

# HOST MODE PROGRAMMING



> Matrix N Family



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Matrix N Family Host Mode Programming

Ed.: 10/2016

This manual refers to software release 1.4.0 or later.

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## CONVENTIONS

The notation in this manual uses angular brackets (< >), to represent **single byte character values** which are equivalent. See ASCII Table in appendix A. For special keys or some non-printable characters, the ASCII symbol for the character name is shown between angular brackets.

Example:     <ESC> means the ESC key character byte  
              <STX> means the start transmission character byte  
              <space> means the whitespace character

- For non-printable characters, the decimal value of the character byte is shown between angular brackets.

Example:     <13><10> = Carriage Return character byte, Line Feed character byte

The following representations using these three methods are equivalent:

<ESC> = <27> = <1B<sub>H</sub>>  
and each send character byte 0x1B to the reader

The program used to generate the strings for Host Mode Programming must be able to manage them correctly.

# 1 HOST MODE PROGRAMMING

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Host Mode programming allows you to perform a partial configuration of your reading device as an alternative method to configuration using DL.CODE™. It consists of substituting or modifying the Matrix N Family device configurations by sending command strings over one of the communication channels.

Probably the most useful command is to change configuration jobs from among those saved in the device memory, directly from the Host.

These strings take the form of command sequences that are specific to each saved configuration. They can be personalized to make command recognition easier. They are transmitted from the Host system to the Matrix reader on the following interfaces:

- On-board Ethernet TCP/IP interface
- Main RS232/RS422 serial interface
- Auxiliary RS232 serial interface

In order to send the programming strings, it is necessary to switch the reader into **Host Mode**.



**CAUTION:** DL.CODE must be disconnected from all reader interfaces before entering in Host Mode.

By entering in Host Mode, any DL.CODE Monitor or X-PRESS connections to the reader will be closed.

## Ethernet Interface

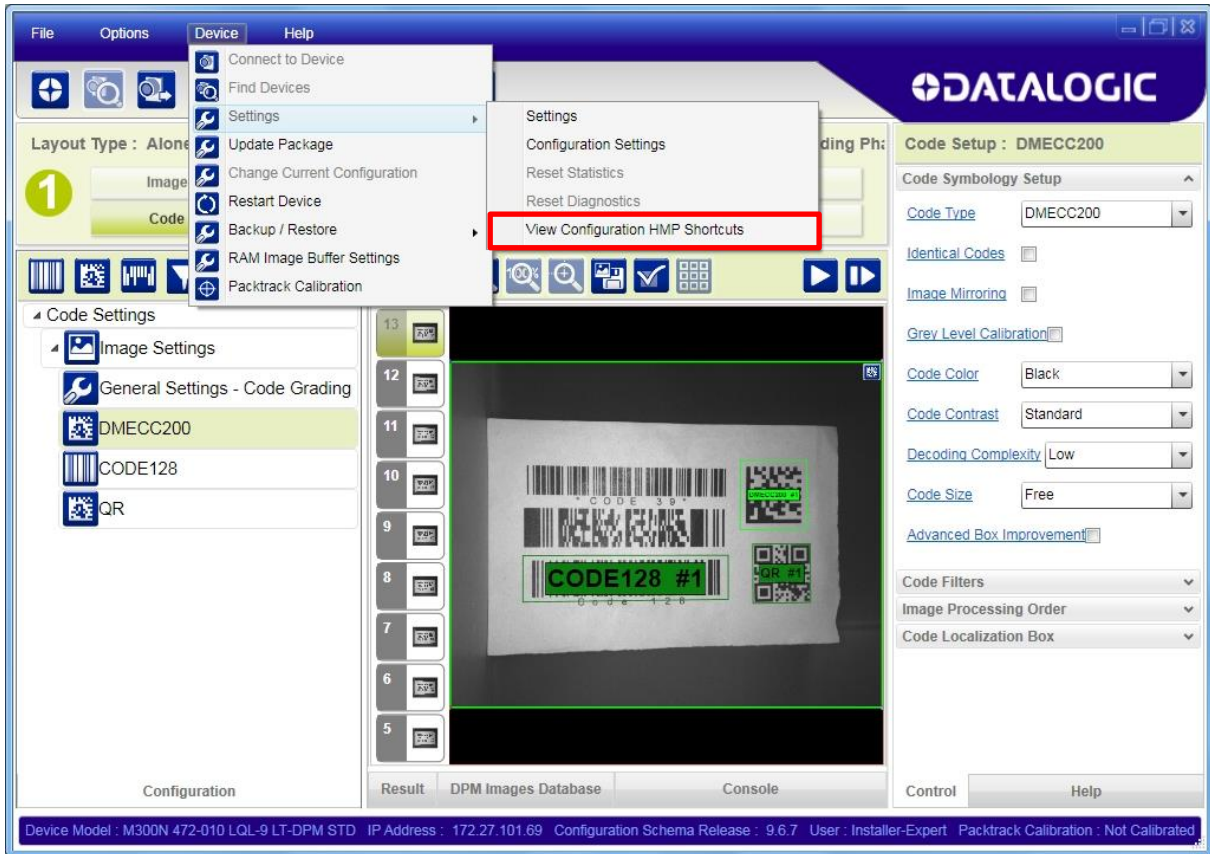
The programming commands and strings can be sent to the reader using the on-board Ethernet TCP/IP interface. Connect to the device IP address, port number: 1023 (pre-defined).

## Serial Interfaces

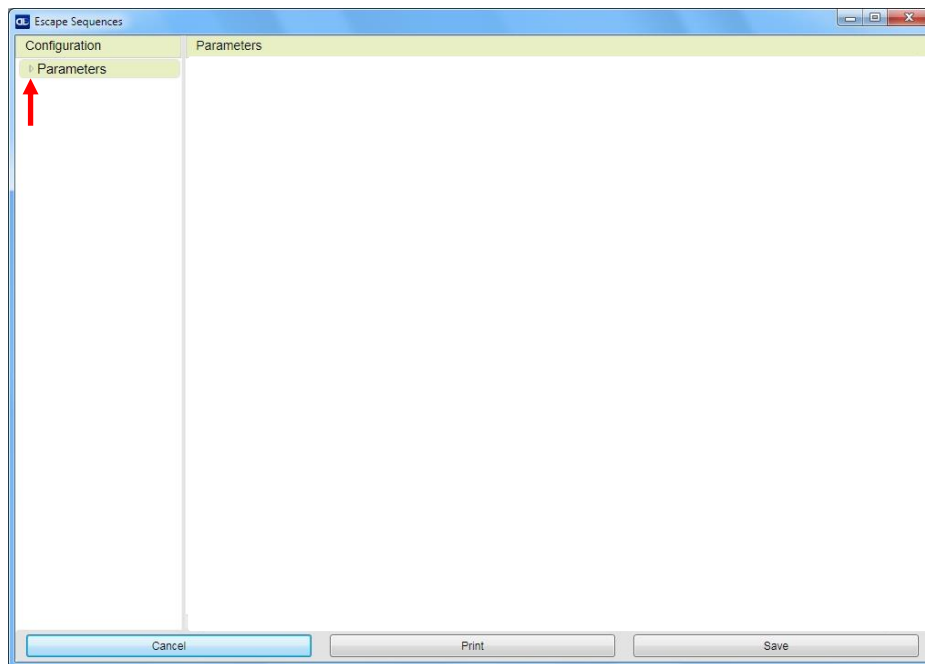
The programming commands and strings can be sent to the reader at the programmed baud rate of the selected serial interface (e.g. if the baud rate of the Auxiliary interface is programmed at 115200 bps the command must be sent at 115200 bps).

## 1.1 COLLECTING HMP STRINGS FROM DL.CODE

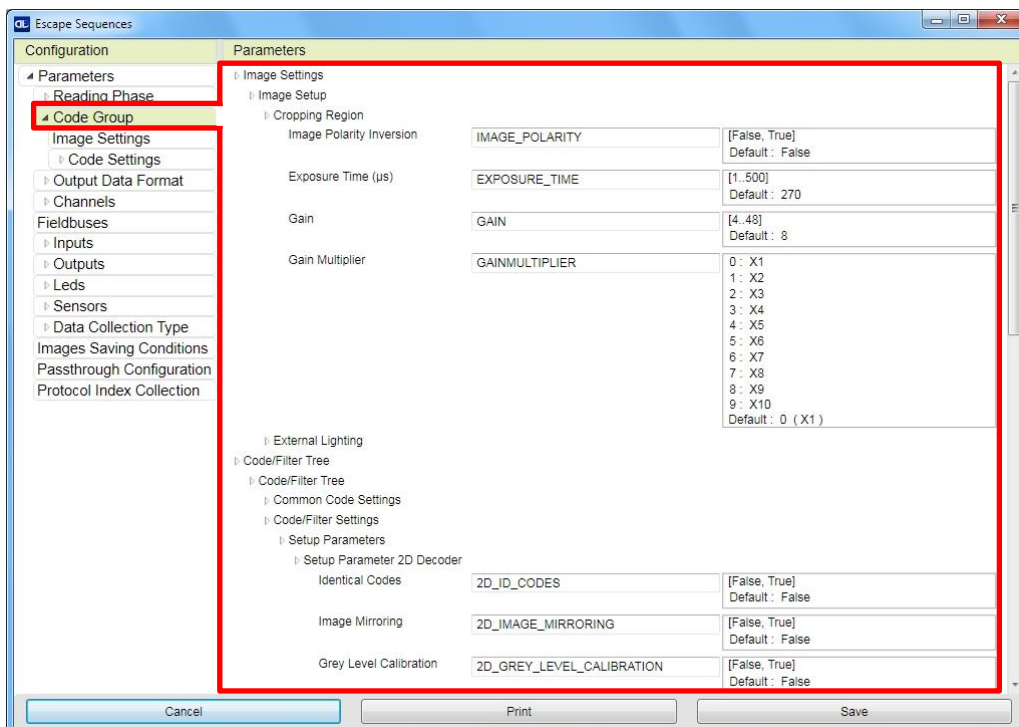
The first thing to do is collect the application specific Programming Strings from the DL.CODE Configuration. Select **View Configuration HMP Shortcuts** from the Device>Settings menu.



This opens the Escape Sequences window.



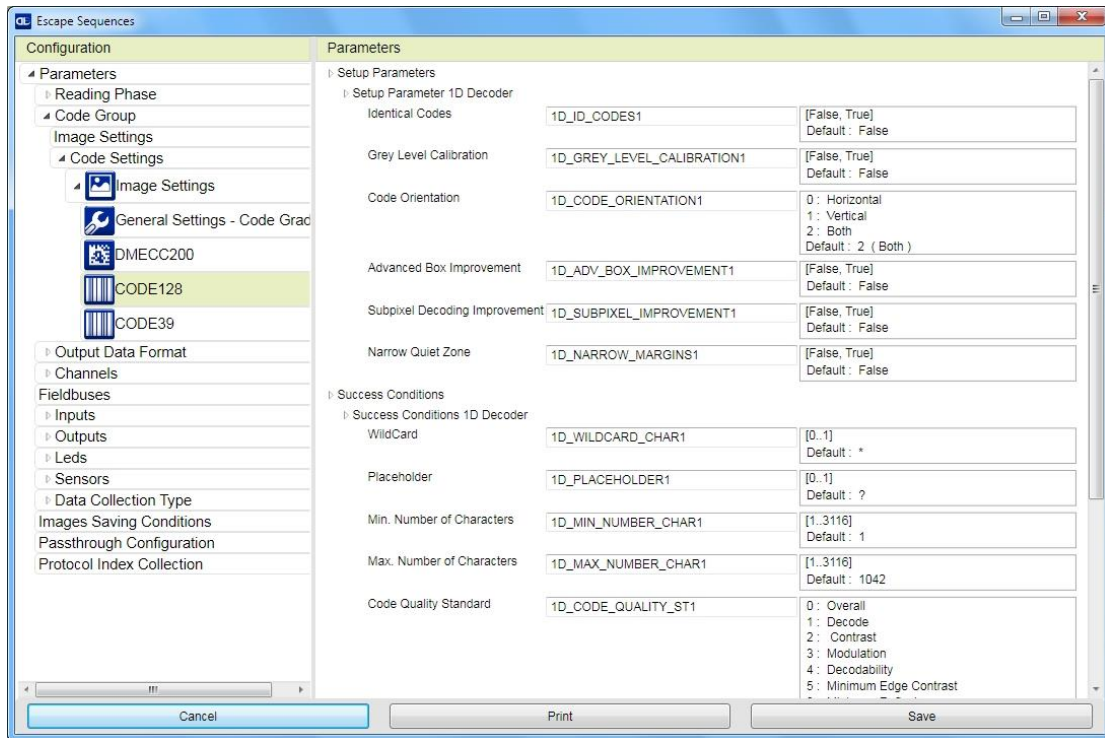
Click on the Parameters triangle to open the tree. Then select the Code Group branch to open the full extension of configuration parameters. Each configurable parameter is shown with its programming string name and a list of its configuration parameter values including the default setting.



You can personalize the programming strings from this window by clicking on the string name and entering a new name (no spaces are allowed). Then click the Save button.

Click the Print button to produce an HMP reference sheet.

You can also click on an individual branch to view only the branch specific parameters.





## 2 PROGRAMMING COMMANDS

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### 2.1 CONNECTION TO DEVICE

	DESCRIPTION	HOST COMMAND	REPLY MESSAGE
1	<b>Enter Host Mode</b>	<b>&lt;ESC&gt; [ C</b>	<b>&lt;ESC&gt; H &lt;CR&gt;&lt;LF&gt;</b>
	After entering this command, the device responds with the first reply message and then waits for the following command.		
2	<b>Enter Programming Mode</b>	<b>&lt;ESC&gt; [ B</b>	<b>&lt;ESC&gt; S &lt;CR&gt;&lt;LF&gt;</b>
	After entering this command, the device responds with the second reply message. Now you can send one or more programming strings as shown in Chapter 3.		
3	<b>Exit Host Mode</b>	<b>&lt;ESC&gt; [ A</b>	<b>&lt;ESC&gt; [ X</b>
	<p>This command must always be transmitted to end the programming session. The configuration job management depends on the commands issued prior to exit from Host Mode. See 3.2 for more details.</p> <ul style="list-style-type: none"> <li>• If the SAVE command was issued before exit from Host Mode, the job is saved in permanent memory (Flash).</li> <li>• If the SAVE command was not issued before exit from Host Mode, the job is saved in temporary memory (RAM).</li> </ul>		

## 3 PROGRAMMING STRINGS

---

### 3.1 DEFINITIONS

Common definitions for each parameter are:

#### **Name (parameter name)**

Name of the parameter available in the DL.CODE Configuration Parameters panel.

The other definitions change according to the parameter type.

#### **Type (parameter type)**

Parameter type is essential in order to decide the features of the command used to set its new value. Types are:

- Type 0: Integer (numeric)
- Type 1: Enumerative (numeric list)
- Type 2: BOOLEAN (true, false)
- Type 3: String (printable characters)

#### **Integer (Type = 0)**

##### **Range**

Minimum and maximum values allowed for the parameter.

##### **Default**

Default value (integer).

Example: *Exposure Time* ( $\mu$ s) parameter

- Name: Exposure Time ( $\mu$ s)
- Type: 0
- Range: 6 to 500 (depending on model)
- Default: 270 (depending on model)

#### **Enumerative (Type = 1)**

##### **Item List**

List of the values allowed for the parameter.

##### **Default**

Default entry (i.e. 0 = first entry of the list, 1 = second entry of the list, etc.).

Example: *Gain Multiplier* parameter.

- Name: Gain Multiplier
- Type: 1
- Item List: X1, X2, X3, X4, X5, X6, X7, X8, X9, X10
- Default: 0 (Entry 0 = X1)

## **BOOLEAN (Type = 2)**

### **Value**

true = Enabled; false = Disabled

### **Default**

Default value (String).

Example: *Identical Codes* parameter.

Name: Identical Codes  
Type: 2  
Value: false, true (case sensitive)  
Default: false (Disabled)

## **String (Type = 3)**

### **Length**

Minimum to maximum number of characters allowed for this parameter.

### **Default**

Default value (String).

Example: *Wildcard* parameter.

Name: Wildcard  
Type: 3  
Length: Min to Max number of allowable characters in string  
Value: Any character from 00 to FF (hex)  
Default: \*

## 3.2 PROGRAMMING STRINGS

### 3.2.1 Set Parameter Value in Current Configuration

The Matrix device single parameter programming string must have the following format:

**SET<space>PSTR<space>VAL <CR><LF>**

Where:

- **SET:** The programming command (all caps)
- **PSTR:** The unique parameter string containing no spaces
- **VAL:** Character or string indicating the assigned parameter value. (case sensitive)

If the command is correct, the device immediately implements the new value and confirms with the following message:

**ACK <LF>**

If programming contents are wrong (i.e. a typing error in the file) or due to a transmission error, the device replies with the following message and programming data will not be updated in this case:

**NACK <LF>**

After transmitting the reply message, the device then waits for another programming string or the exit from host mode programming command.

### 3.2.2 Get Parameter Value in Current Configuration

The Matrix device single parameter get string must have the following format:

**GET<space>PSTR <CR><LF>**

Where:

- **GET:** The programming command (all caps)
- **PSTR:** The unique parameter string containing no spaces

If the command is correct, the device replies with the value string for the current parameter:

**ACK VAL <LF>**

If the sequence is wrong (i.e. a typing error) or due to a transmission error, the device replies with the following message:

**NACK <LF>**

After transmitting the reply message, the device then waits for another programming string or the exit from host mode programming command.

### 3.2.3 Save Current Configuration (Job)

The Matrix configuration saving command must have the following format:

**SAVE<space>configuration\_name <CR><LF>**

After making changes to a configuration, this command should always be transmitted before exit from programming mode.

If the command is correct, the device confirms with the following message:

**ACK <LF>**

If the command is wrong (i.e. missing configuration\_name) or due to a transmission error, the device replies with the following message:

**NACK <LF>**

After transmitting the reply message, the device then waits for another programming string or the exit from host mode programming command.



**NOTE:** To overwrite the current configuration, the configuration name must exactly match the name saved on the device. Names can contain spaces and **are** case sensitive!

If the name does not match, then a copy of the configuration will be saved with the new name.

The Default configuration cannot be overwritten.

### 3.2.4 Set Startup Configuration (Job)

The Matrix startup configuration setting command must have the following format:

**STARTUP\_CFG<space>configuration\_name <CR><LF>**

If the command is correct, the device confirms with the following message:

**ACK <LF>**

If the command is wrong (i.e. a typing error) or due to a transmission error, the device replies with the following message:

**NACK <LF>**

After transmitting the reply message, the device then waits for another programming string or the exit from host mode programming command.



**NOTE:** The configuration names must match those saved on the device. They can contain spaces and **are** case sensitive.

This command does not change the current configuration. It also does not require the **SAVE** command to be issued.

### 3.2.5 Change Current Configuration (Job)

The Matrix change configuration command must have the following format:

**CHANGE\_CFG<space>configuration\_name <CR><LF>**

If the sequence is correct, the device confirms with the following message:

**ACK <LF>**

If programming contents are wrong (i.e. a typing error) or due to a transmission error, the device replies with the following message:

**NACK <LF>**

After transmitting the reply message, the device then waits for another programming string or the exit from host mode programming command.



**NOTE:** The configuration names must match those saved on the device. They can contain spaces and **are** case sensitive.

This command does not change the Startup Configuration.

### 3.2.6 Match Code Content

The Matrix match code command must have the following format:

**MATCH<space>code\_content <CR><LF>**

After using this command, the **SAVE** configuration command should always be transmitted before exit from programming mode.

If the command is correct, the device replies with the **code\_content** string for the Expected Code parameter of the current Match Code configuration:

**ACK code\_content <LF>**

If programming contents are wrong (i.e. a typing error) or due to a transmission error, or if the current configuration is not a Match Code data collection type, the device replies with the following message:

**NACK <LF>**

After transmitting the reply message, the device then waits for another programming string or the exit from host mode programming command.



**NOTE:** The configuration must be a **Match Code** data collection type previously saved on the device. The **code\_content** can contain spaces and **is** case sensitive.

This command overwrites the current Expected Code parameter value.

### 3.2.7 Send Configuration (Upload Job) to Device



**CAUTION:** This command requires a dedicated program to handle file transfer protocol (see below).

It is possible to send a **.dlcfg** (job) file to the Matrix device, saving it to permanent memory.



**NOTE:** Any Matrix configuration can be easily exported to a **.dlcfg** file from DL.CODE by selecting

**File > Save > Save Configuration on PC**

The send configuration to matrix device command must have the following format:

**SEND\_CFG<space>configuration\_name <CR><LF>**

Within 10 seconds of sending the SEND\_CFG command, the **.dlcfg** configuration file transmission must be initiated. The entire file content must be encapsulated using a CRC32 checksum control and transmitted to the device using X-Modem protocol.

Failing to initiate transmission within 10 seconds will result in the device replying with a Timeout message and the command will be considered aborted.

The byte stream containing the configuration that is sent to the device is structured with a 4-byte header containing the total stream length, followed by a data\_buffer section containing the whole .dlcfg byte sequence, followed by a 4-byte CRC32 terminator storing the value computed on the previous length + data\_buffer sections content.

Length (4 bytes)	Data buffer	CRC (4 bytes)
---------------------	-------------	------------------

**Length (4 bytes):** specifies the number of bytes of the message (*Data buffer + CRC* field).

**Data buffer:** the bytes of the file to transmit.

**CRC:** the CRC32 checksum based on both *Length + Data buffer*.

**NOTES:**

- The data format used is **BIG ENDIAN**
- The **packet timeout during transmission is 10 seconds**: on timeout expiration command is considered aborted
- **Only .dlcfg files** are allowed for upload

If the transmission is completed correctly, the device confirms with the following message:

**ACK <LF>**

If transmission is not initiated within 10 seconds, the device replies with the following message:

**Timeout! <LF>**

If programming contents are wrong (i.e. file format, content or CRC error) or due to a transmission error, the device replies with the following message:

**NACK <LF>**

After transmitting the reply message, the device then waits for another programming string or the exit from host mode programming command.



**NOTE:** The saved configuration will have the name you give the **configuration\_name** parameter. Names can contain spaces and **are** case sensitive. Do not include the extension.

If a configuration with the same name already exists in the device memory it will be overwritten by the new file.

This command does not change the Current Configuration nor the Startup Configuration. Use the appropriate commands to change it.



**NOTE:** There is no Host Mode Programming command available for downloading a configuration from a device.

### 3.2.8 Get Device Information

The Matrix get device information command must have the following format:

**GET\_INFO <CR><LF>**

If the sequence is correct, the device confirms with the following message:

**ACK Device Information<LF>**

If programming contents are wrong (i.e. a typing error) or due to a transmission error, the device replies with the following message:

**NACK <LF>**

After transmitting the reply message, the device then waits for another programming string or the exit from host mode programming command.



### 3.2.9 Send Images

For configurations that allow **Image Saving – Send Image On: Demand**, it is possible to start the FTP images transfer from the device to an FTP Server through this command.

The Matrix send images command must have the following format:

**SEND\_IMAGES**<space><NodeNumber>[<space><IdStart>][<space><IdStop>]<CR><LF>

Where:

**SEND\_IMAGES:** The programming command (all caps).

**NodeNumber:** Specifies the node number (0=Master, 1 to 31=Slaves).  
(mandatory)

The asterisk character '\*' can be used to send a broadcast command. In this case the Master and all Slaves will start to transfer images to the FTP Server.

**IdStart:** The pack/phase number from which image transfer begins.  
(optional)

**IdStop:** The pack/phase number from which image transfer ends.  
(optional)



**NOTE:** If the optional parameters are omitted, the entire image buffer of the device (or devices) will be sent.

#### PRE-REQUISISTES:

- The device configuration runs in **Phase Mode, Packtrack** or **OneShot**
- An FTP Server is available and configured to allow uploads on the same TCP/IP network
- After entering the host programming sequence, wait at least 50 ms for the device to correctly setup internal data structures before issuing SEND\_IMAGES commands
- The device configuration (Data Formatting) must include an FTP client channel which must be configured to access the FTP Server (user/password, folder, ...)
- The device configuration (Data Formatting) must include an Image Saving Condition which must be configured with:
  - **Image Destination > On Remote**
  - **Send Image On > Demand**
  - **Saving Condition > Good Reads only, No Reads only, Both**
  - **Image Format > available formats are RAW, BMP, PNG, JPG, Tiff**
  - **Remote Folder > subfolder name on the FTP Server under which images will be saved**
  - **Send Image From > Matrix FTP Client**

See the Image Saving chapter in the DL.CODE User's Manual for more details.

**SAVED IMAGE FILENAMES:**

On the FTP Server, the saved images filenames will have the following syntax:

**IMG\_nnnnnnnnnn\_ss\_ff\_ccc.ext**

Where:

<b>nnnnnnnnnn:</b>	pack#/phase# 10 digits
<b>ss:</b>	slave id (00 for Master, 01-31 for slaves)
<b>ff:</b>	frame sequence # for current image within the related pack/phase
<b>ccc:</b>	# of valid barcodes detected by the reader who produced this image (000 for noread)
<b>ext:</b>	extension to indicate image format (RAW, JPG, PNG, PNG, TIFF)

If the transmission is completed correctly, the device confirms with the following message:

**ACK <LF>**

If programming contents are wrong (i.e. a typing error) or due to a transmission error, the device replies with the following message:

**NACK <LF>**



**NOTE:** The transferred images come from device internal circular buffer which is used for this specific purpose. The buffer size depends on the complexity of the configuration as it is allocated during runtime. The buffer is managed in a round-robin fashion, therefore requesting of packs/phases that are “too old” in the buffer may result in the reader not being able to transmit images, even if returning an ACK response (to be changed in future releases). On IdStart>IdStop errors, NACK is returned.

After transmitting the reply message, the device then waits for another programming string or the exit from host mode programming command.

Images can also be sent to a TCP Channel On Demand.



**CAUTION:** Sending images on demand to a TCP channel requires a dedicated program to correctly handle file transfer.

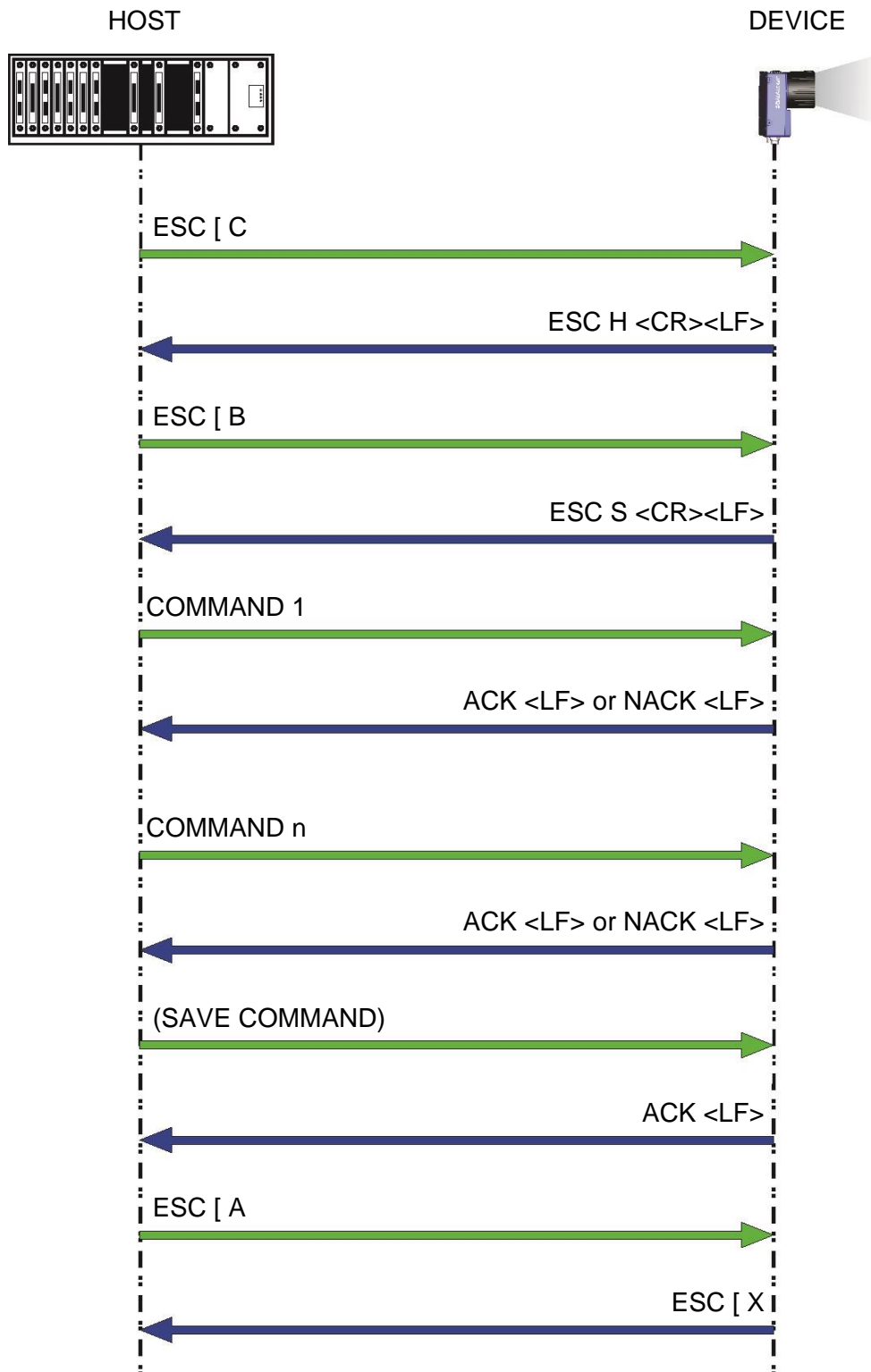


Figure 1 – Connection to Device, Programming and Disconnection from Device

### 3.3 EXAMPLES

- 1 -

Set Image Setting 2 *Exposure Time* parameter to 400  $\mu$ s:

Type: 0  
Range: 6 to 500  
Data: 400

The programming string is:

```
SET<space>EXPOSURE_TIME1<space>400 <CR><LF>
```

- 2 -

Set *GainMultiplier* parameter to X3:

Type: 1  
List: X1, X2, X3, X4, X5, X6, X7, X8, X9, X10  
Data: 2

The programming string is:

```
SET<space>GAINMULTIPLIER<space>2 <CR><LF>
```

- 3 -

Set Data Matrix ECC 200 *Image Mirroring* parameter to *enabled*:

Type: 2  
Item List: *true (Enabled), false (Disabled)*  
Data: true

The programming string is:

```
SET<space>2D_IMAGE_MIRRORING<space>>true <CR><LF>
```

- 4 -

Set Data Matrix ECC 200 Image Filter *Placeholder* character to '&':

Type: 3  
Item List: *any printable character*  
Data: &

The programming string is:

```
SET<space>2D_PLACEHOLDER<space>& <CR><LF>
```

- 5 -

Get Matrix 410N Device Information:

The programming string is:

```
GET_INFO<CR><LF>
```

Device Response:

ACKModel name: M410N:700-010

MAC address: 00:07:BE:01:2B:56

Serial number: C14P00584

Device name: Matrix

Application version: 1.4.0.1073

Current Job: Phase Mode

- 6 -

Transfer all pending images from all devices in the cluster:

The programming string is:

```
SEND_IMAGES *<CR><LF>
```

- 7 -

Transfer images from slave 2 starting from pack/phase 123:

The programming string is:

```
SEND_IMAGES 2 123<CR><LF>
```

- 8 -

Transfer images from Master for packs/phases 10 to 12:

The programming string is:

```
SEND_IMAGES 0 10 12<CR><LF>
```

## 4 MATRIX N FAMILY PARAMETERS LIST

The following tables present a complete list of parameters that can be modified using Host Mode Programming.

The parameter strings shown here are the default ones.

The strings can be modified (personalized) through DL.CODE so it is advised to print them out from DL.CODE for your specific configuration.

These strings are also dynamic. They depend on the order in which the configuration is made. For example, each group of 2D or 1D Code parameters is associated with STRING<sub>x</sub> where “x” is a dynamically assigned number depending on the chronological order in which it was configured. For this reason you must know the relative strings assigned by DL.CODE. See par. 1.1 for details.

### 4.1 IMAGE SETUP

PARAMETER	TYPE	STRING	DATA
Image Polarity Inversion	2	IMAGE_POLARITY <sub>x</sub>	false = Disabled true = Enabled
Exposure Time (μs) M450N all models	0	EXPOSURE_TIME <sub>x</sub>	
Disabled			33 to 64000
Very High-Power Strobed			33 to 500
High-Power Strobed			33 to 2500
Continuous High-Power			33 to 400
M410N all models			
Disabled			10 to 64000
Always On			1000 to 64000
Very High-Power Strobed			10 to 500
High-Power Strobed			100 to 5000
Medium-Power Strobed			1000 to 64000
Continuous High-Power			10 to 300
M300N all models			
Disabled			10 to 50000
Always On			1000 to 50000
Very High-Power Strobed			1 to 500
High-Power Strobed			100 to 3300
M210N-2xx-xxx			
Disabled			10 to 26000
Always On			10 to 26000
Very High-Power Strobed			10 to 600
High-Power Strobed			100 to 5000
Medium-Power Strobed			1000 to 26000



**NOTE:** The *Exposure Time* parameter is measured in μs and range of valid values depends on the Matrix model and the Internal Lighting setting.

Gain	0	GAINx	Range: 1 to 40 (For M210N all models) Range: 4 to 48 (For M300N all models) Range: 4 to 48 (For M410N-500-010 models) Range: 6 to 48 (For M410N-700-010 models) Range: 1 to 25 (For M450N all models)
Gain Multiplier	1	GAINMULTIPLIERx	0 = X1 1 = X2 2 = X3 3 = X4 4 = X5 5 = X6 6 = X7 7 = X8 8 = X9 9 = X10
Reading Distance (mm)	0	READING_DISTANCEx	Range: 40 to 120 mm (For M210N-2x5-x1x models) Range: 22 to 452 mm (For M300N-4x2-0xx models)

## 4.2 CODE SETUP

### 4.2.1 2D Codes

PARAMETER	TYPE	STRING	DATA
<b>DATA MATRIX ECC 200</b>			
Identical Codes	2	2D_ID_CODESx	false = Disabled true = Enabled
Image Mirroring	2	2D_IMAGE_MIRRORINGx	false = Disabled true = Enabled
Grey Level Calibration	2	2D_GREY_LEVEL_CALIBRATIONx	false = Disabled true = Enabled
Code Color	1	2D_CODE_COLORx	0 = Black 1 = White 2 = Both Colors
Code Contrast	1	2D_CODE_CONTRASTx	0 = High 1 = Standard 2 = Low 3 = Very Low 4 = Automatic
Decoding Complexity	1	2D_DECODING_COMPLEXITYx	0 = Low 1 = Medium 2 = High 3 = Very High
Code Size	1	2D_CODE_SIZEx	0 = Free 1 = Squared 2 = Rectangular
Advanced Box Improvement	2	2D_ADVANCED_BOX_IMPROVEMENTx	false = Disabled true = Enabled

PARAMETER	TYPE	STRING	DATA
<b>QR</b>			
Identical Codes	2	2D_ID_CODESx	false = Disabled true = Enabled
Decoding Method	1	2D_DECODING_METHODx	0 = Standard 1 = Dot Peen Decoding
Image Mirroring	2	2D_IMAGE_MIRRORINGx	false = Disabled true = Enabled
Grey Level Calibration	2	2D_GREY_LEVEL_CALIBRATIONx	false = Disabled true = Enabled
Code Color	1	2D_CODE_COLORx	0 = Black 1 = White 2 = Both Colors
Code Contrast	1	2D_CODE_CONTRASTx	0 = High 1 = Standard 2 = Low 3 = Very Low 4 = Automatic

PARAMETER	TYPE	STRING	DATA
<b>MICRO QR</b>			
Identical Codes	2	2D_ID_CODESx	false = Disabled true = Enabled
Image Mirroring	2	2D_IMAGE_MIRRORINGx	false = Disabled true = Enabled
Grey Level Calibration	2	2D_GREY_LEVEL_CALIBRATIONx	false = Disabled true = Enabled
Code Color	1	2D_CODE_COLORx	0 = Black 1 = White 2 = Both Colors
Code Contrast	1	2D_CODE_CONTRASTx	0 = High 1 = Standard 2 = Low 3 = Very Low 4 = Automatic

PARAMETER	TYPE	STRING	DATA
<b>AZTEC</b>			
Identical Codes	2	2D_ID_CODESx	false = Disabled true = Enabled
Image Mirroring	2	2D_IMAGE_MIRRORINGx	false = Disabled true = Enabled
Grey Level Calibration	2	2D_GREY_LEVEL_CALIBRATIONx	false = Disabled true = Enabled
Code Color	1	2D_CODE_COLORx	0 = Black 1 = White 2 = Both Colors
Code Contrast	1	2D_CODE_CONTRASTx	0 = High 1 = Standard 2 = Low 3 = Very Low 4 = Automatic



PARAMETER	TYPE	STRING	DATA
<b>MAXICODE</b>			
Identical Codes	2	2D_ID_CODESx	false = Disabled true = Enabled
Image Mirroring	2	2D_IMAGE_MIRRORINGx	false = Disabled true = Enabled
Grey Level Calibration	2	2D_GREY_LEVEL_CALIBRATIONx	false = Disabled true = Enabled
Code Color	1	2D_CODE_COLORx	0 = Black 1 = White 2 = Both Colors
Code Contrast	1	2D_CODE_CONTRASTx	0 = High 1 = Standard 2 = Low 3 = Very Low 4 = Automatic
Partial Code Tx	2	2D_PARTIAL_CODE_TXx	false = Disabled true = Enabled

PARAMETER	TYPE	STRING	DATA
<b>DOTCODE</b>			
Identical Codes	2	2D_ID_CODESx	false = Disabled true = Enabled
Image Mirroring	2	2D_IMAGE_MIRRORINGx	false = Disabled true = Enabled
Grey Level Calibration	2	2D_GREY_LEVEL_CALIBRATIONx	false = Disabled true = Enabled
Code Color	1	2D_CODE_COLORx	0 = Black 1 = White 2 = Both Colors
Code Contrast	1	2D_CODE_CONTRASTx	0 = High 1 = Standard 2 = Low 3 = Very Low 4 = Automatic
Enable High Resolution	2	2D_HIGH_RESOLUTIONx	false = Disabled true = Enabled
Min Pixel per Module	0	2D_MIN_DOT_DIAMETERx	Range: 0 to 48
Max Pixel per Module	0	2D_MAX_DOT_DIAMETERx	Range: 0 to 48
Fixed Code Position	2	2D_CONSTANT_POSITIONx	false = Disabled true = Enabled

PARAMETER	TYPE	STRING	DATA
<b>2D CODE FILTER</b>			
Wildcard	3	2D_WILDCARD_CHARx	Length: 1 character
Placeholder	3	2D_PLACEHOLDERx	Length: 1 character
Min. Number of Characters	0	2D_MIN_CHARx	Range 1 to 3116
Max. Number of Characters	0	2D_MAX_CHARx	Range 1 to 3116
Code Quality Standard	1	2D_CODE_QUALITY_STx	0 = Overall 1 = Decode 2 = Symbol Contrast 3 = Axial Non Uniformity 4 = Unused Error Correction 5 = Print Growth 6 = Fixed Pattern Damage 7 = Grid Non Uniformity
Code Quality Index	1	2D_CODE_QUALITY_INDEXx	0 = Any 1 = Grade A 2 = Grade B 3 = Grade C 4 = Grade D

**4.2.2 1D Codes**

PARAMETER	TYPE	STRING	DATA
<b>PDF417</b>			
Identical Codes	2	1D_ID_CODESx	false = Disabled true = Enabled
Grey Level Calibration	2	1D_GREY_LEVEL_CALIBRATIONx	false = Disabled true = Enabled
Code Orientation	1	1D_CODE_ORIENTATIONx	0 = Horizontal 1 = Vertical 2 = Both
Advanced Box Improvement	2	1D_ADV_BOX_IMPROVEMENTx	false = Disabled true = Enabled
Subpixel Decoding Improvement	2	1D_SUBPIXEL_IMPROVEMENTx	false = Disabled true = Enabled

PARAMETER	TYPE	STRING	DATA
<b>MICROPDF</b>			
Identical Codes	2	1D_ID_CODESx	false = Disabled true = Enabled
Grey Level Calibration	2	1D_GREY_LEVEL_CALIBRATIONx	false = Disabled true = Enabled
Code Orientation	1	1D_CODE_ORIENTATIONx	0 = Horizontal 1 = Vertical 2 = Both
Advanced Box Improvement	2	1D_ADV_BOX_IMPROVEMENTx	false = Disabled true = Enabled
Subpixel Decoding Improvement	2	1D_SUBPIXEL_IMPROVEMENTx	false = Disabled true = Enabled

PARAMETER	TYPE	STRING	DATA
<b>CODE 128</b>			
Identical Codes	2	1D_ID_CODESx	false = Disabled true = Enabled
Grey Level Calibration	2	1D_GREY_LEVEL_CALIBRATIONx	false = Disabled true = Enabled
Code Orientation	1	1D_CODE_ORIENTATIONx	0 = Horizontal 1 = Vertical 2 = Both
Advanced Box Improvement	2	1D_ADV_BOX_IMPROVEMENTx	false = Disabled true = Enabled
Subpixel Decoding Improvement	2	1D_SUBPIXEL_IMPROVEMENTx	false = Disabled true = Enabled
Narrow Quiet Zone	2	1D_NARROW_MARGINSx	false = Disabled true = Enabled
Start/Stop Characters Tx	2	1D_STARTSTOP_CHAR_TXx	false = Disabled true = Enabled
Characters Tx	2	1D_CHAR_TXx	false = Disabled true = Enabled

PARAMETER	TYPE	STRING	DATA
<b>GS1-128</b>			
Identical Codes	2	1D_ID_CODESx	false = Disabled true = Enabled
Grey Level Calibration	2	1D_GREY_LEVEL_CALIBRATIONx	false = Disabled true = Enabled
Code Orientation	1	1D_CODE_ORIENTATIONx	0 = Horizontal 1 = Vertical 2 = Both
Advanced Box Improvement	2	1D_ADV_BOX_IMPROVEMENTx	false = Disabled true = Enabled
Subpixel Decoding Improvement	2	1D_SUBPIXEL_IMPROVEMENTx	false = Disabled true = Enabled
Narrow Quiet Zone	2	1D_NARROW_MARGINSx	false = Disabled true = Enabled
Start/Stop Characters Tx	2	1D_STARTSTOP_CHAR_TXx	false = Disabled true = Enabled
Characters Tx	2	1D_CHAR_TXx	false = Disabled true = Enabled

PARAMETER	TYPE	STRING	DATA
<b>CODE 39</b>			
Identical Codes	2	1D_ID_CODESx	false = Disabled true = Enabled
Grey Level Calibration	2	1D_GREY_LEVEL_CALIBRATIONx	false = Disabled true = Enabled
Code Orientation	1	1D_CODE_ORIENTATIONx	0 = Horizontal 1 = Vertical 2 = Both
Advanced Box Improvement	2	1D_ADV_BOX_IMPROVEMENTx	false = Disabled true = Enabled
Subpixel Decoding Improvement	2	1D_SUBPIXEL_IMPROVEMENTx	false = Disabled true = Enabled
Narrow Quiet Zone	2	1D_NARROW_MARGINSx	false = Disabled true = Enabled
Character Set	1	1D_CHARACTER_SETx	0 = Standard 1 = Full ASCII
Code 32 Decoding	2	1D_CODE32_DECODINGx	false = Disabled true = Enabled

PARAMETER	TYPE	STRING	DATA
<b>INTERLEAVED 2 OF 5</b>			
Identical Codes	2	1D_ID_CODESx	false = Disabled true = Enabled
Grey Level Calibration	2	1D_GREY_LEVEL_CALIBRATIONx	false = Disabled true = Enabled
Code Orientation	1	1D_CODE_ORIENTATIONx	0 = Horizontal 1 = Vertical 2 = Both
Advanced Box Improvement	2	1D_ADV_BOX_IMPROVEMENTx	false = Disabled true = Enabled
Subpixel Decoding Improvement	2	1D_SUBPIXEL_IMPROVEMENTx	false = Disabled true = Enabled
Narrow Quiet Zone	2	1D_NARROW_MARGINSx	false = Disabled true = Enabled
Min Accepted Code Length	0	1D_INT25_MIN_ENABLED_LENx	Range 2 to 60

PARAMETER	TYPE	STRING	DATA
<b>PHARMA</b>			
Identical Codes	2	1D_ID_CODESx	false = Disabled true = Enabled
Grey Level Calibration	2	1D_GREY_LEVEL_CALIBRATIONx	false = Disabled true = Enabled
Advanced Box Improvement	2	1D_ADV_BOX_IMPROVEMENTx	false = Disabled true = Enabled
Subpixel Decoding Improvement	2	1D_SUBPIXEL_IMPROVEMENTx	false = Disabled true = Enabled
Minimum Code Height (mm)	0	1D_MIN_CODE_HEIGHTx	Range 1 to 500
Code Aspect Ratio	1	1D_CODE_ASPECT_RATIOx	0 = Standard 1 = Low
Code Contrast	1	1D_CODE_CONTRASTx	0 = Standard 1 = Low
Small Codes Improvement	2	1D_SMALL_CODES_IMPROVEMENTx	false = Disabled true = Enabled

PARAMETER	TYPE	STRING	DATA
<b>MSI</b>			
Identical Codes	2	1D_ID_CODESx	false = Disabled true = Enabled
Grey Level Calibration	2	1D_GREY_LEVEL_CALIBRATIONx	false = Disabled true = Enabled
Code Orientation	1	1D_CODE_ORIENTATIONx	0 = Horizontal 1 = Vertical 2 = Both
Advanced Box Improvement	2	1D_ADV_BOX_IMPROVEMENTx	false = Disabled true = Enabled
Subpixel Decoding Improvement	2	1D_SUBPIXEL_IMPROVEMENTx	false = Disabled true = Enabled
Narrow Quiet Zone	2	1D_NARROW_MARGINSx	false = Disabled true = Enabled

PARAMETER	TYPE	STRING	DATA
<b>PLESSEY</b>			
Identical Codes	2	1D_ID_CODESx	false = Disabled true = Enabled
Grey Level Calibration	2	1D_GREY_LEVEL_CALIBRATIONx	false = Disabled true = Enabled
Code Orientation	1	1D_CODE_ORIENTATIONx	0 = Horizontal 1 = Vertical 2 = Both
Advanced Box Improvement	2	1D_ADV_BOX_IMPROVEMENTx	false = Disabled true = Enabled
Subpixel Decoding Improvement	2	1D_SUBPIXEL_IMPROVEMENTx	false = Disabled true = Enabled
Narrow Quiet Zone	2	1D_NARROW_MARGINSx	false = Disabled true = Enabled

PARAMETER	TYPE	STRING	DATA
<b>STANDARD 2 OF 5</b>			
Identical Codes	2	1D_ID_CODESx	false = Disabled true = Enabled
Grey Level Calibration	2	1D_GREY_LEVEL_CALIBRATIONx	false = Disabled true = Enabled
Code Orientation	1	1D_CODE_ORIENTATIONx	0 = Horizontal 1 = Vertical 2 = Both
Advanced Box Improvement	2	1D_ADV_BOX_IMPROVEMENTx	false = Disabled true = Enabled
Subpixel Decoding Improvement	2	1D_SUBPIXEL_IMPROVEMENTx	false = Disabled true = Enabled
Narrow Quiet Zone	2	1D_NARROW_MARGINSx	false = Disabled true = Enabled

PARAMETER	TYPE	STRING	DATA
<b>MATRIX 2 OF 5</b>			
Identical Codes	2	1D_ID_CODESx	false = Disabled true = Enabled
Grey Level Calibration	2	1D_GREY_LEVEL_CALIBRATIONx	false = Disabled true = Enabled
Code Orientation	1	1D_CODE_ORIENTATIONx	0 = Horizontal 1 = Vertical 2 = Both
Advanced Box Improvement	2	1D_ADV_BOX_IMPROVEMENTx	false = Disabled true = Enabled
Subpixel Decoding Improvement	2	1D_SUBPIXEL_IMPROVEMENTx	false = Disabled true = Enabled
Narrow Quiet Zone	2	1D_NARROW_MARGINSx	false = Disabled true = Enabled

PARAMETER	TYPE	STRING	DATA
<b>CODABAR</b>			
Identical Codes	2	1D_ID_CODESx	false = Disabled true = Enabled
Grey Level Calibration	2	1D_GREY_LEVEL_CALIBRATIONx	false = Disabled true = Enabled
Code Orientation	1	1D_CODE_ORIENTATIONx	0 = Horizontal 1 = Vertical 2 = Both
Advanced Box Improvement	2	1D_ADV_BOX_IMPROVEMENTx	false = Disabled true = Enabled
Subpixel Decoding Improvement	2	1D_SUBPIXEL_IMPROVEMENTx	false = Disabled true = Enabled
Narrow Quiet Zone	2	1D_NARROW_MARGINSx	false = Disabled true = Enabled
Start/Stop Characters Tx	2	1D_STARTSTOP_CHAR_TXx	false = Disabled true = Enabled

PARAMETER	TYPE	STRING	DATA
<b>GS1 DATABAR EXPANDED</b>			
Identical Codes	2	1D_ID_CODESx	false = Disabled true = Enabled
Grey Level Calibration	2	1D_GREY_LEVEL_CALIBRATIONx	false = Disabled true = Enabled
Code Orientation	1	1D_CODE_ORIENTATIONx	0 = Horizontal 1 = Vertical 2 = Both
Advanced Box Improvement	2	1D_ADV_BOX_IMPROVEMENTx	false = Disabled true = Enabled
Subpixel Decoding Improvement	2	1D_SUBPIXEL_IMPROVEMENTx	false = Disabled true = Enabled

PARAMETER	TYPE	STRING	DATA
<b>GS1 DATABAR EXPANDED STACKED</b>			
Identical Codes	2	1D_ID_CODESx	false = Disabled true = Enabled
Grey Level Calibration	2	1D_GREY_LEVEL_CALIBRATIONx	false = Disabled true = Enabled
Code Orientation	1	1D_CODE_ORIENTATIONx	0 = Horizontal 1 = Vertical 2 = Both
Advanced Box Improvement	2	1D_ADV_BOX_IMPROVEMENTx	false = Disabled true = Enabled
Subpixel Decoding Improvement	2	1D_SUBPIXEL_IMPROVEMENTx	false = Disabled true = Enabled

PARAMETER	TYPE	STRING	DATA
<b>GS1 DATABAR LIMITED</b>			
Identical Codes	2	1D_ID_CODESx	false = Disabled true = Enabled
Grey Level Calibration	2	1D_GREY_LEVEL_CALIBRATIONx	false = Disabled true = Enabled
Code Orientation	1	1D_CODE_ORIENTATIONx	0 = Horizontal 1 = Vertical 2 = Both
Advanced Box Improvement	2	1D_ADV_BOX_IMPROVEMENTx	false = Disabled true = Enabled
Subpixel Decoding Improvement	2	1D_SUBPIXEL_IMPROVEMENTx	false = Disabled true = Enabled

PARAMETER	TYPE	STRING	DATA
<b>GS1 DATABAR</b>			
Identical Codes	2	1D_ID_CODESx	false = Disabled true = Enabled
Grey Level Calibration	2	1D_GREY_LEVEL_CALIBRATIONx	false = Disabled true = Enabled
Code Orientation	1	1D_CODE_ORIENTATIONx	0 = Horizontal 1 = Vertical 2 = Both
Advanced Box Improvement	2	1D_ADV_BOX_IMPROVEMENTx	false = Disabled true = Enabled
Subpixel Decoding Improvement	2	1D_SUBPIXEL_IMPROVEMENTx	false = Disabled true = Enabled

PARAMETER	TYPE	STRING	DATA
<b>GS1 DATABAR STACKED</b>			
Identical Codes	2	1D_ID_CODESx	false = Disabled true = Enabled
Grey Level Calibration	2	1D_GREY_LEVEL_CALIBRATIONx	false = Disabled true = Enabled
Code Orientation	1	1D_CODE_ORIENTATIONx	0 = Horizontal 1 = Vertical 2 = Both
Advanced Box Improvement	2	1D_ADV_BOX_IMPROVEMENTx	false = Disabled true = Enabled
Subpixel Decoding Improvement	2	1D_SUBPIXEL_IMPROVEMENTx	false = Disabled true = Enabled



**NOTE:** GS1 DataBar option also enables GS1 DataBar Truncated symbology, while GS1 DataBar Stacked option also enables GS1 DataBar Stacked Omni-directional symbology.



PARAMETER	TYPE	STRING	DATA
<b>CODE 93</b>			
Identical Codes	2	1D_ID_CODESx	false = Disabled true = Enabled
Grey Level Calibration	2	1D_GREY_LEVEL_CALIBRATIONx	false = Disabled true = Enabled
Code Orientation	1	1D_CODE_ORIENTATIONx	0 = Horizontal 1 = Vertical 2 = Both
Advanced Box Improvement	2	1D_ADV_BOX_IMPROVEMENTx	false = Disabled true = Enabled
Subpixel Decoding Improvement	2	1D_SUBPIXEL_IMPROVEMENTx	false = Disabled true = Enabled
Narrow Quiet Zone	2	1D_NARROW_MARGINSx	false = Disabled true = Enabled

PARAMETER	TYPE	STRING	DATA
<b>EAN 13</b>			
Identical Codes	2	1D_ID_CODESx	false = Disabled true = Enabled
Grey Level Calibration	2	1D_GREY_LEVEL_CALIBRATIONx	false = Disabled true = Enabled
Code Orientation	1	1D_CODE_ORIENTATIONx	0 = Horizontal 1 = Vertical 2 = Both
Advanced Box Improvement	2	1D_ADV_BOX_IMPROVEMENTx	false = Disabled true = Enabled
Subpixel Decoding Improvement	2	1D_SUBPIXEL_IMPROVEMENTx	false = Disabled true = Enabled
Narrow Quiet Zone	2	1D_NARROW_MARGINSx	false = Disabled true = Enabled

PARAMETER	TYPE	STRING	DATA
<b>EAN 8</b>			
Identical Codes	2	1D_ID_CODESx	false = Disabled true = Enabled
Grey Level Calibration	2	1D_GREY_LEVEL_CALIBRATIONx	false = Disabled true = Enabled
Code Orientation	1	1D_CODE_ORIENTATIONx	0 = Horizontal 1 = Vertical 2 = Both
Advanced Box Improvement	2	1D_ADV_BOX_IMPROVEMENTx	false = Disabled true = Enabled
Subpixel Decoding Improvement	2	1D_SUBPIXEL_IMPROVEMENTx	false = Disabled true = Enabled
Narrow Quiet Zone	2	1D_NARROW_MARGINSx	false = Disabled true = Enabled

PARAMETER	TYPE	STRING	DATA
<b>UPCA / UPCE</b>			
Identical Codes	2	1D_ID_CODESx	false = Disabled true = Enabled
Grey Level Calibration	2	1D_GREY_LEVEL_CALIBRATIONx	false = Disabled true = Enabled
Code Orientation	1	1D_CODE_ORIENTATIONx	0 = Horizontal 1 = Vertical 2 = Both
Advanced Box Improvement	2	1D_ADV_BOX_IMPROVEMENTx	false = Disabled true = Enabled
Subpixel Decoding Improvement	2	1D_SUBPIXEL_IMPROVEMENTx	false = Disabled true = Enabled
Narrow Quiet Zone	2	1D_NARROW_MARGINSx	false = Disabled true = Enabled

PARAMETER	TYPE	STRING	DATA
<b>1D CODE FILTER</b>			
Wildcard	3	1D_WILDCARD_CHARx	Length: 1 character
Placeholder	3	1D_PLACEHOLDERx	Length: 1 character
Min. Number of Characters	0	1D_MIN_NUMBER_CHARx	Range 1 to 3116
Max. Number of Characters	0	1D_MAX_NUMBER_CHARx	Range 1 to 3116
Code Quality Standard	1	1D_CODE_QUALITY_STx	0 = Overall 1 = Decode 2 = Symbol Contrast 3 = Axial Non Uniformity 4 = Unused Error Correction 5 = Print Growth 6 = Fixed Pattern Damage 7 = Grid Non Uniformity
Code Quality Index	1	1D_CODE_QUALITY_INDEXx	0 = Any 1 = Grade A 2 = Grade B 3 = Grade C 4 = Grade D

### 4.2.3 Postal Codes

PARAMETER	TYPE	STRING	DATA
<b>Australia Post</b>			
Identical Codes	2	POSTAL_ID_CODESx	false = Disabled true = Enabled
Image Mirroring	2	POSTAL_IMAGE_MIRRORINGx	false = Disabled true = Enabled
Code Orientation	1	POSTAL_CUSTOMER_FIELD_DECODINGx	0 = N Decoding Table 1 = C Decoding Table 2 = Bars Value (Decimal)

PARAMETER	TYPE	STRING	DATA
<b>Royal Mail 45 State</b>			
Identical Codes	2	POSTAL_ID_CODESx	false = Disabled true = Enabled
Image Mirroring	2	POSTAL_IMAGE_MIRRORINGx	false = Disabled true = Enabled

PARAMETER	TYPE	STRING	DATA
<b>KIX Code</b>			
Identical Codes	2	POSTAL_ID_CODESx	false = Disabled true = Enabled
Image Mirroring	2	POSTAL_IMAGE_MIRRORINGx	false = Disabled true = Enabled

PARAMETER	TYPE	STRING	DATA
<b>Japan Post</b>			
Identical Codes	2	POSTAL_ID_CODESx	false = Disabled true = Enabled
Image Mirroring	2	POSTAL_IMAGE_MIRRORINGx	false = Disabled true = Enabled

PARAMETER	TYPE	STRING	DATA
<b>PLANET</b>			
Identical Codes	2	POSTAL_ID_CODESx	false = Disabled true = Enabled
Image Mirroring	2	POSTAL_IMAGE_MIRRORINGx	false = Disabled true = Enabled

PARAMETER	TYPE	STRING	DATA
<b>POSTNET</b>			
Identical Codes	2	POSTAL_ID_CODEsx	false = Disabled true = Enabled
Image Mirroring	2	POSTAL_IMAGE_MIRRORINGx	false = Disabled true = Enabled
POSTNET BB	2	POSTAL_POSTNETBBx	false = Disabled true = Enabled

PARAMETER	TYPE	STRING	DATA
<b>Intelligent Mail</b>			
Identical Codes	2	POSTAL_ID_CODEsx	false = Disabled true = Enabled
Image Mirroring	2	POSTAL_IMAGE_MIRRORINGx	false = Disabled true = Enabled

PARAMETER	TYPE	STRING	DATA
<b>Swedish Postal</b>			
Identical Codes	2	POSTAL_ID_CODEsx	false = Disabled true = Enabled
Image Mirroring	2	POSTAL_IMAGE_MIRRORINGx	false = Disabled true = Enabled

PARAMETER	TYPE	STRING	DATA
<b>POSTAL CODE FILTER</b>			
Wildcard	3	POSTAL_WILDCARD_CHARx	Length: 1 character
Placeholder	3	POSTAL_PLACEHOLDERx	Length: 1 character
Min. Number of Characters	0	POSTAL_MIN_NUM_CHARx	Range 1 to 3116
Max. Number of Characters	0	POSTAL_MAX_NUM_CHARx	Range 1 to 3116

## A ASCII TABLE

CHARACTER CONVERSION TABLE								
CHAR	DEC	HEX	CHAR	DEC	HEX	CHAR	DEC	HEX
NUL	0	00	*	42	2A	U	85	55
SOH	1	01	+	43	2B	V	86	56
STX	2	02	,	44	2C	W	87	57
ETX	3	03	-	45	2D	X	88	58
EOT	4	04	.	46	2E	Y	89	59
ENQ	5	05	/	47	2F	Z	90	5A
ACK	6	06	0	48	30	[	91	5B
BEL	7	07	1	49	31	\	92	5C
BS	8	08	2	50	32	]	93	5D
HT	9	09	3	51	33	^	94	5E
LF	10	0A	4	52	34	~	95	5F
VT	11	0B	5	53	35	`	96	60
FF	12	0C	6	54	36	a	97	61
CR	13	0D	7	55	37	b	98	62
SO	14	0E	8	56	38	c	99	63
SI	15	0F	9	57	39	d	100	64
DLE	16	10	:	58	3A	e	101	65
DC1	17	11	;	59	3B	f	102	66
DC2	18	12	<	60	3C	g	103	67
DC3	19	13	=	61	3D	h	104	68
DC4	20	14	>	62	3E	i	105	69
NAK	21	15	?	63	3F	j	106	6A
SYN	22	16	@	64	40	k	107	6B
ETB	23	17	A	65	41	l	108	6C
CAN	24	18	B	66	42	m	109	6D
EM	25	19	C	67	43	n	110	6E
SUB	26	1A	D	68	44	o	111	6F
ESC	27	1B	E	69	45	p	112	70
FS	28	1C	F	70	46	q	113	71
GS	29	1D	G	71	47	r	114	72
RS	30	1E	H	72	48	s	115	73
US	31	1F	I	73	49	t	116	74
SPACE	32	20	J	74	4A	u	117	75
!	33	21	K	75	4B	v	118	76
"	34	22	L	76	4C	w	119	77
#	35	23	M	77	4D	x	120	78
\$	36	24	N	78	4E	y	121	79
%	37	25	O	79	4F	z	122	7A
&	38	26	P	80	50	{	123	7B
'	39	27	Q	81	51		124	7C
(	40	28	R	82	52	}	125	7D
)	41	29	S	83	53	~	126	7E
			T	84	54	DEL	127	7F



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