


## SUPPORT THROUGH THE WEBSITE

Datalogic provides several services as well as technical support through its website. Log on to [www.datalogic.com](http://www.datalogic.com).

For quick access, from the home page click on the search icon , and type in the name of the product you're looking for. This allows you access to download Data Sheets, Manuals, Software & Utilities, and Drawings.

Hover over the Support & Service menu for access to Services and Technical Support.

## INSTALLATION PROCEDURE

- Using a 2.5 mm hex key, set the Focus Adjustment Screw to one of the three pre-calibrated distances according to your application.
- Physically mount the Matrix 120 reader.
- Make the necessary electrical connections.
- Configure the reader using the X-PRESS interface (AIM, SETUP, LEARN and TEST for simple configuration) or the DL.CODE software configuration program (complete configuration).





## HMI X-PRESS™ INTERFACE

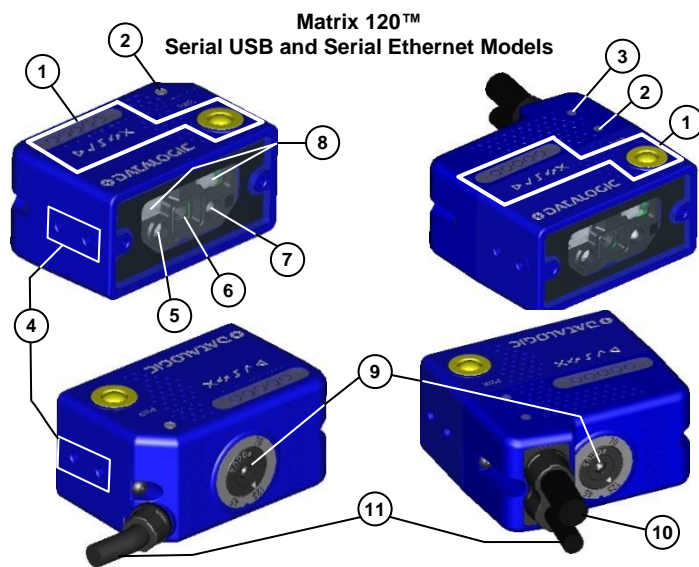
In normal operating mode the colors and meaning of the five LEDs are illustrated in the following table:

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

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

The single push button gives immediate access to the following relevant functions:

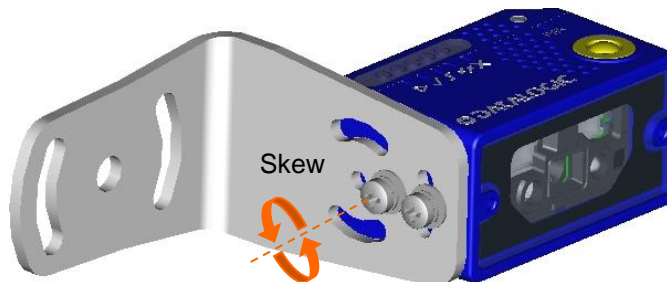
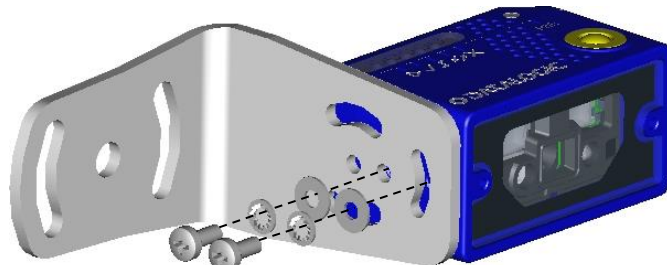
	Test Mode with bar graph visualization to check static reading performance.
	Focus (Aim) turns on the laser LED to aim the reader at the target. <b>The target should be placed 8 mm to the left and centered vertically with respect to the aiming pattern (cross).</b>
	Setup to self-optimize and auto-configure photometry parameters.
	Learn to self-detect and auto-configure for reading an unknown barcode (by type and length). Only one symbology type can be saved using this method. Performing Autolearn on a second symbology will overwrite the first one.



- General View**
- |                              |                              |
|------------------------------|------------------------------|
| ① HMI X-PRESS™ Interface     | ⑦ Good Read LED (green)      |
| ② Power On LED               | ⑧ Internal Illuminators      |
| ③ Ethernet Connection LED    | ⑨ Focus Adjustment Screw     |
| ④ Mounting Holes (4)         | ⑩ Ethernet Cable             |
| ⑤ Aiming System Laser Source | ⑪ Power - Serial - I/O Cable |
| ⑥ Lens                       |                              |

## Mounting

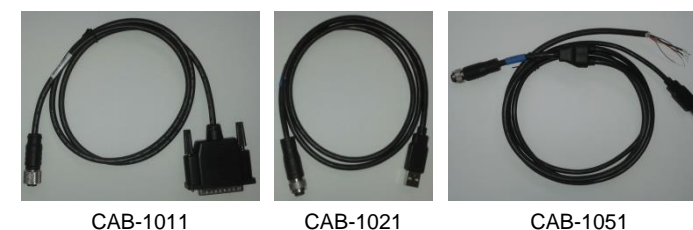
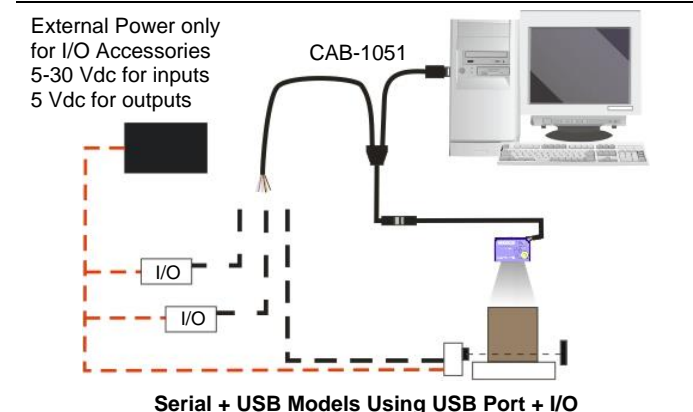
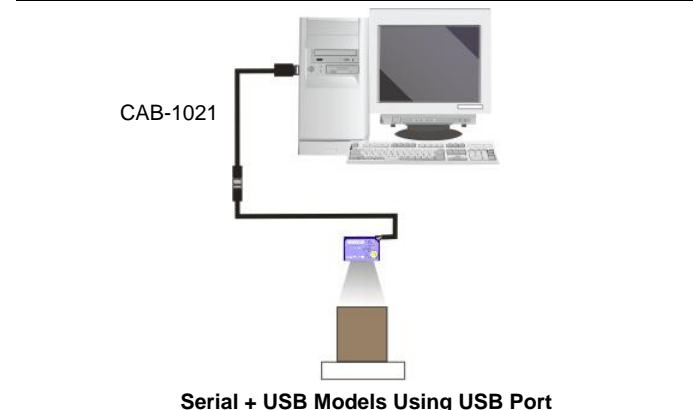
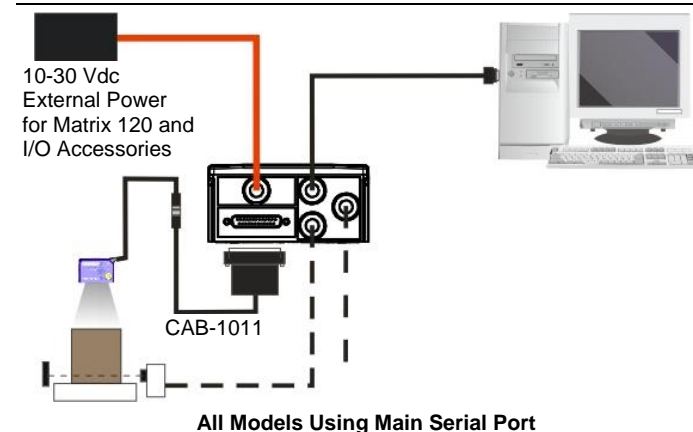
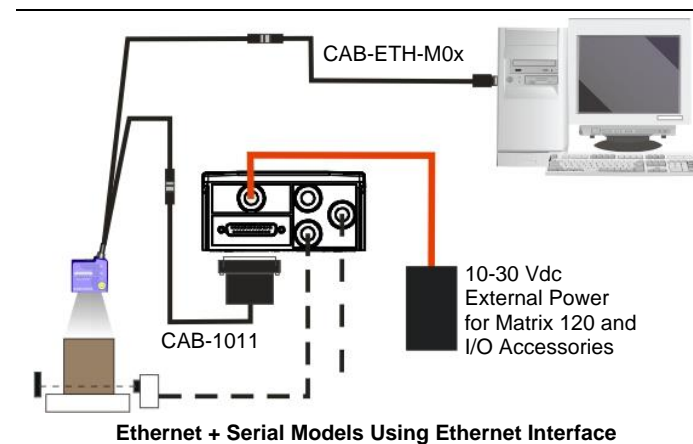
- To mount the Matrix 120, use the mounting bracket to obtain the most suitable position for the reader. Common mounting configurations are shown in the figures below.



Assure a 10° – 15° Skew Angle on the code to avoid direct reflections.



## Electrical Connections



## I/O Connections

### I/O Using CAB-1011 to CBX:



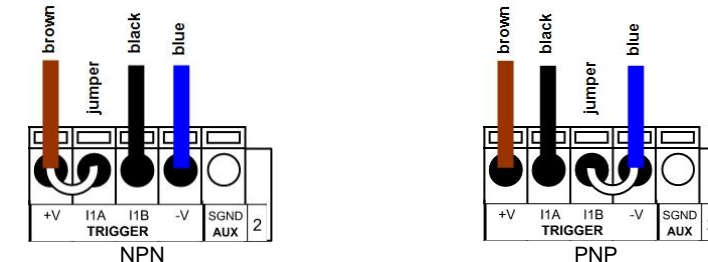
**CAUTION:** When Matrix 120 is connected to the CBX connection box through CAB-1011, **Inputs** and **Outputs** become opto-isolated and maintain the polarity significance of the CBX signals. To function correctly, they all require setting the respective Line Type configuration parameters to NPN. The hardware connection to the CBX can be either NPN or PNP.

The electrical features of both inputs at the CBX are:

$$V_{AB} = 30 \text{ Vdc max.}$$

$$I_{IN} = 12 \text{ mA (CAB-1011) + 12 mA (CBX) max.}$$

The following connections refer to Datalogic sensors.

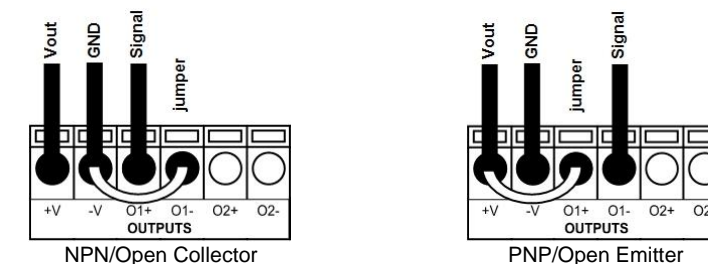


### NPN and PNP Trigger Input Wiring to CBX

The electrical features of the two outputs at the CBX are the following:

$$V_{CE} = 30 \text{ Vdc max.}$$

$$I_{CE} = 40 \text{ mA continuous max.; 130 mA pulsed max.}$$



### NPN and PNP Output Wiring to CBX

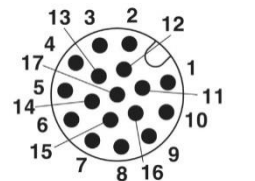
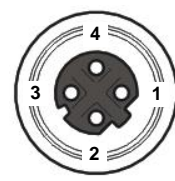
### I/O Using CAB-1051:



**CAUTION:** If output devices are powered externally (separate from Matrix 120 power), it is always advised to maintain the same voltage levels used for the Matrix 120 device.

Inputs	Outputs
<p><b>V<sub>ext</sub> = 5-30 Vdc max</b>  <b>I<sub>IN</sub> = 3.5 mA max</b></p> <p>Matrix 120 Set to NPN or PNP            GND black            TRIGGER orange</p> <p>NPN or PNP Sensor            brown V+            blue GND            black N.O. or Output</p>	<p><b>V<sub>ext</sub> = 5 Vdc max</b>  <b>I<sub>CE</sub> = 100 mA max</b></p> <p>Matrix 120 Set to NPN            GND black            OUT 1 purple</p> <p>Vext 5 Vdc            Load</p>
<p>Matrix 120 Set to PNP            GND black            TRIGGER orange</p> <p>Switch</p>	<p>Matrix 120 Set to PNP            GND black            OUT 1 purple</p> <p><b>V<sub>out</sub> = 3.3 Vdc max</b>  <b>I<sub>out</sub> = 50 mA max</b></p> <p>Vext 5 Vdc            Load</p>
<p>Matrix 120 Set to PNP            GND black            TRIGGER orange</p> <p>Switch</p>	<p>Matrix 120 Set to Push-Pull            GND black            OUT 1 purple</p> <p>Vext 5 Vdc            Load A            Load B</p>
<p>CAB-1051            Input 1 (Trigger) = orange            Input 2 = grey            GND = black</p>	<p>CAB-1051            Output 1 = purple            Output 2 = red/white            GND = black</p>

## Connector Pinouts

Power - Serial - IO			Ethernet		
			Pin 1 = TX+ Pin 2 = RX+ Pin 3 = TX- Pin 4 = RX-  Use Cat 5e or superior cables. 		
17-pin	Name	Function			
9**	O1	Output 1 (referenced to GND)			
8**	O2	Output 2 (referenced to GND)			
6	IN1	External Trigger (referenced to GND)			
13	IN2	Input Signal 2 (referenced to GND)			
7	USB+	USB Data + (only for USB models)			
15	USB-	USB Data - (only for USB models)			
1	Vdc	Power Supply Input Voltage +			
2	GND	Power Supply Input Voltage -			
5	-	Reserved			
3, 4, 14, 16	NC	not connected			
Shield	Cable shield connected to chassis and 17-pin connector shell				
RS232 Main Serial Interface			RS422 FD		
17	TX		TX+		
11	RX		*** RX+		
12	-		TX-		
10	-		*** RX-		

\*\* referenced to GND; Outputs become opto-isolated and polarity sensitive when connected through the CBX connection box. See Reference Manual for connection details.

\*\*\* do not leave floating. See Reference Manual for connection details.

## Focus and Positioning

The Matrix 120 models are factory calibrated at three focus positions (45, 70 and 125 mm for WVGA models; 45, 80 and 125 mm for MP models). Using a 2.5 mm Hex key (Allen wrench), rotate the Focus Adjustment Screw at the back of the reader to one of these three positions for your application.



**CAUTION:** Do not rotate the Focus Adjustment Screw beyond the focus scale limits otherwise damage can occur to the focus mechanism.

The following tables show the reading ranges at the three focus positions for Code 128 (1D) and Data Matrix (2D) mil resolution codes:

WVGA Models (Matrix 120 210-xxx)			
Focus Position	Horizontal FOV	Reading Range (DOF)	
		1D	2D
45	38 mm 1.5 in	30 – 80 mm 1.2 – 3.1 in	25 - 70 mm 1.0 – 2.8 in
		60 – 125 mm 2.4 – 4.9 in	45 – 100 mm 1.8 – 3.9 in
70	56 mm 2.2 in	95 – 155 mm 3.7 – 6.1 in	65 – 120 mm 2.6 – 4.7 in

MP Models (Matrix 120 310-xxx)			
Focus Position	Horizontal FOV	Reading Range (DOF)	
		1D	2D
45	40 mm 1.6 in	30 – 90 mm 1.2 – 3.5 in	30 - 80 mm 1.2 – 3.1 in
		60 – 130 mm 2.4 – 5.1 in	60 – 125 mm 2.4 – 4.9 in
80	67 mm 2.6 in	100 – 190 mm 3.9 – 7.5 in	110 – 165 mm 4.3 – 6.5 in

WA Models without Polarizer (Matrix 120 311-xx0)			
Focus Position	Horizontal FOV	Reading Range (DOF)	
		1D	2D
45	52 mm 2.0 in	25 – 90 mm 1.0 – 3.5 in	30 - 65 mm 1.2 – 2.6 in
		65 – 145 mm 2.6 – 5.7 in	55 – 105 mm 2.2 – 4.1 in
80	86 mm 3.4 in	105 – 180 mm 4.1 – 7.1 in	80 – 125 mm 3.1 – 4.9 in

The focus range is continuous to provide fine-tuning for your application.

## CONFIGURATION

### Installing DL.CODE

- On the PC that will be used for configuration, (running Windows 7, 8, or 10), download the DL.CODE mini-DVD .zip file. Extract the files maintaining the folder structure and run the **start.hta** file to access the installation pop-up. Click on the **Install DL.CODE** link to run the installation program and follow the installation procedure.
- When the installation is complete the DL.CODE entry is created in the Start>Programs bar under "Datalogic" as well as a desktop icon. Double-click the desktop icon to run it.
- Follow the Matrix 120 Reference Manual to configure:
  - Image lighting and code definition (Automatic or Advanced Setup)
  - Reading Phase and Communication Channel Selection
  - Data Collection Type
  - Data Formatting
  - Digital Output(s)

## TECHNICAL FEATURES

ELECTRICAL FEATURES	
<b>Power</b>	
Supply Voltage	5 to 30 Vdc (10 to 30 Vdc with CBX)
Consumption	0.4 to 0.1 A Max.
<b>Communication Interfaces</b>	
Main	
RS232 or RS422 FD	2400 to 115200 bit/s
USB	USB 2.0 Hi-Speed
Ethernet <sup>1</sup>	10/100 Mbit/s
<b>Inputs:</b>	short-circuit protected (Opto-coupled and polarity insensitive when connected through CBX)
<b>Outputs:</b>	short-circuit protected (Opto-coupled when connected through CBX)
<b>OPTICAL FEATURES</b> (see Reference Manual for details)	

PHYSICAL FEATURES	Serial + USB	Serial + Ethernet
Dimensions mm (inch)	45.4 x 31.1 x 23.5 (1.8 x 1.2 x 1)	45.4 x 48.5 x 23.5 (1.8 x 1.9 x 1)
Weight grams (ounces)	117 (4.1) with cable	200 (7.1) with cable
Material	Aluminium	Aluminium
ENVIRONMENTAL FEATURES		
Operating Temperature <sup>2</sup>	0 to 45 °C (32 to 113 °F)	
Storage Temperature	-20 to 70 °C (-4 to 158 °F)	
Max. Humidity	90% non-condensing	
Vibration Resistance	14 mm @ 2 to 10 Hz; 1.5 mm @ 13 to 55 Hz; EN 60068-2-6	
Shock Resistance	30g; 11 ms; 3 shocks up and 3 down on each axis	
Bump Resistance	30g; 6 ms; 5000 bumps up and 5000 down on each axis	
Protection Class	IP65	
EN 60529		
USER INTERFACE		
LED Indicators	Power; Ready, Good, Trigger, Com, Status; Ethernet Network; Green Spot; (see Reference Manual for other LEDs)	
Other	X-PRESS™ Keypad Button (configurable via DL.CODE™), Beeper	

<sup>1</sup> the embedded Ethernet interface supports application protocols: TCP/IP, EtherNet/IP, PROFINET-IO, Modbus TCP.

<sup>2</sup> high ambient temperature applications should use metal mounting bracket for heat dissipation.

SOFTWARE FEATURES			
Readable Code Symbolologies			
1D and stacked	2D	POSTAL	Digimarc Barcode
<ul style="list-style-type: none"> <li>PDF417 Standard and Micro PDF417</li> <li>Code 128 (GS1-128)</li> <li>Code 39 (Standard and Full ASCII)</li> <li>Code 32</li> <li>MSI</li> <li>Standard 2 of 5</li> <li>Matrix 2 of 5</li> <li>Interleaved 2 of 5</li> </ul>	<ul style="list-style-type: none"> <li>Codabar</li> <li>Code 93</li> <li>Pharmacode</li> <li>EAN-8/13 - UPC-A/E (including Addon 2 and Addon 5)</li> <li>GS1 DataBar Family</li> <li>Composite Symbolologies</li> </ul>	<ul style="list-style-type: none"> <li>Data Matrix ECC 200 (Standard, GS1 and Direct Marking)</li> <li>QR Code (Standard and Direct Marking)</li> <li>Micro QR Code</li> <li>MAXICODE</li> <li>Aztec Code</li> </ul>	<ul style="list-style-type: none"> <li>Australia Post</li> <li>Royal Mail 4 State Customer Kix Code</li> <li>Japan Post</li> <li>PLANET</li> <li>POSTNET (+BB)</li> <li>Intelligent Mail</li> <li>Swedish Post</li> </ul>
<b>Operating Mode</b>	CONTINUOUS, ONE SHOT, PHASE MODE		
<b>Configuration Methods</b>	X-PRESS™ Human Machine Interface Windows-based SW (DL.CODE™) via Ethernet or Serial Interface Host Mode Programming sequences sent over Serial or Ethernet TCP interfaces		
<b>Parameter Storage</b>	Permanent memory (Flash)		

<sup>\*</sup>DWCODE models available

## PATENTS

See [www.patents.datalogic.com](http://www.patents.datalogic.com) for patent list.

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

### Matrix 120™

Design patents: EP003042845; EP003074079

Utility patents: EP0996284B1; EP0999514B1; EP1014292B1; EP1128315B1; EP1172756B1; EP1396811B1; EP1413971B1; EP1804089B1; EP2315156B1; EP2517148B1; EP2649555B1; JP4435343B2; JP4571258B2; JP5192390B2; US6512218; US6616039; US6808114; US6877664; US6997385; US7053954; US7387246; US8058600; US8113430; US8368000; US8888003; US8915443; US9268982; US9430689; ZL200680050007.8.

## COMPLIANCE

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

### EMC COMPLIANCE

In order to meet the EMC requirements:

- connect reader chassis to the plant earth ground by means of a flat copper braid shorter than 100 mm;
- connect pin "Earth" of the CBX connection box to a good Earth Ground;

### POWER SUPPLY

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

This product is intended to be connected to a UL Listed Computer (LPS or "Class 2") which supplies power directly to the reader or a UL Listed Direct Plug-in Power Unit marked LPS or "Class 2".

### EAC COMPLIANCE

Customs Union: The CU Conformity certification has been achieved; this allows the Product to bear the Eurasian mark of conformity.

### LED SAFETY

LED emission according to EN 62471.

## LASER SAFETY

All Matrix 120s contain one aiming Laser source used to position the reader.

These products conform to the applicable requirements of IEC 60825-1 and comply with 21 CFR 1040.10 except for deviations pursuant to Laser Notice N° 50, date June 24, 2007. This product is classified as a Class 1M laser product according to IEC 60825-1 regulations.



**WARNING:** Use of controls or adjustments or performance of procedures other than those specified herein may result in exposure to hazardous visible laser light.

LASER RADIATION DO NOT VIEW DIRECTLY WITH OPTICAL INSTRUMENTS CLASS 1M LASER PRODUCT

Disconnect the power supply when opening the device during maintenance or installation to avoid exposure to hazardous laser light. The laser beam can be switched on or off through a software command.

## CE COMPLIANCE

CE marking states the compliance of the product with essential requirements listed in the applicable European directive. Since the directives and applicable standards are subject to continuous updates, and since Datalogic promptly adopts these updates, therefore the EU declaration of conformity is a living document. The EU declaration of conformity is available for competent authorities and customers through Datalogic commercial reference contacts. Since April 20<sup>th</sup>, 2016 the main European directives applicable to Datalogic products require inclusion of an adequate analysis and assessment of the risk(s). This evaluation was carried out in relation to the applicable points of the standards listed in the Declaration of Conformity. Datalogic products are mainly designed for integration purposes into more complex systems. For this reason, it is under the responsibility of the system integrator to do a new risk assessment regarding the final installation.

### Warning

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

## FCC COMPLIANCE

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

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

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

## LEGAL NOTICES

© 2016 - 2019 Datalogic S.p.A. and/or its affiliates • ALL RIGHTS RESERVED. • Without limiting the rights under copyright, no part of this documentation may be reproduced, stored in or introduced into a retrieval system, or transmitted in any form or by any means, or for any purpose, without the express written permission of Datalogic S.p.A. and/or its affiliates.

Datalogic and the Datalogic logo are registered trademarks of Datalogic S.p.A. in many countries, including the U.S. and the E.U.

Matrix 120, DL.CODE and X-PRESS are trademarks of Datalogic S.p.A. and/or its affiliates. Digimarc® and DWCODE™ are trademarks of Digimarc Corporation. All other trademarks and brands are property of their respective owners.

Datalogic shall not be liable for technical or editorial errors or omissions contained herein, nor for incidental or consequential damages resulting from the use of this material.