
- *Main Serial Port (COM) TX*: the reader is transmitting on the Main Serial COM port

Blue Diamonds Status

Enables/disables the Blue Diamonds™ optical system functioning. If disabled, the Blue Diamonds™ cannot be activated.

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), Focus (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), Focus (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. It is possible to select more than one communication interface so that all of the selected interfaces will transmit Test Mode Data. To do this, from the pull down menu, hold down the CTRL key and select the desired interfaces with the mouse. The interfaces will be listed separated by a comma. The possible selections are:

- *None*: Test Mode Data Tx is disabled.
- *Auxiliary Port*: Test Mode Data Tx is enabled on the Auxiliary serial interface.
- *Main Port*: Test Mode Data Tx is enabled on the Main serial interface.
- *Ethernet Data Socket*: Test Mode Data Tx is enabled on the onboard Ethernet interface.
- *ID-NET*: Test Mode Data Tx is enabled on the ID-NET interface.
- *Fieldbus Port*: Test Mode Data Tx is enabled on the Fieldbus 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 410™ 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 Standard 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 (1D, 2D, Postal, etc.)
- *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*
- *1D And 2D Only*: attempts to process and decode only all the possible 1D and 2D symbologies (excludes Postal)

NOTE

The following codes are always excluded from the Autolearning procedure:
Pharmacode, MSI, Matrix 2 of 5, Standard 2 of 5

This parameter also affects the same functions performed through the Standard 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 free slot, 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 X-PRESS™ *Autolearning*, *Calibration Only* and *Code Setting Only* functions.
The X-PRESS™ *Autolearning* procedure exits automatically after this timeout expires.

If set to 0, the X-PRESS™ *Autolearning Timeout* is disabled.

This parameter also affects the same functions performed through the Standard 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 410™ 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.

Display

Display Language

This parameter sets the language used for all messages on the display.

Selection: **English (United States)**
French (France)
German (Germany)
Italian (Italy)
Japanese (Japan)

Layout Monitor

For Matrix devices connected to a CBX500/BM150, this parameter determines which type of Reading Mask can be displayed. When selecting "Reading Mask" from the display menu, either the standard Reading Mask will be displayed or the combination Reading Mask/Device State screen displays.

It is valid for devices set to Stand Alone (Other) or Master SYNCHRONIZED topology roles.

Reading Mask Only:

X = code content (or "No Read" or "Multiple Read")
Y = Good Read, No Read, Multiple Read and Partial Read counters on the last 100 codes read (%)
S = Reading Mask for Stand Alone or Master plus Slave readers 1 - 15
(0 = No Read, 1 = Good Read, M = Multiple Read)
T = Reading Mask for Slave readers 16 - 31
(0 = No Read, 1 = Good Read, M = Multiple Read)

Reading Mask/Device Status:

X = Recognized code label data (or "No Read" or "Multiple Read")
Y = Phase Counter (range: 0000000 to 9999999)
Z = Good Read or Multiple Read counters (%)
S = Reading Mask for Stand Alone or Master plus Slave readers 1 - 15
(0 = No Read, 1 = Good Read, M = Multiple Read)
U = Diagnostic condition for Stand Alone or Master plus Slave readers 1 - 15:
* = reader OK
- = reader not detected at startup
? = reader detected at startup but not responding to diagnostic polling
! = reader diagnostic error

Diagnostics

Heartbeat

The Heartbeat message is used to signal the device's or system'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) and can be enabled on the desired communication interface (Main/Auxilary/Fieldbus/Ethernet Data Socket), except for the one currently used by VisiSet.
If, for example, VisiSet is connected to the Auxiliary Serial Port, the Heartbeat message will be transmitted on Main Port or Fieldbus or Ethernet Data Socket according to the system configuration and the user's selection.

Diagnostics

For information on Diagnostic Error Messages see Diagnostic Error Conditions.

Status

If enabled, it allows configuring the Diagnostics parameters. Diagnostic error messages (or alarms) can be used to activate digital outputs when the Activate on any Diagnostic Error parameter is selected and/or they can be sent as strings when the Diagnostic Message Format parameter is set as a *User Defined String*.

Refresh Time (sec)

It defines the frequency at which the diagnostic messages are updated. This parameter excludes the network diagnostics which are updated at a fixed internal frequency.

LED Indication on Slave Failure

This parameter has meaning only for a Master reader since it allows signalling a network Slave Failure (ID-NET™ or Master/Slave RS232 network). When enabled, if a Slave Failure is detected, the Master reader's Status and Ready LEDs blink simultaneously and the GOOD LED remains on constantly.

Slave Diagnostics

This parameter has meaning only for a Master reader since it enables all diagnostic messages coming from the network Slaves through the Master (ID-NET™ or Master/Slave RS232) to the host. If disabled, Slave reader alarms will be ignored and will not be sent to the host.

Local Network Failure

This parameter allows activating an alarm signalling a malfunctioning of the onboard ID-NET™ network controller, independent from the device topology role (Master, Slave, Other).

Fieldbus Communication Failure

This parameter allows activating an alarm whenever there is a communication error between the reader and the Fieldbus module inside the CBX connection box.

Fieldbus Configuration Error

This parameter allows activating an alarm whenever a configuration error has occurred between the reader and the Fieldbus module inside the CBX connection box.

Fieldbus DHCP Problem

This parameter allows activating an alarm whenever there is a communication problem between the DHCP server and the Fieldbus module inside the CBX connection box.

Fieldbus Type Mismatch

This parameter allows activating an alarm whenever the Fieldbus module inside the CBX doesn't match the one saved in the reader configuration memory.

Wrong Rotary Switch Selection

This parameter allows activating an alarm whenever one or more of the selected BM100 Rotary Switch settings inside the CBX doesn't match the reader configuration memory.

Backup Memory Communication Failure

This parameter allows activating an alarm whenever there is a communication error between the reader and the Backup Memory (BM100 module inside the CBX connection box, QLM).

Actions

Heartbeat TX Mode

This parameter is available when the Heartbeat Status parameter is enabled. Defines the transmission mode 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 Heartbeat 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.

Tx Mode

The diagnostic message can be transmitted to the system by the Stand Alone or Master reader either asynchronously (at programmed intervals), or synchronously with the code.

Tx Refresh Timeout (sec)

It defines the time interval in which the diagnostic messages will be transmitted if Tx Mode is asynchronous (On Timeout).

Interface Transmission [Aux, Main, Fieldbus, Ethernet (Data, Modbus, Ethernet/IP Sockets) , CBX Ethernet (Data, Modbus, Ethernet/IP Sockets)]

The interface(s) on which the diagnostic messages will be transmitted can be selected (enabled) if Tx Mode is asynchronous (On Timeout). The selected interface can be different from the code transmission interface.

NOTE

The Main Interface is not compatible with Fieldbus and/or User Socket selections. If a Fieldbus module is installed in the CBX500 connection box, the Main Interface selection will be ignored.

Message Position

If Tx Mode is synchronous (With Code), the diagnostic messages will be transmitted on the same interface used for code transmission. This selection determines if the messages will replace the code or be appended to it.

Example:

<STX><10DL><CR><LF> code
<STX><00#185><ETX> diagnostic message

Format

The format of diagnostic messages in general is <Header><Message><Terminator> where the Internal Numeric Message has the following syntax:

xx#yyy space...

xx is the address of the reader: 00 = Master, all others = Slaves.
yyy is the diagnostic error number as described in the Diagnostic Error Conditions tables.

Examples

Stand Alone	<**STX**>**#189**<**ETX**>	Numeric Diagnostic Message Fieldbus communication failure
Master	<**STX**>00#**189** 01#**1**<**ETX**>	Internal Numeric Message Master (00) Fieldbus communication failure + Slave (01) not responding
	<**STX**>00#**<** 01#**^**<**ETX**>	User Defined Message Master (00) Fieldbus communication failure (default string) + Slave (01) not responding (default string)
	<**STX**>00#Fieldbus Comm Fail 01#Slave Not Responding**^**<**ETX**>	User Defined Message Master (00) "Fieldbus Comm Fail" (user defined string) + Slave (01) "Slave Not Responding" (user defined string)

Header String

A Header String (up to 128 bytes) can be defined and transmitted as a block preceding the diagnostic 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 diagnostic message.

Selections: characters from **NUL** (00H) to **~** (7EH).

Diagnostic Message Format

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

Heartbeat Message Format

This parameter is available when the Heartbeat Status parameter is enabled. It defines whether the Heartbeat message will be sent as an *Internal Numeric Message* or as a *User Defined Message*.

In this case the ***Internal Numeric Message*** has the following syntax:

xx#999

where:

xx is the node address of the reader (if Heartbeat Add Node Address is enabled): 00 = Master, all others = Slaves,
999 is the internal number associated with the Heartbeat Message.

Heartbeat Add Node Address

If enabled (default), the number of the node is added as information preceding the heartbeat message (conforms to the Heartbeat Message Format shown above). If disabled, the node address is removed from the heartbeat message format.

In this case the ***Internal Numeric Message*** has the following syntax:

999

User Defined Messages

The following messages substitute the *Internal Numeric Messages* when Diagnostic Message Format is set to *User Defined Messages*.

The format of diagnostic messages in general is <Header><Message><Terminator> where the User Defined Message has the following syntax:

xx#yyy space...

xx is the address of the reader: 00 = Master, all others = Slaves.
yyy is the User Defined Message string

Examples

Stand Alone	<**STX**>**#189**<**ETX**>	Numeric Diagnostic Message Fieldbus communication failure
Master	<**STX**>00#**189** 01#**1**<**ETX**>	Internal Numeric Message Master (00) Fieldbus communication failure + Slave (01) not responding
	<**STX**>00#**<** 01#**^**<**ETX**>	User Defined Message Master (00) Fieldbus communication failure (default string) + Slave (01) not responding (default string)
	<**STX**>00#Fieldbus Comm Fail 01#Slave Not Responding**^**<**ETX**>	User Defined Message Master (00) "Fieldbus Comm Fail" (user defined string) + Slave (01) "Slave Not Responding" (user defined string)

Local Network Failure

It defines the message string (up to 128 bytes) that will be sent as a diagnostic message whenever the local ID-NET™ network controller failure is present.

Slave No Reply

This message is sent only by the Master reader. It defines the message string (up to 128 bytes) that will be sent as a diagnostic message whenever there is no response from slave number **xx**, where xx is the slave address.

Slave Address Duplication

This message is sent only by the Master reader. It defines the message string (up to 128 bytes) that will be sent as a diagnostic message whenever there are two or more slaves that have the same address xx.

Slave Net Configuration

This message is sent only by the Master reader. It defines the message string (up to 128 bytes) that will be sent as a diagnostic message whenever slave xx has been (re)configured.

Fieldbus Communication Failure

It defines the message string (up to 128 bytes) that will be sent as a diagnostic message whenever there is a communication error between the reader and the Fieldbus module inside the CBX connection box.

Fieldbus DHCP Problem

It defines the message string (up to 128 bytes) that will be sent as a diagnostic message whenever there is a communication problem between the DHCP server and the Fieldbus module inside the CBX connection box.

Fieldbus Configuration Error

It defines the message string (up to 128 bytes) that will be sent as a diagnostic message whenever a configuration error has occurred between the reader and the Fieldbus module inside the CBX connection box.

Fieldbus Type Mismatch

It defines the message string (up to 128 bytes) that will be sent as a diagnostic message whenever the Fieldbus module inside the CBX doesn't match the one saved in the reader configuration memory.

Wrong Rotary Switch Selection

It defines the message string (up to 128 bytes) that will be sent as a diagnostic message whenever one or more of the selected BM100 Rotary Switch settings inside the CBX doesn't match the reader configuration memory.

Backup Memory Communication Failure

It defines the message string (up to 128 bytes) that will be sent as a diagnostic message whenever there is a communication error between the reader and the Backup Memory (BM100 module inside the CBX connection box, QLM).

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

Diagnostic Error Conditions

The following tables summarize all Internal Numeric Error Messages generated when working in the network.

Diagnostic Error Messages

Stand Alone / Master/ MULTIDATA Slave

Diagnostic Error Number	Meaning
[151]	**Local Network Failure:** a local ID-NET™ network controller error has occurred.
[185]	**Backup Memory Communication Failure:** there is a communication error between the reader and the Backup Memory (BM100 module inside the CBX connection box, QLM).
[187]	**Wrong Rotary Switch Selection:** one or more of the selected BM100 Rotary Switch settings inside the CBX doesn't match the reader configuration memory.
[189]	**Fieldbus Communication Failure:** there is a communication error between the reader and the Fieldbus module inside the CBX connection box.
[191]	**Fieldbus Type Mismatch:** the Fieldbus module inside the CBX doesn't match the one saved in the reader configuration memory.
[193]	**Fieldbus Configuration Error:** a configuration error has occurred between the reader and the Fieldbus module inside the CBX connection box.
[195]	**Fieldbus DHCP Problem:** a communication problem has occurred between the DHCP server and the Fieldbus module inside the CBX connection box.

Master only

Diagnostic Error Number	Meaning
[1]	**Slave xx No Reply**: no response from slave number **xx**, where xx is the slave address.
[64]	**Slave Address xx Duplication**: two or more slaves have the same address xx.
[80]	**Slave xx Net Configuration**: slave xx has been (re)configured.

NOTE

- Errors [1] and [80] may be detected whenever any reader configuration changes.
- Error [64] may be detected a few minutes after the problem is generated and it is maintained until the master reader configuration changes or until the next power cycle of the master reader itself.
- Error [1] may be detected before Error [64] is detected due to the latency required for Error [64] detection.

SYNCHRONIZED Slave only

Diagnostic Error Number	Meaning
[151]	**Local Network Failure:** a local ID-NET™ network controller error has occurred.
[185]	**Backup Memory Communication Failure:** there is a communication error between the reader and the Backup Memory (BM100 module inside the CBX connection box, QLM).
[187]	**Wrong Rotary Switch Selection:** one or more of the selected BM100 Rotary Switch settings inside the CBX doesn't match the reader configuration memory.

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>

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 410
Code Field Justification: *left*
Code Field Length: *15*
Fill Character: *@ (at symbol)*

Transmitted Code Field:

MATRIX 410@@@@@

- 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

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

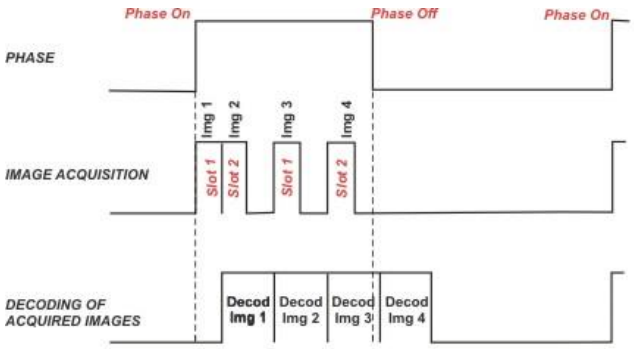
<Header>MULREAD1<Separator>NOREAD2<Terminator>

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:

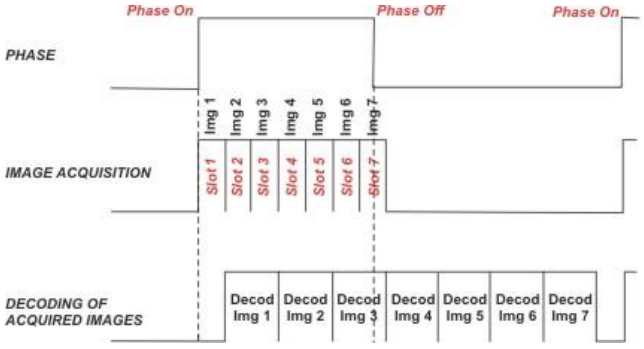
Operating Mode: *Phase Mode*
Reading Phase ON: *Ext. Trig. Leading Edge*
Reading Phase OFF: *Ext. Trig. Trailing Edge*
Acquisition Trigger: *Continuous*
Image Acquisition Buffer Size: *2*



- 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: *Ext. Trig. Leading Edge*
Reading Phase OFF: *Ext. Trig. Trailing Edge*
Acquisition Trigger: *Continuous*
Image Acquisition Buffer Size: *7*



Digital I/O Examples

- 1 -

This is an example of output activation when setting *ISO-IEC Symbol Contrast* as the ***Activation Event***:

Activation Events:	*ISO-IEC Symbol Contrast*
ISO-IEC 16022-18004 Threshold:	*Grade B*
Number of Reading Phases:	*5*
Number of Events:	*3*

Result:
The reader output is activated when three code labels with contrast <Grade B are read within the last 5 collections.

Digital Output Control by External Host Command

The Digital Outputs can be controlled (in addition to other activation events or exclusively) by an external Host command.

It is possible to activate/deactivate the Matrix reader digital outputs by sending specific programming strings over one of the Serial interfaces or over the Ethernet interface.
The following methods are available:

1. Activation Event only
The external host activates the output; the output is deactivated according to the programming of the Deactivation Events parameter. The Line Function parameter must be *Standard* and the Additional Activation Events parameter must be *External Host Command*.

The output will be activated when the Matrix device receives the following 5-byte Hex string:

0x05 0x4F 0x55 0x54 0xyy

where: byte **yy** has the following bit mask:

bit 0 level of output 1 (0 = ignore, 1 = activate)
bit 1 level of output 2 (0 = ignore, 1 = activate)
bit 2 meaningless
bit 3 meaningless
bit 4 meaningless
bit 5 meaningless
bit 6 meaningless
bit 7 meaningless

No reply is sent to the Host.

2. Exclusive Control
The external host activates and deactivates the output(s) exclusively according to the programming string. The Line Function parameter must be *External Host Command*. The output will be changed when the Matrix device receives the following 5-byte Hex string:

0x05 0x4F 0x55 0x54 0xyy

where: byte **yy** has the following bit mask:

bit 0 level of output 1 (0 = low, 1 = high)
bit 1 level of output 2 (0 = low, 1 = high)
bit 2 meaningless
bit 3 meaningless
bit 4 meaningless
bit 5 meaningless
bit 6 meaningless
bit 7 meaningless

No reply is sent to the Host.

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**

Remote Image Transfer

The remote image transfer allows transmitting images and saving them to a file on an FTP Server via Ethernet. In particular, a remote PC running an FTP server can communicate with a Matrix 410 xxx-010 reader through the on-board Ethernet Image FTP Client service, or a Matrix 410 xxx-000 reader (non-Ethernet, connected to a QL500 or a CBX500 with a BM2x0 Ethernet TCP/IP module) through the CBX Ethernet Image FTP Client service.

To guarantee the image transfer and saving, set the **Image FTP Client** parameters as follows:

• **FTP CLIENT**:	***Status:***	Any value but *Disabled*
	Image Subsampling	User defined
	Image Format:	User defined
	FTP Server Address:	User defined
	User Name:	User defined
	Password:	User defined
	Image Saving Path:	User defined
	Image File Name:	User defined
	Max Different Files to Save:	User defined
	File Type:	User defined

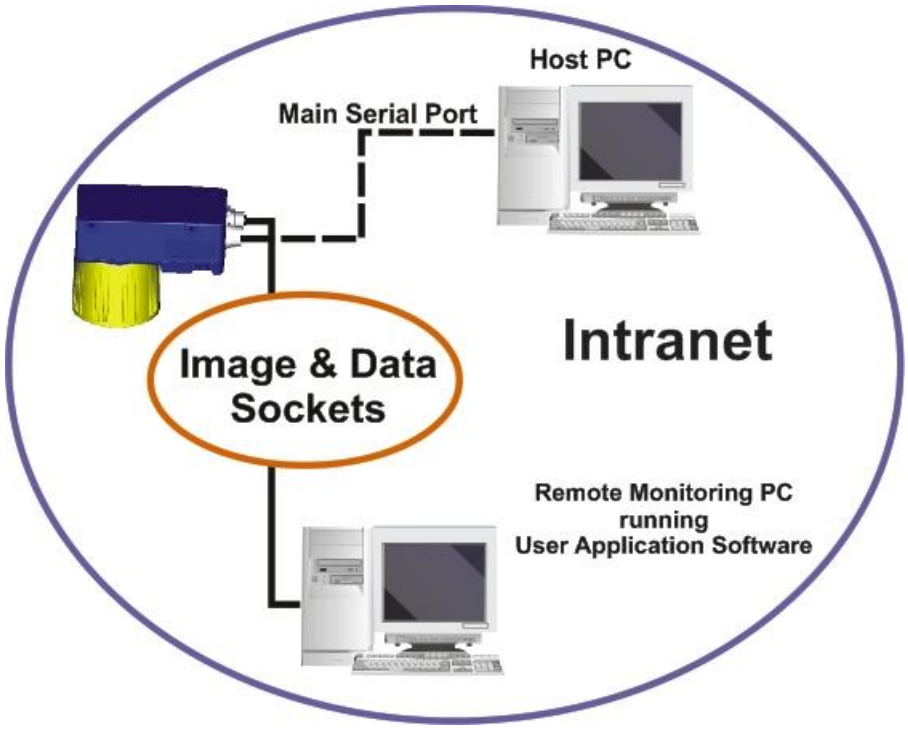
Remote Monitoring

The remote monitoring allows checking the functioning of the reader via Ethernet.

User Application Software

A remote monitoring PC running user application software can communicate with either a Matrix 410 xxx-010 reader through the on-board Ethernet **DATA SOCKET** and **IMAGE SOCKET**, or a Matrix 410 xxx-000 (non Ethernet) reader through the CBX Gateway (BM2x0 or QL500) Ethernet **DATA SOCKET** and **IMAGE SOCKET**.

For on-board Ethernet models, the Main Serial Port is available as an alternative for Host communications.



It is necessary to set the **DATA SOCKET** and **IMAGE SOCKET** parameters as follows:

- **DATA SOCKET**:

Status:	*Enabled*
Header String:	User defined
Terminator String:	*<13><10>*
Protocol:	*TCP*
Port:	*51236*
Type:	*Server*

- **IMAGE SOCKET**:

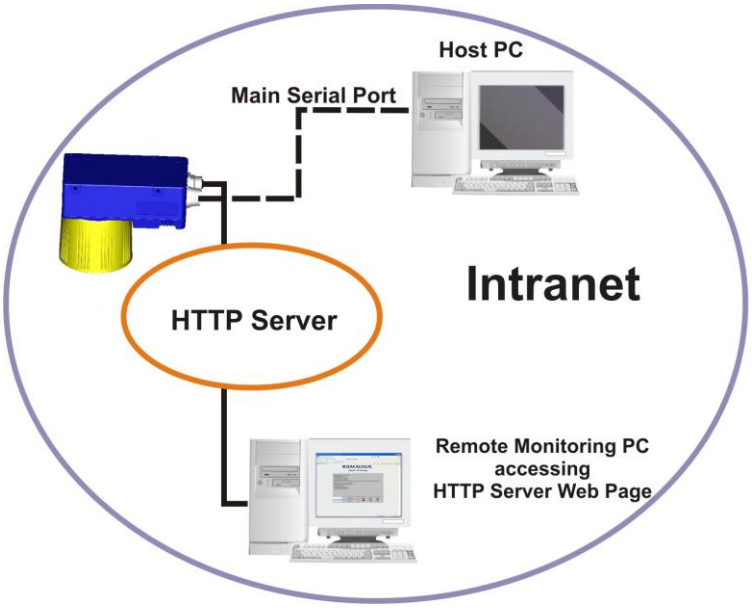
Status:	Any value but *Disabled*
Image Subsampling:	User defined
Image Format:	User defined
Jpeg Quality:	User defined
Protocol:	*TCP*
Port:	*51237*
Type:	*Server*

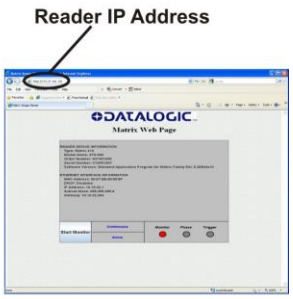
HTTP Server Web Page

(Matrix 410 xxx-010 on-board Ethernet models only)

For on-board Ethernet models, a remote monitoring PC can access a web page through the on-board Ethernet **HTTP SERVER**.

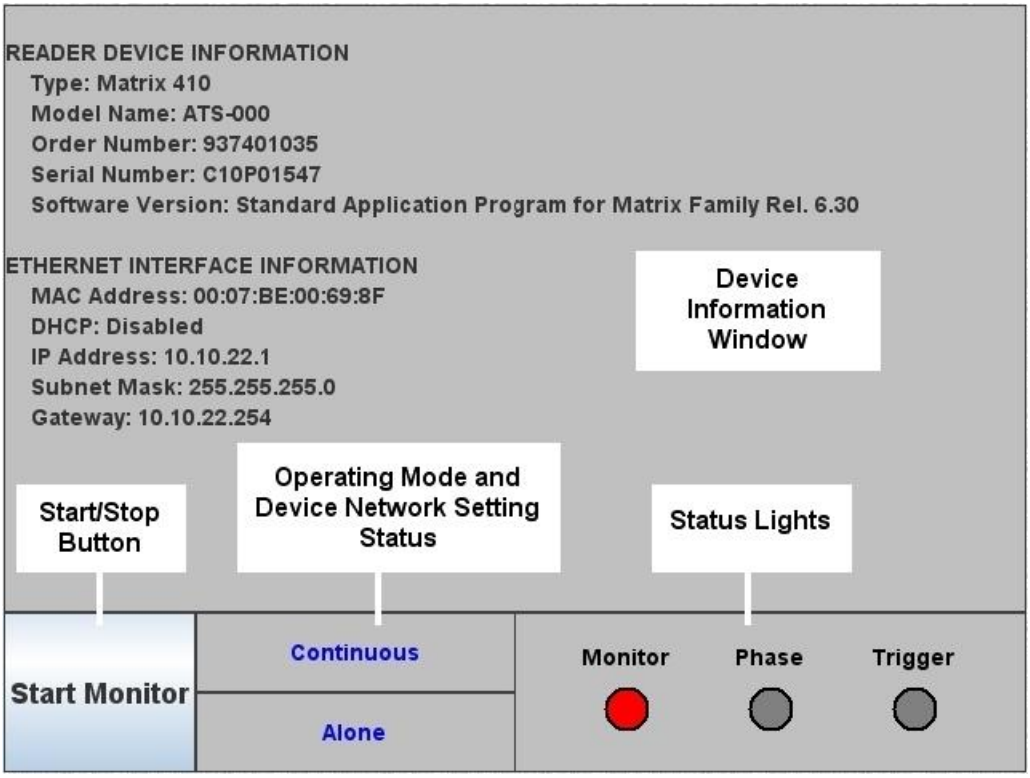
By typing the Reader IP Address into the web browser of the remote PC, a monitoring web page appears on the screen of the remote PC and shows a real-time image:



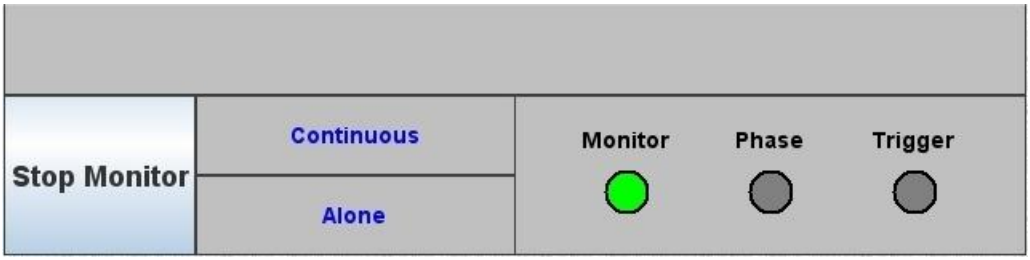


To guarantee the display of the monitoring web page, it is necessary to enable the **HTTP Server**.

The web page Monitor presents the reader device information and several status indicators as shown in the figure:



Click on the Start Monitor button to begin monitoring the reader.



The Operating Mode field shows which Operating Mode is used: One Shot, Continuous, or Phase Mode.

The Device Network Setting Status field shows the reader's network status: Alone, Master ID-Net Sync, Slave ID-Net Sync, Master ID-Net Multidata, Slave ID-Net Multidata, Master RS232 TypeA, Slave RS232 TypeA, Master RS232 TypeM, Slave RS232 TypeM.

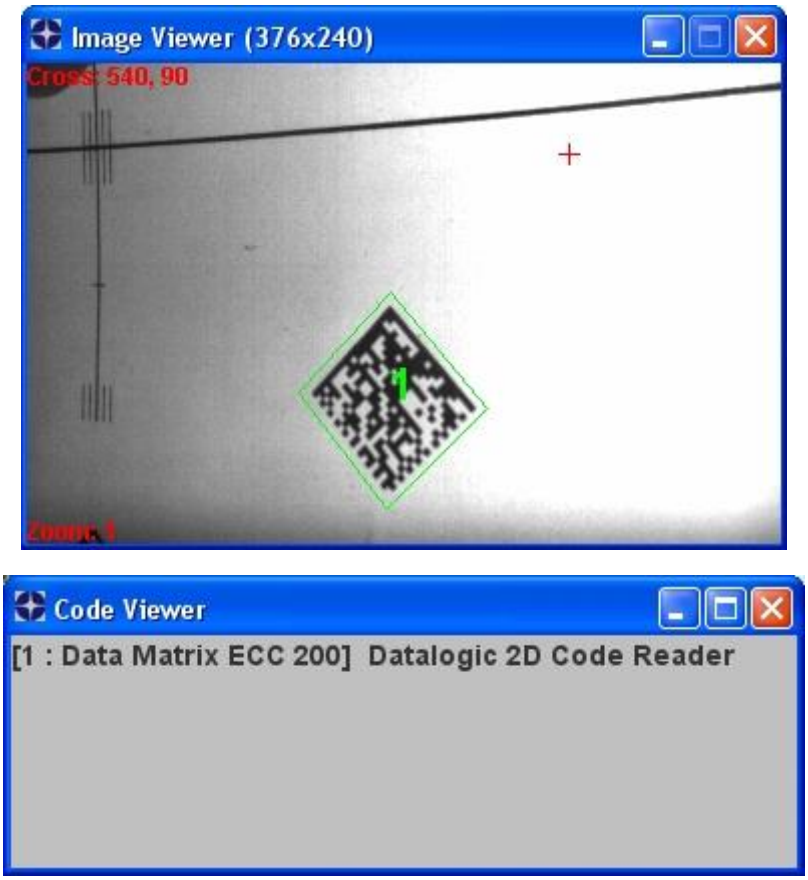
The Status Lights show: Monitor running (green) or stopped (red); Phase signal (toggling green=Reading Phase ON/red=Reading Phase OFF when in Phase Mode) Trigger signal (toggling green=Acquisition Trigger ON/red=Acquisition Trigger OFF when in One Shot or Phase Mode).

When the Monitor is started (running), the Image Viewer and Code Viewer windows will open and show the codes being read and the decoded content. When multiple codes are read in the same image the graphic representation in the Image Viewer window will show a number associated with the code read and that number will also be shown in the Code Viewer window next to the decoded string.

NOTE

If working in Continuous Operating mode while the web page Monitor is running, you may have to Stop the Monitor in order to Connect/Disconnect VisiSet™ to/from the reader.

You can zoom the image with the mouse wheel while the cursor is over the Image Viewer window and also the pixel coordinates are shown as you pass the cursor over the image.



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 one of the serial interfaces or over the Ethernet interface.

These strings take the form of ESCAPE sequences and are transmitted from the Host system to the Matrix reader on either the auxiliary RS232 serial interface, main RS232/RS485 serial interface or Ethernet interface (only for Matrix 410 x00-010 models).

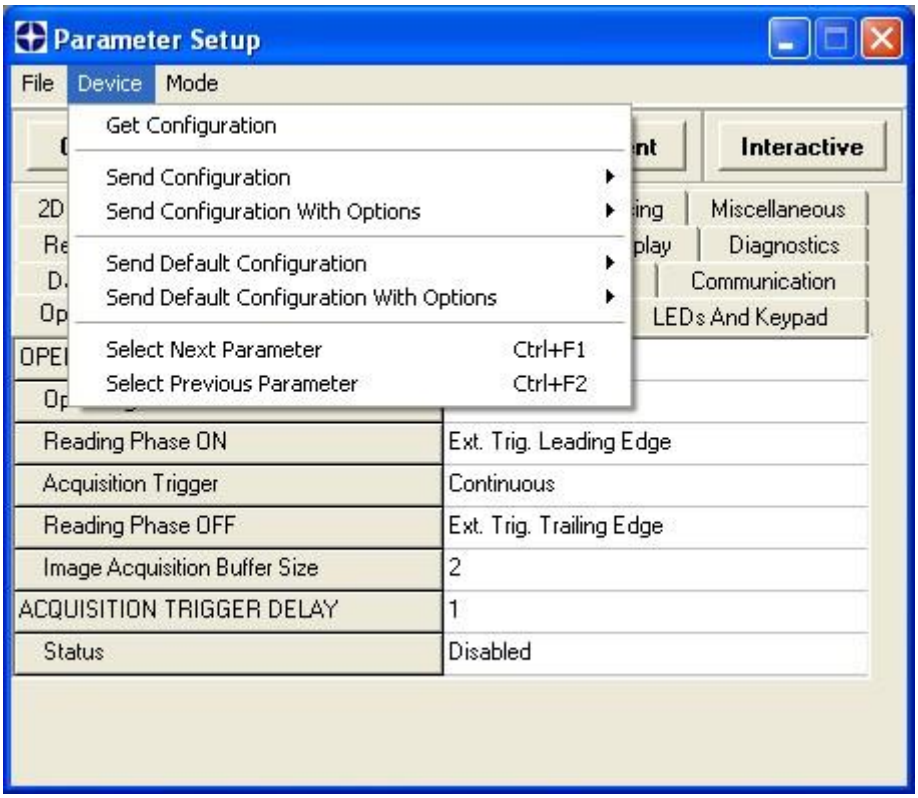
This is called Host Mode programming.

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 Position in a Network (ID-NET™, Master/Slave RS232, MUX 32, Ethernet) and are not influenced by the "Send Default Configuration" and "Send Configuration" commands. This allows individual devices to be configured differently without affecting their recognized position in the network.

The following is a list of the Environmental Parameters:

READING SYSTEM LAYOUT
- Device Network Setting
- Number of Slaves

DEVICE NETWORK SETTING
- Topology Role
- ID-NET Slave Address
- Network Baud Rate
- Acquisition Trigger String (available only in Multidata configuration)
- Reading Phase ON String (available only in Multidata configuration)
- Reading Phase OFF String (available only in Multidata configuration)
- Header String (available only in Slave Multidata configuration)
- Terminator String (available only in Slave Multidata configuration)
- Link Failure String (available only in Master Synchronized configuration)
- Link Failure Timeout (ms) (available only in Master Synchronized configuration)

EXPECTED SLAVE DEVICES
- Status
- Device Description
- Device Network Name

MAIN PORT
- Communication Protocol
- Multidrop Address

ETHERNET SYSTEM (on board)
- Status
- DHCP Client
- IP Address
- Subnet Mask
- Gateway Address
- DNS1 Address

HOST INTERFACE
- Host Interface Type

CBX ETHERNET SYSTEM (CBX with Host Interface Modules)
- Status
- DHCP Client
- IP Address
- Subnet Mask
- Gateway Address

PROFIBUS
- Node Address

DEVICENET
- Node Address

ETHERNET-IP
- IP Addressing Mode
- IP Address
- Subnet Mask
- Gateway Address

PROFINET IO
- IP Addressing Mode
- IP Address
- Subnet Mask
- Gateway Address

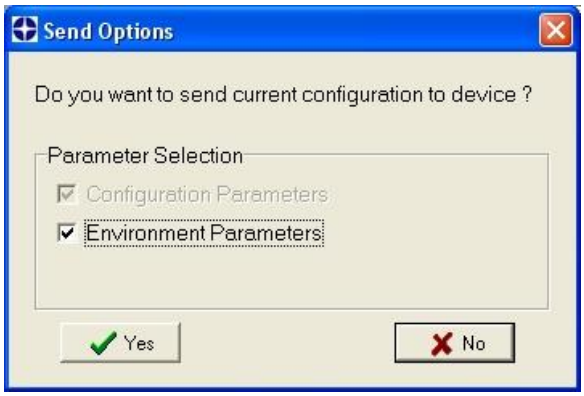
CANOPEN
- Node Address

CC-LINK
- Node Address

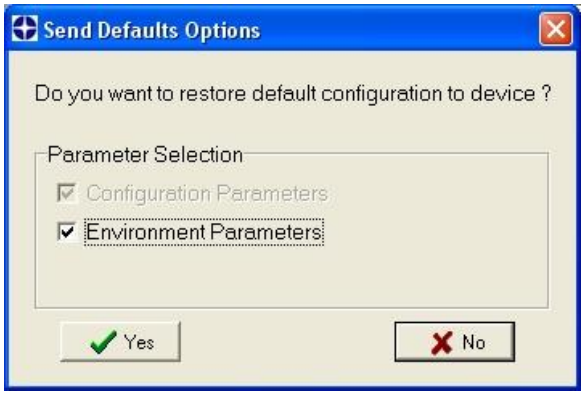
MODBUS TCP
- IP Addressing Mode
- IP Address
- Subnet Mask
- Gateway Address

MISCELLANEOUS
- Reader Name
- User Name
- Line Name
- Lens Type & S/N
- Internal Lighting System & S/N
- Diaphragm Aperture
- Focus Distance (mm)

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:



Configuration Through Ethernet

IP Address Alignment Procedures

In order to connect a Matrix reader to VisiSet™ using CBX Ethernet TCP/IP or Embedded Ethernet TCP/IP, the Ethernet IP Addressing parameters must be aligned between VisiSet™ and the reader.

In order to find the reader using the VisiSet™ Look For Devices On Network tool, the reader and VisiSet™ must be on the same network (not through a sub-network or router).

Using Setup Programming Barcodes

DHCP Enabled

1. Printout the "Setup Procedure Using Programming Barcodes" document from the Mini-DVD and read the **CBX Ethernet TCP/IP enabled DHCP enabled** barcode or **Embedded Ethernet TCP/IP enabled DHCP enabled** barcode using the X-PRESS™ Learn function (as described in the Reference Manual).

2. Set the VisiSet™ Options>Communication window to Ethernet and click on *Look For Devices On Network*. The Matrix reader will appear with its assigned IP Address in the list. If more than one device is found, verify the correct device by its MAC Address written on the product label.

3. Input the IP address from the list in the IP Address field of the Device Ethernet Channel Address section of the VisiSet™ Options>Communication window (or double-click on the device in the list). The IP port number is 51235. Then click Save.

4. Perform a Connect (to device) from VisiSet™.

NOTE

Devices working in DHCP may be assigned different IP addresses at each powerup, therefore steps 2 - 4 of the above procedure may need to be repeated at successive connections between VisiSet™ and the reader.

Static IP Addressing (DHCP Disabled)

1. For models connected to QL500 or CBX with BM2x0 modules: printout the "Setup Procedure Using Programming Barcodes" document from the Mini-DVD and read the **CBX Ethernet TCP/IP enabled DHCP disabled** barcode using the X-PRESS™ Learn function (as described in the Reference Manual).

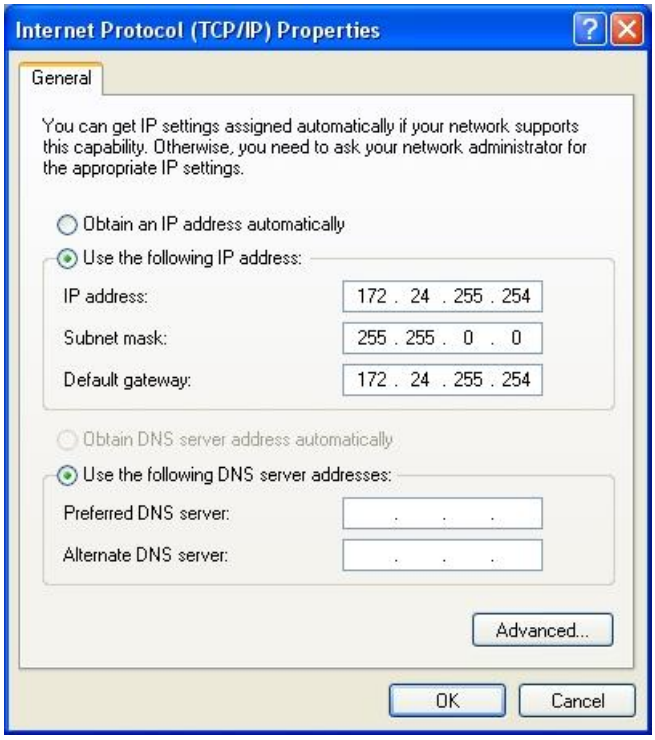
   For Embedded Ethernet models: this is the default setting. To disable DHCP for these models, restore the Factory Default settings (also described in the "Setup Procedure Using Programming Barcodes" document).

2. Before changing the Ethernet network settings on the PC running VisiSet™, close any open applications which use network resources (i.e. Outlook, or Web browser).

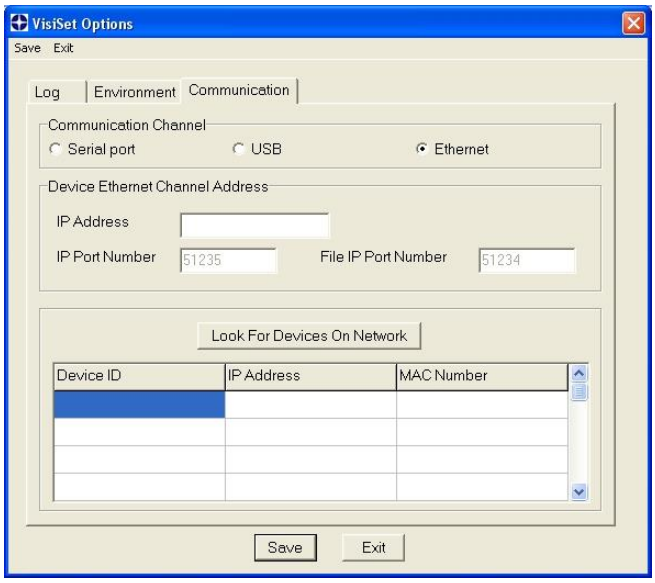
3. On the Configuration PC, from the Control Panel>Network Connections, right-click on the LAN connection icon and open the properties window.

4. Select the Internet Protocol (TCP/IP) item and open the properties window.

5. Set the IP Address fields as follows and click OK to save.



6. In VisiSet select the Ethernet Communication Channel in the Options>Communication window. Then press the Look For Devices On Network button. The Matrix reader will appear with its default IP Address in the list.



7. Input the IP address from the list in the IP Address field of the Device Ethernet Channel Address section of the VisiSet™ Options>Communication window (or double-click on the device in the list). The IP port number is 51235. Then click Save.

8. Perform a Connect (to device) from VisiSet™.

Using the Serial Interface (For models connected to QL500 or CBX with BM2x0 modules)

1. Connect to VisiSet™ through the RS232 Serial Port (enabled by default) and the reader Aux RS232 port.
2. Perform a Connect (to device) from VisiSet™.
3. Set the **CBX GATEWAY** > **Host Interface Type** to *Ethernet TCP/IP* and the desired **CBX ETHERNET SYSTEM** parameters.
4. Send the configuration to the reader then Disconnect from VisiSet™.
5. In VisiSet select the Ethernet Communication Channel in the Options>Communication window. Then press the Look For Devices On Network button. The Matrix reader will appear with newly configured IP Address in the list.
6. Input the IP address from the list in the IP Address field of the Device Ethernet Channel Address section of the VisiSet™ Options>Communication window (or double-click on the device in the list). The IP port number is 51235. Then click Save.
7. Perform a Connect (to device) from VisiSet™.

External Memory Backup and Restore Through VisiSet™

The "External Memory Backup" or "External Memory Restore" functions allow performing Complete Configuration and Environmental parameter storage for network and reading devices. Backup & Restore can be applied to any reader connected through a device having External Backup Memory, regardless of the reader's network configuration. Backup & Restore automatically checks whether a previous backup or configuration is already available for each device speeding the procedure up and making it more secure.

These functions are supported by VisiSet™ for all reading devices having sw 6.10 and later when connected to:

- CBX + BM100 and/or BM2x0 (sw release 2.02.01 and later)
- QL500 (Ethernet TCP/IP) (sw release 2.02.01 and later)
- QLM-Series Gateways (reading device sw release 6.50 and later)

NOTE

- Before executing a Backup on a BM100 backup module make sure the Write Protection switch is set to Unlocked.
- If BM100 and BM2x0 are both installed B&R is automatically performed only on the BM100 module.
- BM2x0 can execute B&R only with Network up and running (network cable connected).
- QL500 can backup up to 10 nodes (Master + 9 slaves).

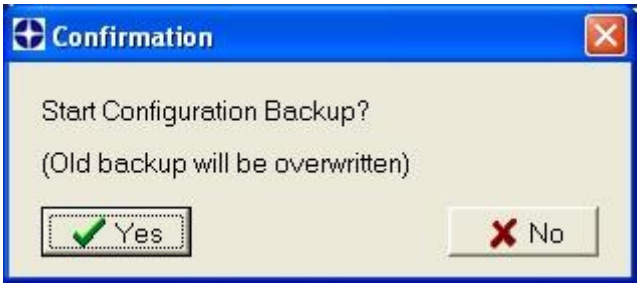
NOTE

For all Matrix 410™ readers having sw 6.56 and later, Backup and Restore also saves the PackTrack Calibration parameters in the External Memory. These parameters however are not included in the configuration file saved to PC. Restoring these parameters must be performed from the External Memory.

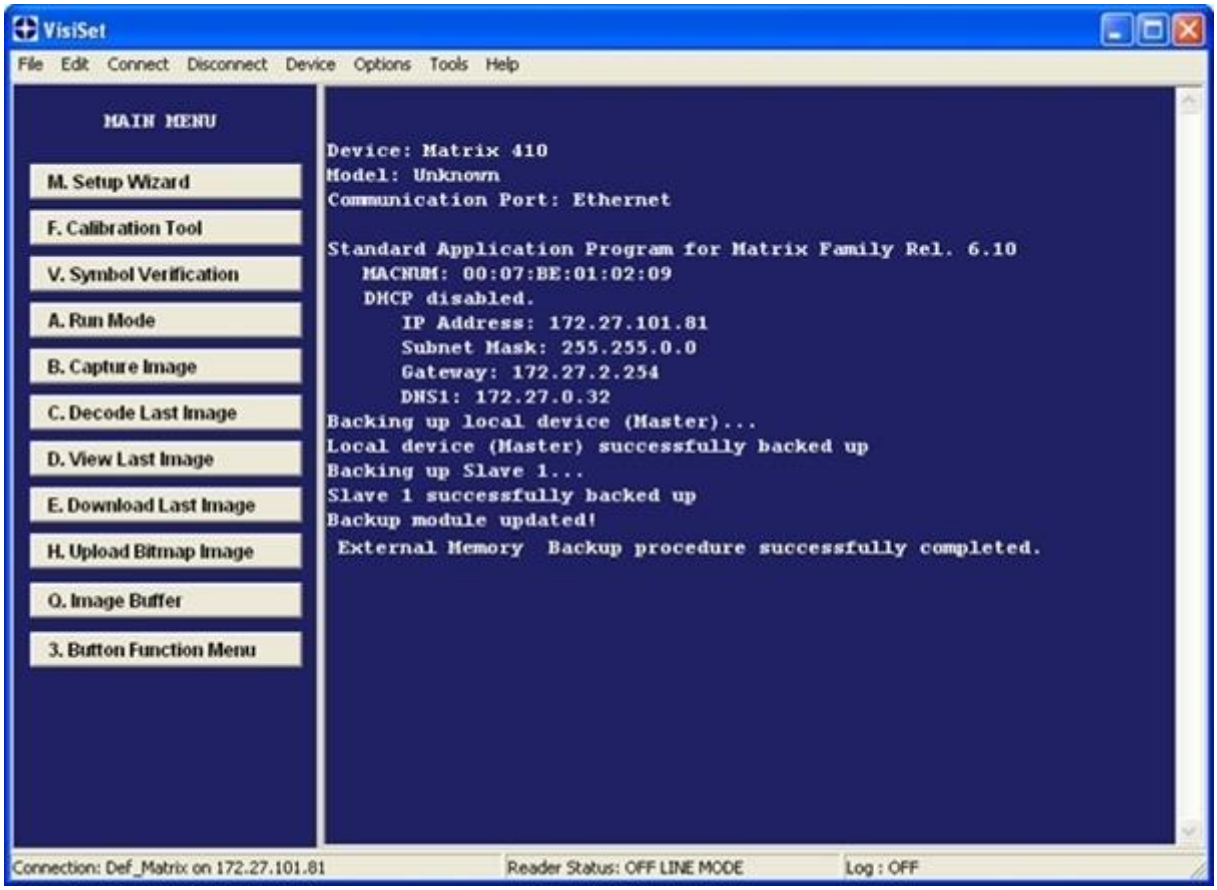
Backup

To perform a **Backup**:

1. Select "External Memory Backup" from the VisiSet™ Device menu
2. You will be warned that the previous backup will be overwritten. Confirm by clicking Yes.



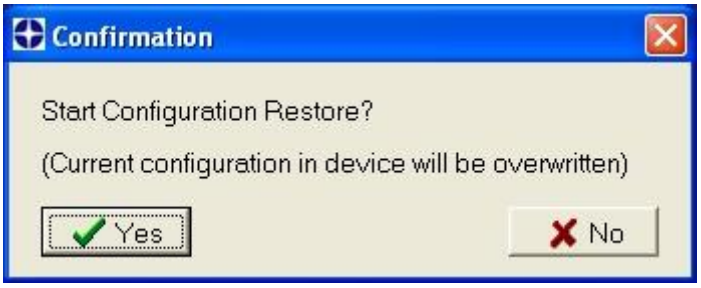
The VisiSet™ Main window shows information as the backup procedure is performed and a message indicating successful completion.



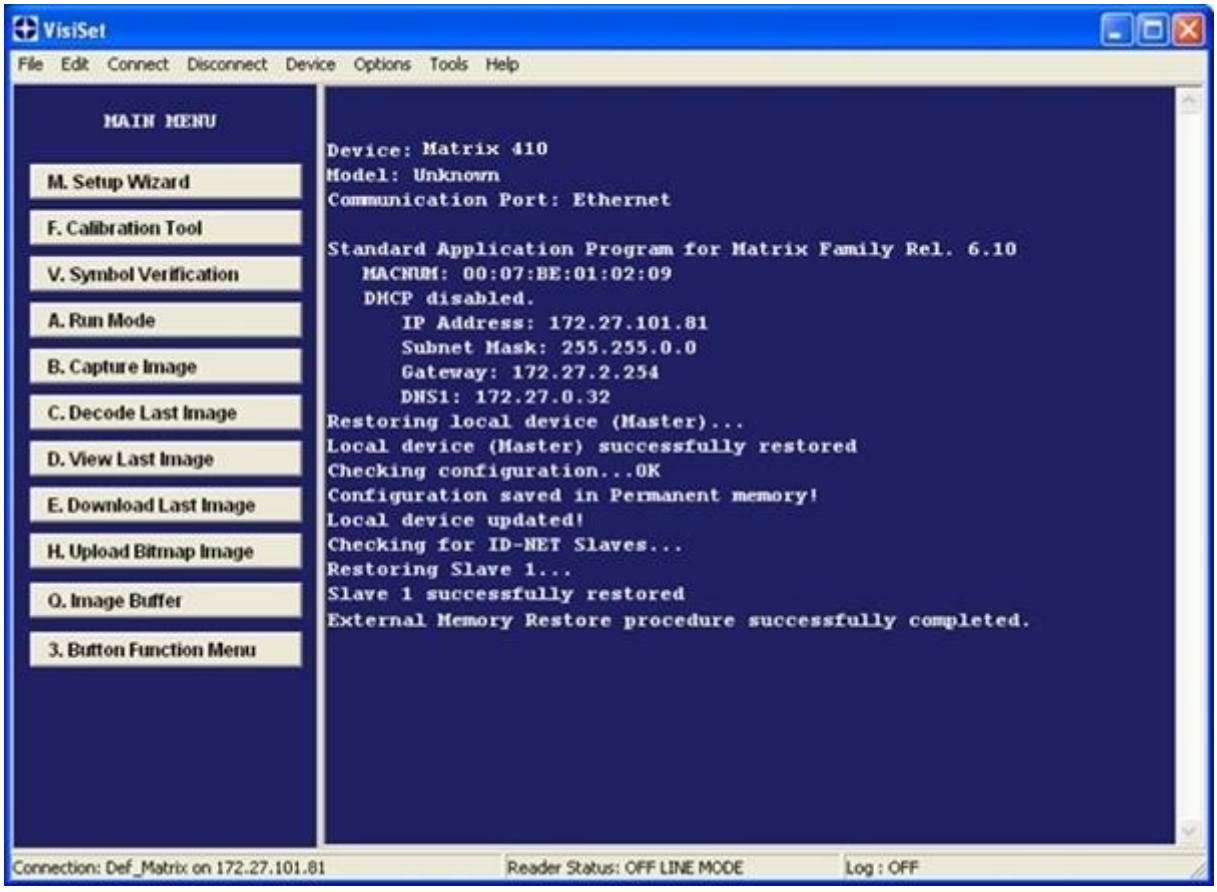
Restore

To perform a **Restore**:

1. Select "External Memory Restore" from the VisiSet™ Device menu
2. You will be warned that the current device configuration(s) will be overwritten. Confirm by clicking Yes.



The VisiSet™ Main window shows information as the restore procedure is performed and a message indicating successful completion.



Replacement

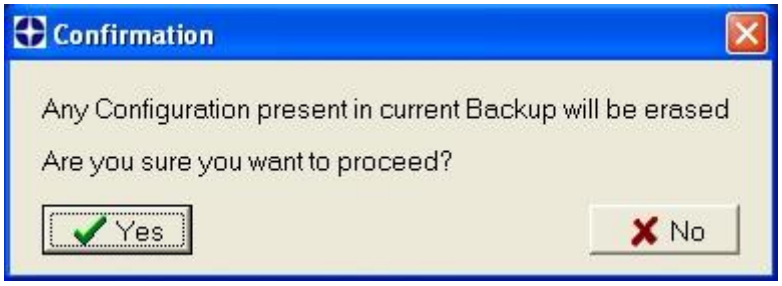
The **External Memory Restore** function also provides easy and secure Single Device Replacement:

1. Remove the device to be replaced
2. Connect the new device (make sure the new device has been previously set to default)
3. Run the Restore procedure by selecting the "External Memory Restore" item (see: Restore procedure)

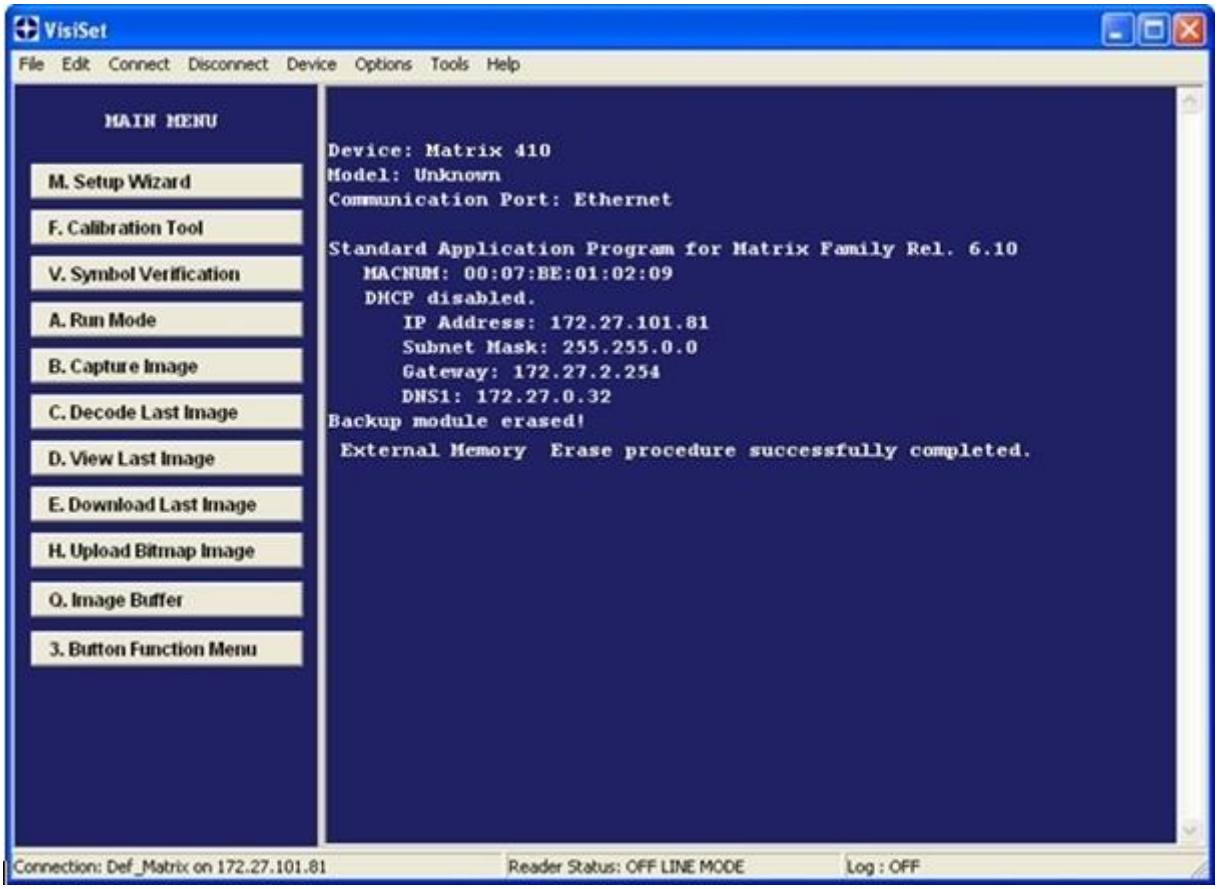
Erase

To **Erase** any previous Backup:

1. Select "External Memory Erase" from the VisiSet™ Device menu
2. You will be warned that all device configurations in the current backup will be erased. Confirm by clicking Yes.



The VisiSet™ Main window shows a message indicating successful completion.

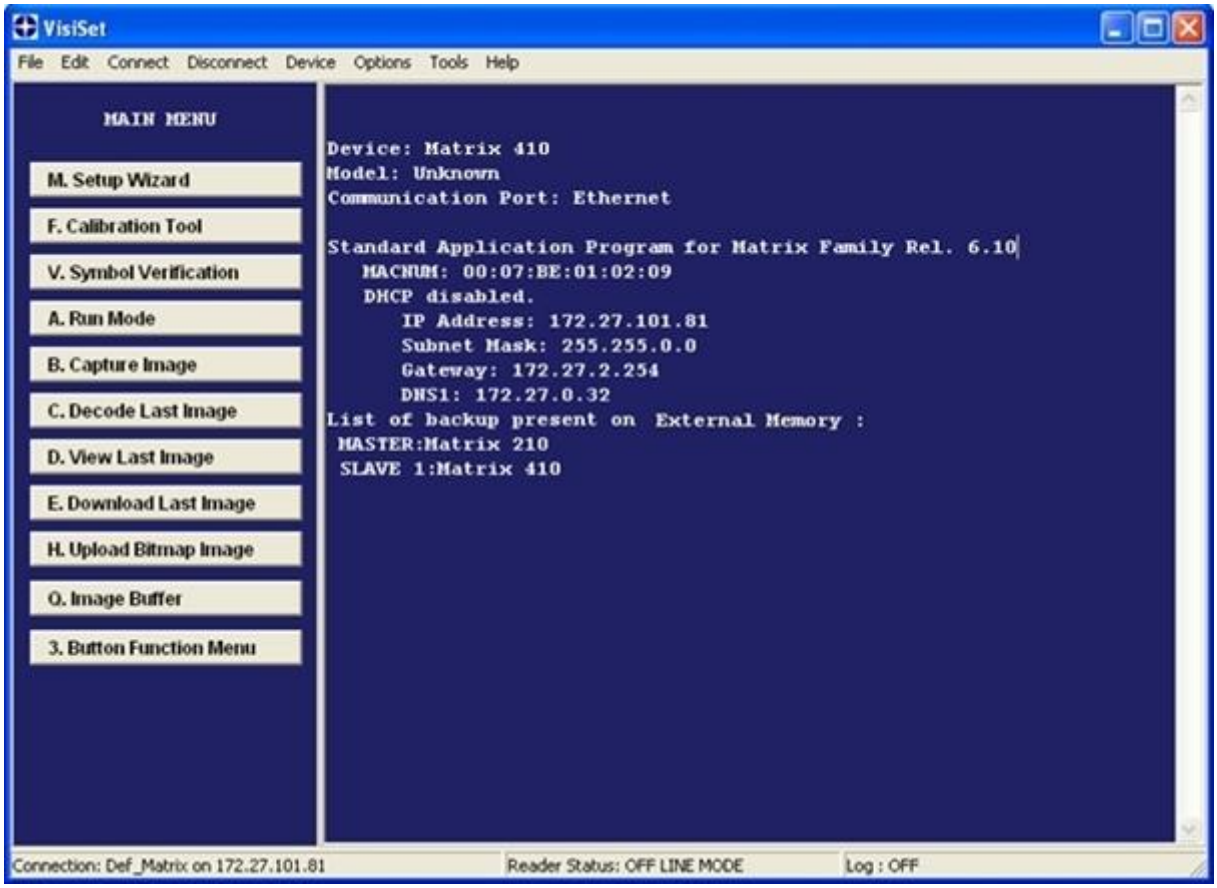


List

To see a **List** of the current Backup:

1. Select "External Memory Read Backup" from the VisiSet™ Device menu

The VisiSet™ Main window shows a list of devices in the current Backup.



The following is a list of possible error messages displayed on the VisiSet™ main window in case of an External Memory function failure:

Module not present: backup module not mounted (BM100) or not ready (QL500 , BM2x0)

Unable to Read Backup State: VisiSet™ is unable to get connected to the device

Backup function not allowed: when device is in X-PRESS™ Menu mode (BM100, QLM) or is out of memory (QL500)

Failed! (Device not found): Master is unable to reach the addressed device

Failed! (Module is write protected): BM100 Write Protection switch is set to Locked