> P-Series™

⊕DATALOGIC

◆DATALOGIC

Datalogic Automation s.r.l.
Via Lavino, 265
40050 - Monte S. Pietro
Bologna - Italy

P-Series™ Reference Manual
821003521 (Rev A)
Ed.: 012/2014

08/12/14

CONTENTS

REFERENCES

CONVENTIONS

This manual uses the following conventions:

"User" refers to anyone using a P-Series™ camera.
"Camera" refers to the P-Series™ camera.
"You" refers to the System Administrator or Technical Support person using this manual to install, configure, operate, maintain or troubleshoot a P-Series™ camera.

REFERENCE DOCUMENTATION

For further details refer to the Impact Reference Guide and P-Series Quick Start Guide provided as supplementary documentation on the Impact Software DVD.

SUPPORT THROUGH THE WEBSITE

All necessary firmware is installed on the P-Series camera at the factory. Vision Program Manager Lite (VPM Lite) software must be installed to configure the camera inputs, strobe, general purpose outputs, and internal illuminators. Installation software can be downloaded from the Datalogic web site.

Datalogic provides several services as well as technical support through its website.
Log on to **www.datalogic.com** and click on the **Industrial Automation** links for further information:

- **Products - Industrial Automation - Identification**

  Select your product from the links on the **Machine Vision** page. The product page describes specific Info, Features, Applications, Models, Accessories, and Downloads including documentation, software drivers, and Vision Program Manager, which allows device configuration using a PC through an Ethernet interface.

- **Support & Services - Industrial Automation**

  Several links from the **Industrial Automation** list take you to additional services such as: Service Program which contains Maintenance Agreements and Warranty Extensions; Repair Centers; On-Line RMA Return Material Authorizations; Technical Support through email or phone, Partner Program; Downloads for additional downloads.

PATENTS

Patent. See www.patents.datalogic.com for patent list.

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

Utility patents: EP0996284B1, EP0999514B1, EP1014292B1, EP1128315B1, EP1396811B1, EP1413971B1, JP4435343B2, JP4571258B2, US6512218, US6616039, US6808114, US6997385, US7053954, US7387246, US8058600, US8368000

COMPLIANCE

For installation, use and maintenance it is not necessary to open the camera.

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 camera 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;
- for direct connections, connect your cable shield to the locking ring nut of the connector

POWER SUPPLY

ATTENTION: READ THIS INFORMATION BEFORE INSTALLING THE PRODUCT

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 camera, or a UL Listed Direct Plug-in Power Unit (rated 10 to 30 V, minimum 1 A) marked LPS or "Class 2."

CE COMPLIANCE

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

FCC COMPLIANCE

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

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

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

LED SAFETY

LED emission according to EN 62471.

HANDLING

The P-Series™ camera is designed to be used in an industrial environment and is built to withstand vibration and shock when correctly installed, however it is also a precision product and therefore before and during installation it must be handled correctly to avoid damage.

- Avoid dropping the camera (exceeding shock limits).

- Do not fine tune the position by striking the camera or bracket.
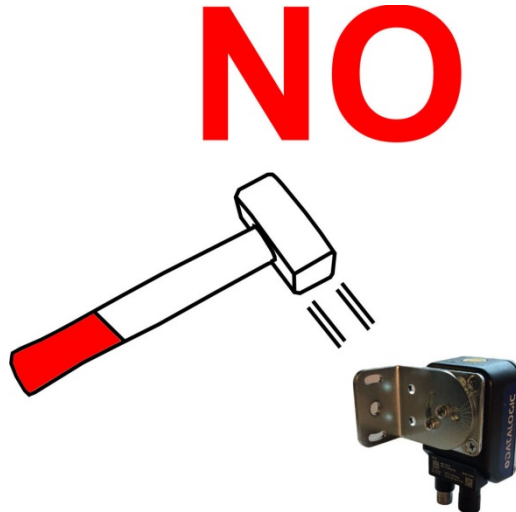
- Do not weld the camera into position. This can cause electrostatic, heat, or imager damage.
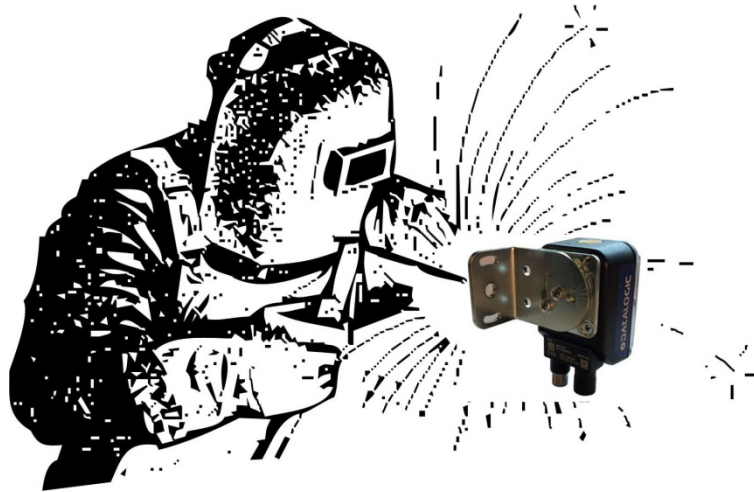
- Do not spray paint near the camera. This can cause lens or imager damage.

GENERAL VIEW

P-Series™

**Connector block
rotates to 90° position**
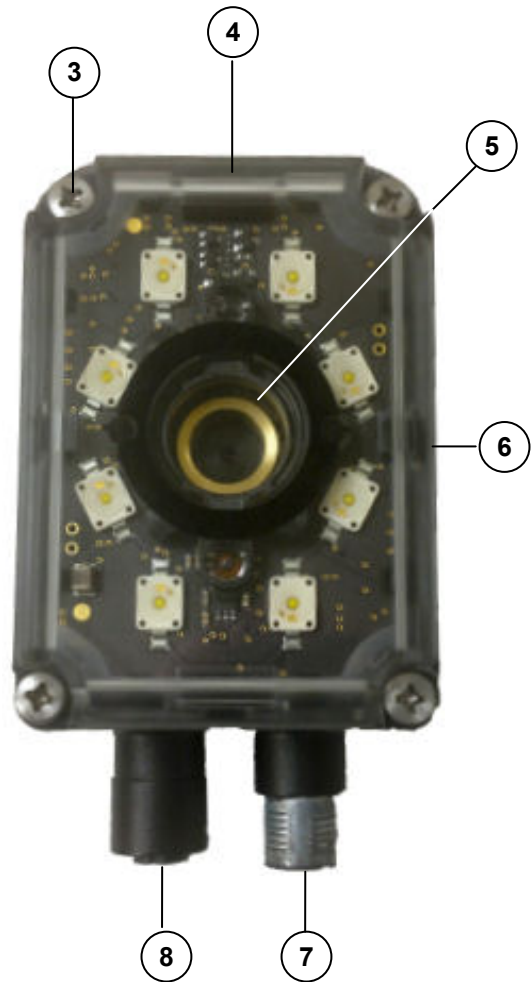
1. Device Class and Warning Labels
2. Bracket Mounting Holes (4)
3. Lens Cover Screws (4)
4. Lens Cover and Internal Illuminator
5. Lens
6. Focus Adjustment Screw (on side)
7. Power - Serial Interfaces - I/O Connector
8. Ethernet Connector
9. Ethernet Connection LED
10. Power On LED

1   RAPID CONFIGURATION

STEP 1 – CONNECT THE SYSTEM

In the typical layout shown in the figure below, an Ethernet host is connected to the camera. The camera can use an external trigger or internal software trigger to signal image acquisition. If an external trigger is used, the Ethernet host connection is needed only for camera and program configuration and inspection monitoring.

The CBX is used to facilitate the connection between the camera, external trigger, and optional input and output devices.
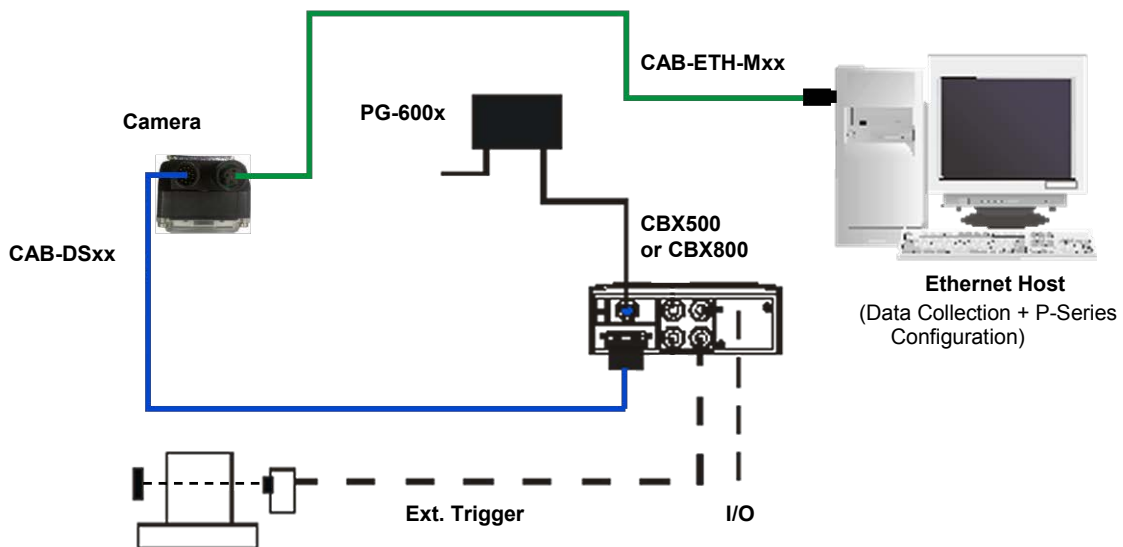
Figure 1 – P-Series™ Stand Alone Layout to Ethernet Host

- **Power Supply Connection**
  Use the PG600x AC/DC Power Supply Unit (3 versions for European, UK or US plug).

- **CBX Connection**

  Use CAB-DSxx-S between the P-Series camera and the CBX for power, external trigger device (photocell), and additional I/O connections.

  Use the CAB-ETH-Mxx for the Ethernet connection to the host.

NOTE	*The P-Series does not support sourcing power towards the CBX in order to power I/O devices. These devices must be powered through the CBX or from an external source.*

CBX500/CBX800 Pinout for P-Series™

The table below gives the pinout of the CBX500/CBX800 terminal block connectors. Use this pinout when the P-Series™ camera is connected using the CBX500/CBX800.

CBX500/800 Terminal Block Connectors			
Input Power		**Outputs**	
Vdc	Power Supply Input Voltage +	+V	Power Source - Outputs
GND	Power Supply Input Voltage -	-V	Power Reference - Outputs
Earth	Protection Earth Ground	O1+	Output 1 +
		O1-	Output 1 -
Inputs		O2+	Output 2 +
+V	Power Source – External Trigger	O2-	Output 2 -
I1A	External Trigger A (polarity insensitive)	O3A	CBX500: Strobe/Output 3 (Single Pin Connection)
I1B	External Trigger B (polarity insensitive)		
-V	Power Reference – External Trigger	O3B	CBX500: Not Used
+V	Power Source – Inputs	O3A	CBX800: Strobe + / Output 3+ (Opto-isolated; See Note)
I2A	Input 2 A (polarity insensitive)	O3B	CBX800: Strobe - / Output 3- (See Note)
I2B	Input 2 B (polarity insensitive)	**RS232 Interface**	
-V	Power Reference – Inputs	TX	Transmit
Shield		RX	Receive
Shield	Network Cable Shield	SGND	Signal Ground

Note: The strobe signal connection is shared with Output 3. If a non-zero value is defined for the Strobe Pulse Length value (in VPM – Impact – General), the strobe is active. If the value is zero, Output 3 is active.

⚠️ **CAUTION**

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

STEP 2 – INSTALL THE LENS AND ILLUMINATOR

Continue with this step if the camera has no lens or internal illuminator, or you want to use a lens or illuminator with different characteristics.
If the camera already contains the correct lens and illuminator, continue with Step 3.
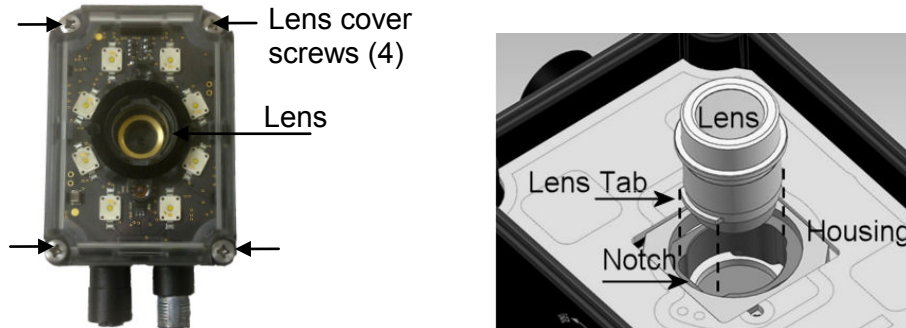
To Remove the Camera Lens

1. Remove the four lens cover screws and carefully remove the cover. Be sure the sealing gasket stays with the cover.

2. Grasp the lens firmly, then press in until the lens stops moving.

3. Turn the lens 90º counter-clockwise.

4. Lift the lens straight up until it clears the lens housing.

To Replace the Camera Lens

1. Align the tabs on the lens with the notches in the lens housing.

2. Grasp the lens firmly, then press in until the lens stops moving.

3. Turn the lens 90º clockwise.

4. Release the lens.

5. When the lens is mounted correctly, it should not turn in the housing.

6. Carefully replace the cover. Be sure the sealing gasket fits into the grooves in the camera body.

7. Replace the four cover screws. Over tightening can damage the cover.

To Replace the Internal Illuminator

1. Remove the four lens cover screws and carefully remove the illuminator and cover. The illuminator is integrated with the cover.

2. Be sure the sealing gasket remains with the cover.

3. Align the new illuminator with the camera case and gently press down until the illuminator is tight to the case.

4. Replace the four cover screws. Overtightening can damage the cover.

5. NOTE: Configure the Internal Illuminator in VPM – Camera Setup.

STEP 3 – MOUNT AND POSITION THE CAMERA

Use the P-Series™ mounting brackets to obtain the most suitable position for the camera. The most common mounting configuration is shown in the figure below.

Figure 2 –Positioning with Mounting Bracket

When mounting the camera, take into consideration that significant pitch, skew, or tilt may degrade accuracy.
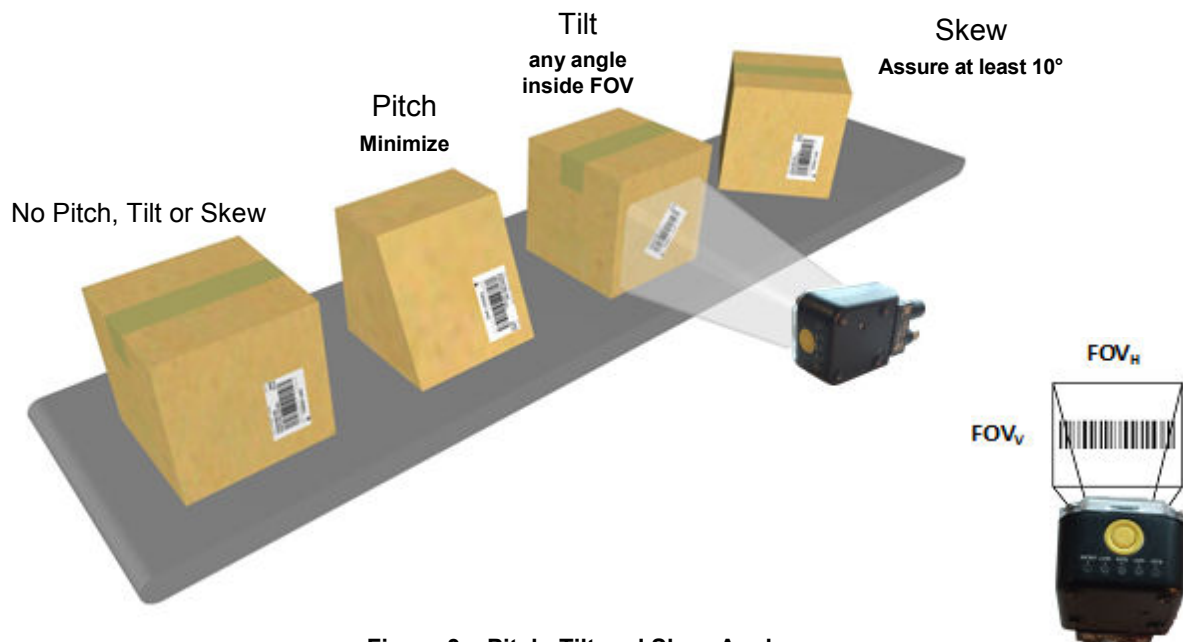

Figure 3 – Pitch, Tilt and Skew Angles

STEP 4 – FOCUS THE CAMERA

To adjust the P-Series™ lens, use VPM Lite to continuously snap and display an image. Use the camera Focus adjustment on the side of the camera to adjust the focus.

1. Install or change the lens, if necessary.

2. Power the camera on. The "POWER ON" LED (blue) on the rear of the camera indicates that the camera is correctly powered.

3. Start Impact VPM Lite and connect to the camera.

4. Direct the camera toward a correctly lighted calibration image or other clearly defined object.

5. Select the Settings tab, then click the Camera system object.

6. In the Camera Setup tab, click the Live button.

7. Adjust the lens until the image is clearly in focus in the VPM Lite image window. Turn the Focus Adjustment clockwise to focus on near objects. Turn it counter-clockwise to focus on objects that are further away.

8. When focusing is complete, click the Snap button in the Camera Setup tab. You can now calibrate the camera, if needed.

Focus Adjustment
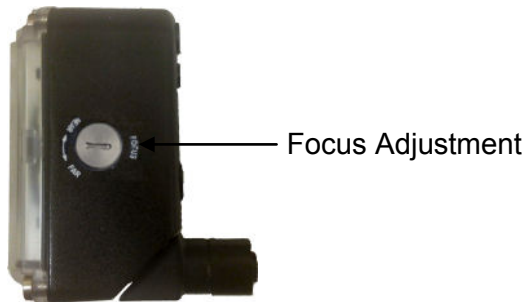
STEP 5 – CALIBRATE IMAGE DENSITY

In order to function correctly when inspecting images, the camera needs the image resolution or PPI (pixels per inch). Calibration insures that the measurements indicated in VPM Lite tools accurately relate the inspected object's measurements.

There are several methods available for calibrating the camera. Refer to the Calibration Panel section of the Impact Reference Guide (Publication # 843-0093) for complete details.

2 INTRODUCTION

2.1 PRODUCT DESCRIPTION

The P-Series™ cameras are Datalogic industrial compact 2D cameras designed and produced to be a high performance affordable solution for all machine vision applications.

IMPACT P10, Grayscale, 640x480, 120 FPS, 1/4" CMOS

IMPACT P15, Grayscale, 1280x1024, 58 FPS, 1/1.8" CMOS

Rugged construction, IP67 protection and max 50°C operative temperature make the P-Series™ the ideal product for industrial environments where protection against harsh external conditions is required.

The camera is contained in an aluminum housing. With its internal illuminator, lens and protective cover, the mechanical dimensions are 95 x 54 x 43 mm and it weighs about 238 g.

Electrical connection of Power and I/O signals is provided through an M12 (IP67) 17-pin connector. A standard M12 D-Coded (IP67) Ethernet connector is also present.

- Cost effective compact Smart Camera Series
- Right-angle IP67 rated enclosure with rotating, sealed connectors
- VGA (P10 - 640x480) or 1.3 MP (P15 - 1280x1024) grey-scale imagers
- Embedded interchangeable lenses and illuminators
- Built-in digital I/Os, Serial, and Ethernet interfaces
- A variety of powerful Internal Lighting Systems
- Frame Rate up to 120 frames/sec
- Supply voltage ranges from 10 to 30 Vdc

The P-Series™ camera has been developed for use in numerous industries like:

Automotive
- DPM (Direct Part Marked) Reading and Verification
- Tires Sorting

Electronics
- Large PCB Board Tracking
- Electronics Product Tracking

Distribution & Retail Industry
- Presentation Scanner
- Small Objects Tracking & Sorting
- Warehouse applications

Medical & Pharmaceutical
- Medical Devices Traceability
- Pharmaceutical and Medicine Manufacturing
- Chemical & Biomedical Analysis

Food & Beverage
- Work in Progress Traceability
- Code Quality Control
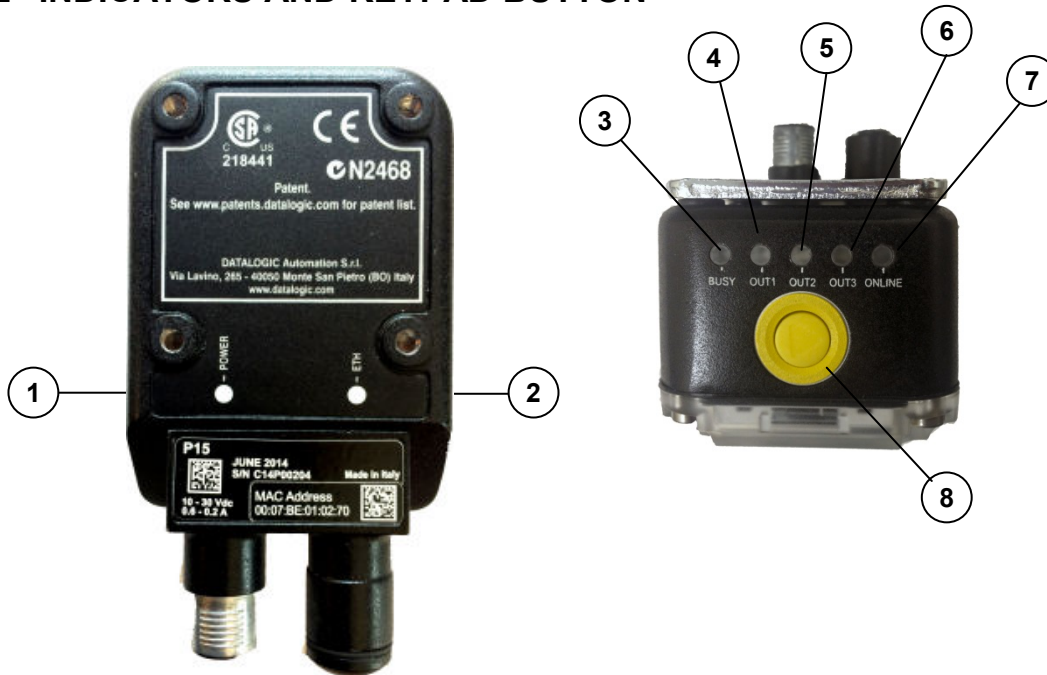
2.2 INDICATORS AND KEYPAD BUTTON

Figure 4 - Indicators

The following button and LED indicators are located on the camera.

1	**POWER**	On – camera is connected to power
2	**ETH**	On – Ethernet link is established. Blinking - data transmission
3	**BUSY**	LED blinks during task execution and flash memory access
4	**OUT1**	On – Output 1 is on
5	**OUT2**	On – Output 2 is on
6	**OUT3**	On – Output 3 is on
7	**ONLINE**	On – Loaded tasks will be executed based on their trigger parameters
8	**BUTTON**	Camera Reset: See Note below Camera Button Event: Press and release the button (Internal software event only)

Note: Camera Reset restores the factory camera settings including deleting all user settings and resetting the camera's Mask and IP Address to the factory default (192.168.0.128).

To Reset the Camera

1. Turn off camera power.

2. Press and hold the Camera Reset button.

3. Turn on power. Continue holding the Camera Reset button.

4. After about 30 seconds, all the LED indicators turn on for a few seconds. Continue holding the Camera Reset button.

5. The LED indicators turn off for about five seconds, then turn on.

6. When all the LED indicators have turned on and remain lit, release the Camera Reset button.

7. Wait approximately 30 seconds for the camera to restart.

2.2.1   Lighting System and Lensing Notes

The following table shows the lenses and illuminators that are available for the P-Series™. Illuminators are enabled in VPM Lite – Camera Setup.

Lenses and Filters	Illuminators
Micro Video Lens, 6mm	Wide angle 8 LEDs, red
Micro Video Lens, 9mm	Wide angle 8 LEDs, white
Micro Video Lens, 12mm	Wide angle 8 LEDs, blue
Micro Video Lens,16mm	Wide angle 8 LEDs, IR
Micro Video Lens, 25mm	Multi-chain 50 LEDs, red
Filter, IR band pass filter	Multi-chain 50 LEDs, white
Micro Video Lens, 25mm with IR band pass filter	Multi-chain 50 LEDs, blue

2.3 ACCESSORIES

The following accessories can be used with the P-Series™ camera.

Accessory	Description	Order No.
Cables		
CAB-DS01-S	M12-IP67 Cable To CBX or QL (1M)	93A050058
CAB-DS03-S	M12-IP67 Cable To CBX or QL (3M)	93A050059
CAB-DS05-S	M12-IP67 Cable To CBX or QL (5M)	93A050060
CAB-DS10-S	M12-IP67 Cable To CBX or QL (10M)	93A051390
CAB-ETH-M01	M12-IP67 Ethernet Cable (1M)	93A051346
CAB-ETH-M03	M12-IP67 Ethernet Cable (3M)	93A051347
CAB-ETH-M05	M12-IP67 Ethernet Cable (5M)	93A051348
CAB-ETH-M10	M12-IP67 Ethernet Cable (10M)	93A051391
Connectivity		
CBX500	Modular Connection Box	93A301068
CBX800	Gateway	93A301077
BM100	Backup Module for CBX500	93ACC1808
BM150	Display Module for CBX500	93ACC1809
Various Fieldbus and Non-Fieldbus Host Interface Modules and All-In-One Connection Box Kits are available		
BM300	Profibus Module	93ACC1810
BM310	Profibus IP65 Module	93ACC1811
BA100	DIN Rail Adapters	93ACC1821
BA200	Bosch Adapters	93ACC1822
Various M12 Panel Connectors for CBX Connection Boxes are available		
License	OCR, Smart Camera	95A906540
Power Supplies		
PG6002	AC/DC Power Supply Unit (US)	93ACC1718
PG6001	AC/DC Power Supply Unit (UK)	93ACC1719
PG6000	AC/DC Power Supply Unit (EU)	93ACC1720
Sensors		
MEP-593	Photocell Kit PNP (PH-1)	93ACC1791
MEP-543	Photocell Kit-NPN	93ACC1728
S3Z-PR-5-C11-PL	Diffuse Proximity Sensor	95B010011

3 INSTALLATION

3.1 PACKAGE CONTENTS

Verify that the P-Series™ camera and all the parts supplied with the equipment are present and intact when opening the packaging; the list of parts includes:

❑ P-Series™ camera

❑ Quick Reference Guide

❑ Mounting Kit
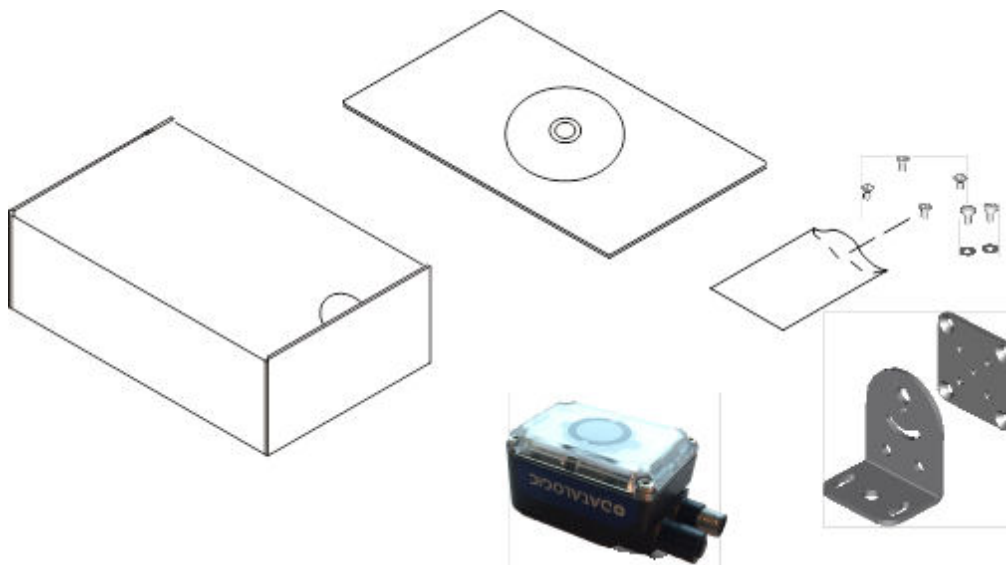- Mounting Screws (4 + 2)
- Washers (2)
- Mounting Brackets (2)

Figure 5 - Package Contents

3.2 MECHANICAL DIMENSIONS

The P-Series™ cameras can be installed to operate in different positions. The twelve screw holes (M4 x 5) on the body of the camera are for mounting the camera to a mechanical fixture or the provided brackets. (Figure 6).

The diagram below gives the overall dimensions of the camera and may be used for its installation.
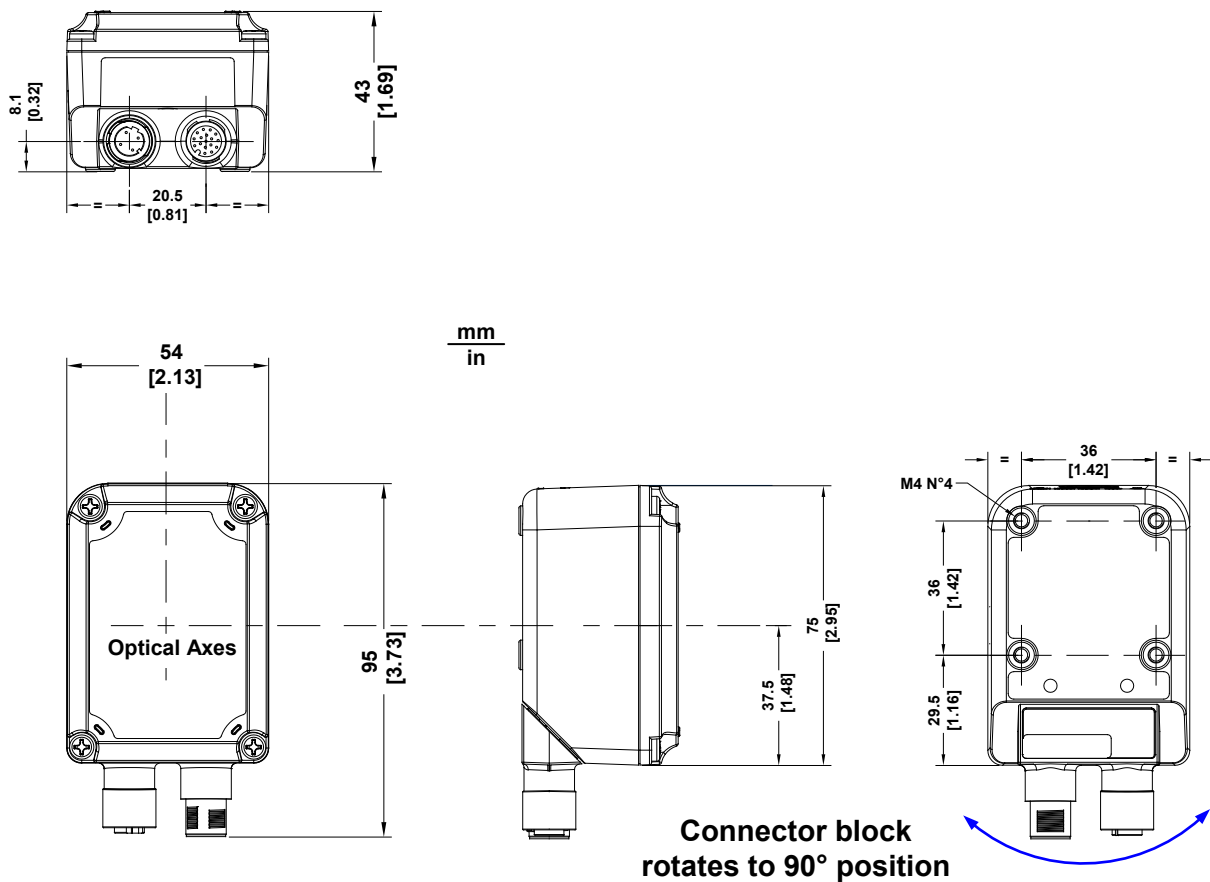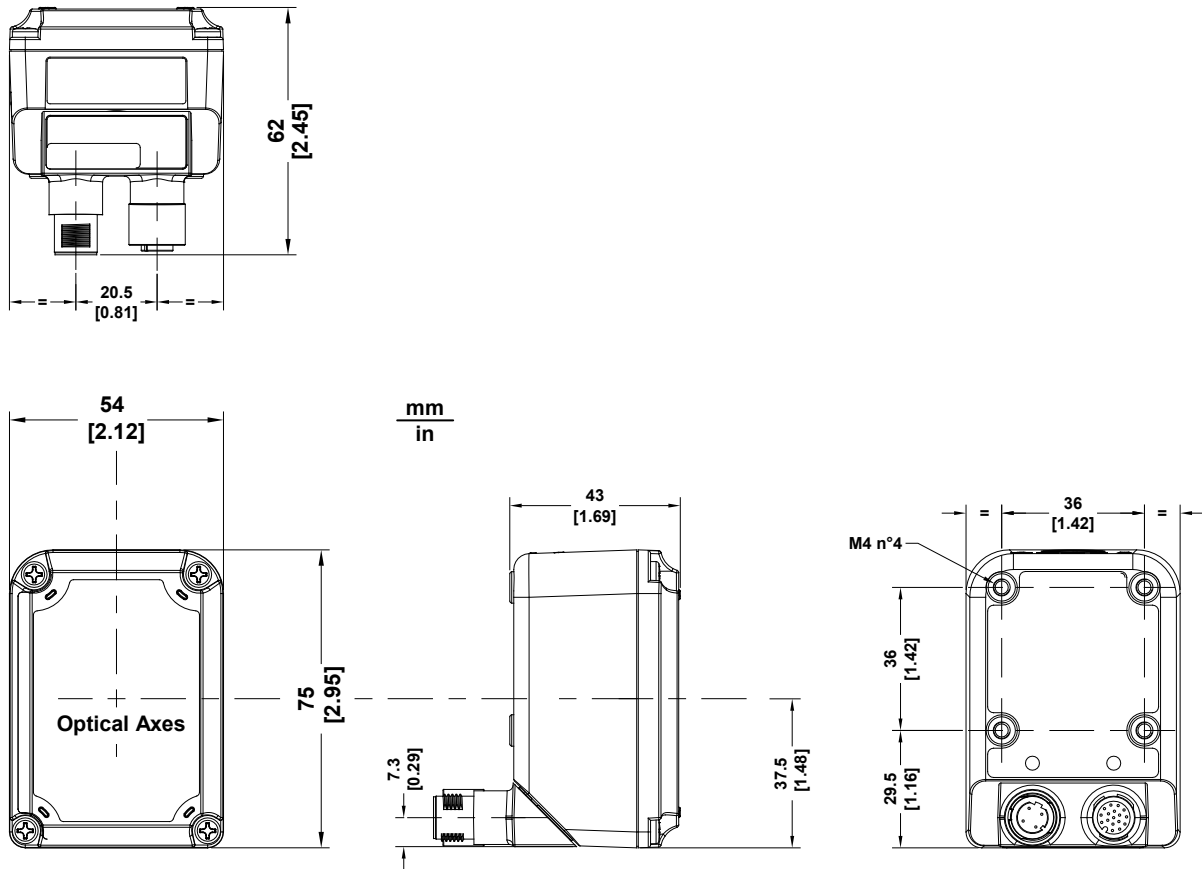

Figure 6 - Overall Dimensions with Connector at 0°

Figure 7 - Overall Dimensions with Connector at 90°

47
[1.85]

36
[1.42]

17.7
[0.70]

M 4 N°5

47
[1.85]

17.7
[0.70]

36
[1.42]

3
[0.12]

mm
in

Ø4.5
[Ø0.18]

4.5
[0.18]

90°

60
[2.36]

40
[1.57]

90°

47
[1.85]

3
[0.12]

23
[0.91]

36
[1.42]

30°
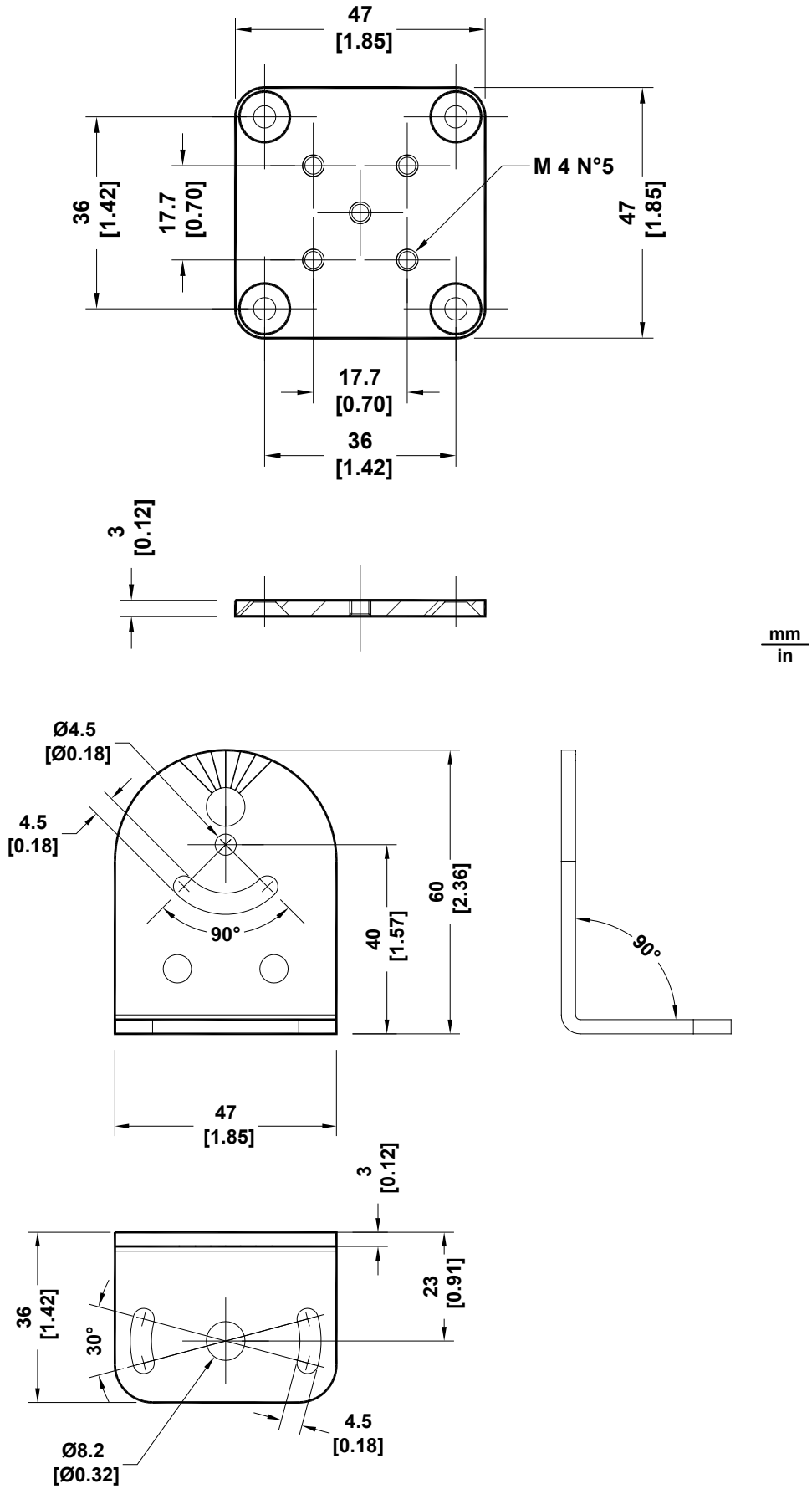
4.5
[0.18]

Ø8.2
[Ø0.32]

Figure 8 - Mounting Bracket Overall Dimensions

3.3 MOUNTING AND POSITIONING THE P-SERIES™

Use the P-Series™ mounting brackets to obtain rotation on the various axes of the camera as shown in the diagram below:
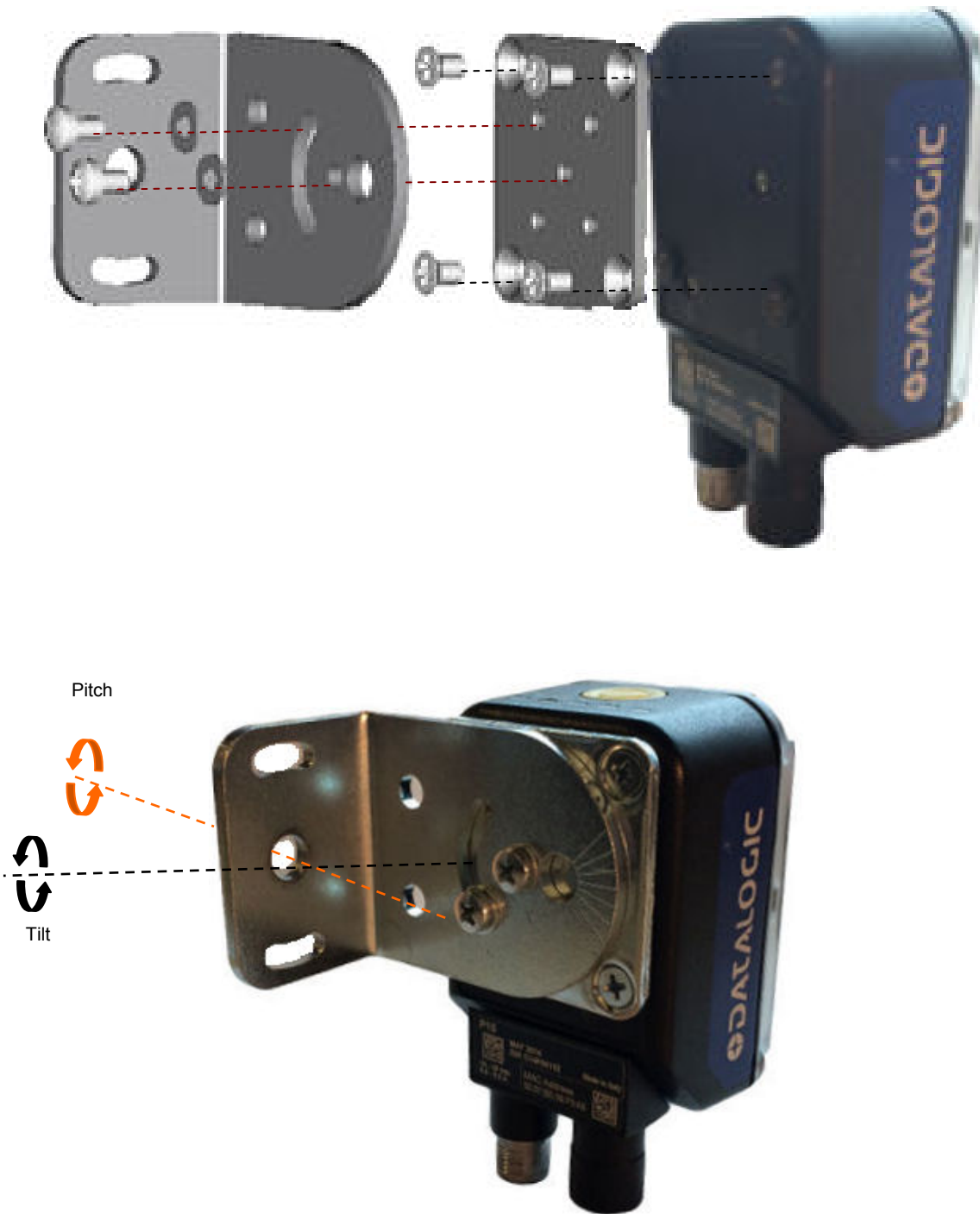

Figure 9 –Positioning with Mounting Bracket

The P-Series™ camera is able to capture and analyze images at a variety of angles. However, when mounting the P-Series™ camera, take into consideration that significant pitch, skew, or tilt may degrade performance.

The **Pitch, Skew and Tilt** angles are represented in Figure 10. Follow the suggestions below for the best orientation:

Position the camera in order to avoid the direct reflection of the light emitted by the P-Series™ camera; it is advised to **assure at least 10°** for the Skew angle.
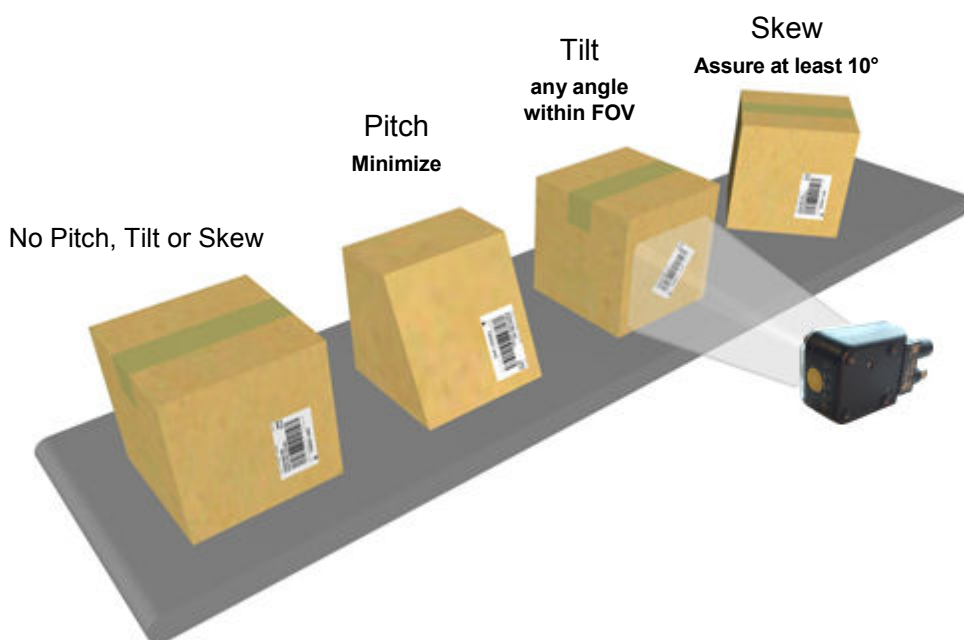

Figure 10 - Orientation

4 CBX ELECTRICAL CONNECTIONS

All P-Series™ models can be connected to a CBX500 or CBX800 connection box through one of the available **CAB-DSxx-S** accessory cables. These accessory cables terminate in an M12 17-pin connector on the camera side and in a 25-pin male D-sub connector on the CBX side.

We recommend making system connections through one of the CBX connection boxes since they offer the advantages of easy connection, easy device replacement, opto-isolated outputs (Outputs 1 and 2), and filtered reference signals.

NOTE: If you require direct wiring to the camera see page 38.

The table below gives the terminal block connections on the CBX500/800.

CBX500/800 Terminal Block Connectors	
Input Power	
Vdc	Power Supply Input Voltage +
GND	Power Supply Input Voltage -
Earth	Protection Earth Ground
Inputs	
+V	Power Source – External Trigger
I1A	External Trigger A (polarity insensitive)
I1B	External Trigger B (polarity insensitive)
-V	Power Reference – External Trigger
+V	Power Source – Inputs
I2A	Input 2 A (polarity insensitive)
I2B	Input 2 B (polarity insensitive)
-V	Power Reference – Inputs
Outputs	
+V	Power Source - Outputs
-V	Power Reference - Outputs
O1+	Output 1 + opto-isolated and polarity sensitive
O1-	Output 1 - opto-isolated and polarity sensitive
O2+	Output 2 + opto-isolated and polarity sensitive
O2-	Output 2 - opto-isolated and polarity sensitive
03A	CBX500: Strobe / Output 3 (Single pin connection)
03B	CBX500: Not Used
03A	CBX800: Strobe + / Output 3 + (Opto-isolated; See Note)
03B	CBX800: Strobe - / Output 3 -
RS232 Interface	
TX	Auxiliary Interface TX
RX	Auxiliary Interface RX
SGND	Auxiliary Interface Reference

Note: The strobe signal connection is shared with Output 3. If a non-zero value is defined for the Strobe Pulse Length value (in VPM – Impact – General), the strobe is active. If the value is zero, Output 3 is active.

CAUTION

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

NOTE: To avoid electromagnetic interference when the camera is connected to a CBX connection box, verify the jumper positions in the CBX as indicated in its Installation Manual.

4.1 POWER SUPPLY

To power the camera and/or I/O devices through the CBX, power must be supplied to the CBX500/800 spring clamp terminal pins as shown in Figure 11:
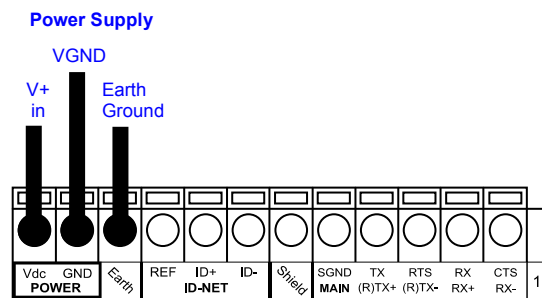

Figure 11 - Power Supply Connections

The power must be between 10 and 30 Vdc only.

It is recommended to connect the device CHASSIS to earth ground (Earth) by setting the appropriate jumper in the CBX connection box. See the CBX Installation Manual for details.

4.2 RS232 INTERFACE

The signals relative to the following serial interface types are available on the CBX spring clamp terminal blocks.

The serial interface parameters (baud rate, data bits, etc.) are defined in VPM Lite software. Refer to the Serial Port section of the Impact Reference Guide (Publication # 843-0093).

The following pins are used for RS232 interface connection:

CBX500/800	Function
TX	Transmit Data
RX	Receive Data
SGND	Signal Ground

It is always advisable to use shielded cables. The overall maximum cable length must be less than 15 m (49.2 ft.).
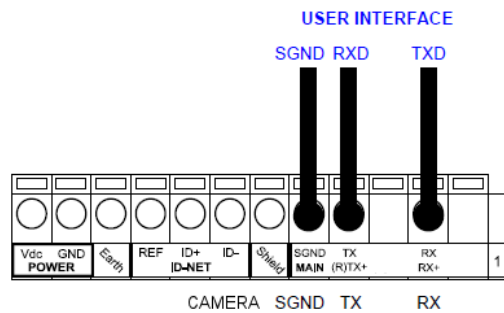

Figure 12 – RS232 Interface Connections

4.2.1 RS485 Full-Duplex Interface
The Impact software does not support RS485 protocol.

4.4 AUXILIARY RS232 INTERFACE

The 9-pin female Auxiliary Interface connector inside the CBX is to be used by Factory and Support personnel only.

☝ *Do not make any connections to the Aux Interface.*

NOTE

4.5 INPUTS

There are two optocoupled polarity insensitive inputs available on the camera: Input 1 (Trigger) and Input 2, a generic input:

The Trigger is used to trigger the camera so it will acquire an image.

Input 2 can be used as a signal to a software task to perform an action.

The electrical features of both inputs are:

V_{AB} = 30 Vdc max.

I_{IN} = 10 mA (camera) + 12 mA (CBX) max.

The active state of these inputs are selected in software. Refer to the Camera Setup tab and Discrete Input tool sections of the Impact Reference Guide (Publication # 843-0093).

An anti-disturbance filter is implemented in software on both inputs so that the default minimum pulse duration is $\cong$ 0.5 milliseconds. This value can be increased or decreased through the software parameter Debounce Filter. Refer to the Camera Setup tab section in the Impact Reference Guide for further details.

These inputs are optocoupled and can be driven by both NPN and PNP type commands.

NOTE: Polarity insensitive inputs assure full functionality even if pins A and B are exchanged.

The connections are indicated in the following diagrams:

CBX500/800	Function
+V	Power Source - External Trigger
I1A	External Trigger A (polarity insensitive)
I1B	External Trigger B (polarity insensitive)
-V	Power Reference - External Trigger

EXTERNAL TRIGGER INPUT CONNECTIONS USING P-Series™ POWER

CAUTION: Power from the Vdc/GND spring clamps is available directly to the Input Device on the +V/-V spring clamps, and does not pass through the Power Switch (ON/OFF) inside the CBX. Disconnect the power supply when working inside the CBX.
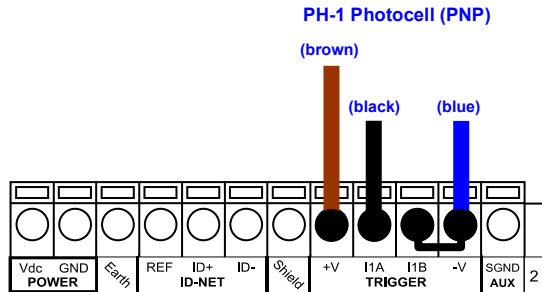

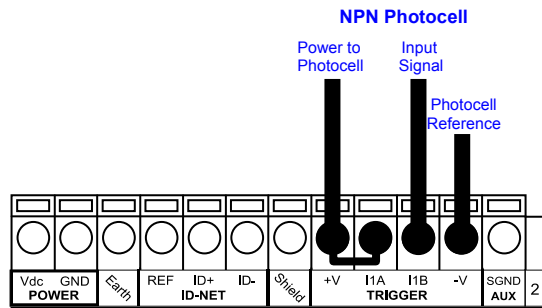**Figure 13 – PH-1 External Trigger Using P-Series™ Power**

Figure 14 - NPN External Trigger Using P-Series™ Power

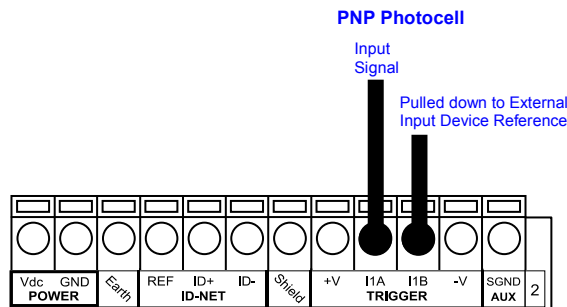## EXTERNAL TRIGGER INPUT CONNECTIONS USING EXTERNAL POWER

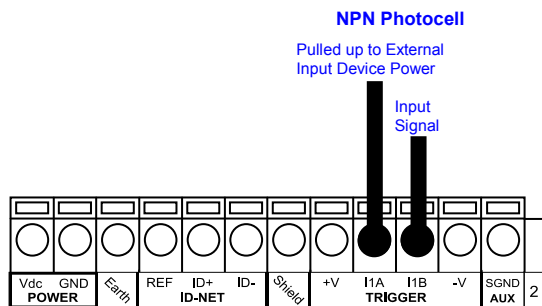**Figure 15 - PNP External Trigger Using External Power**

Figure 16 - NPN External Trigger Using External Power

| CBX500/800	Function
+V	Power Source - Inputs
I2A	Input 2 A (polarity insensitive)
I2B	Input 2 B (polarity insensitive)
-V	Power Reference - Inputs

INPUT 2 CONNECTIONS USING P-Series™ POWER

CAUTION: Power from the Vdc/GND spring clamps is available directly to the Input Device on the +V/-V spring clamps, and does not pass through the Power Switch (ON/OFF) inside the CBX. Disconnect the power supply when working inside the CBX.
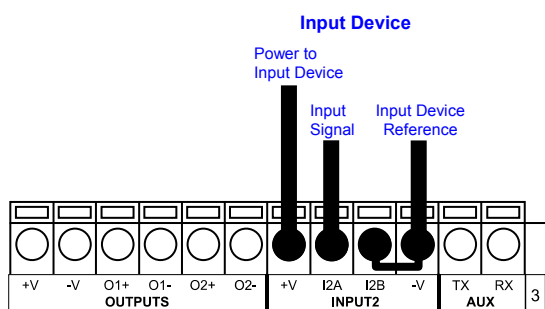
PNP Input 2 Using P-Series™ Power
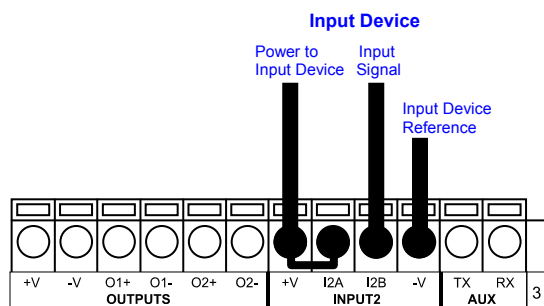
NPN Input 2 Using P-Series™ Power
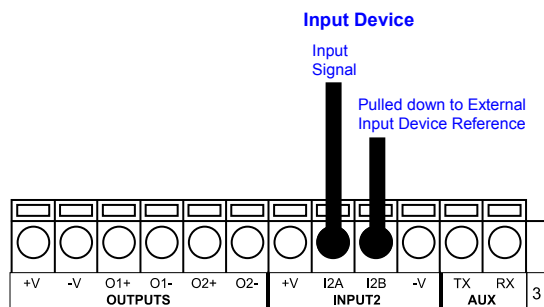
INPUT 2 CONNECTIONS USING EXTERNAL POWER
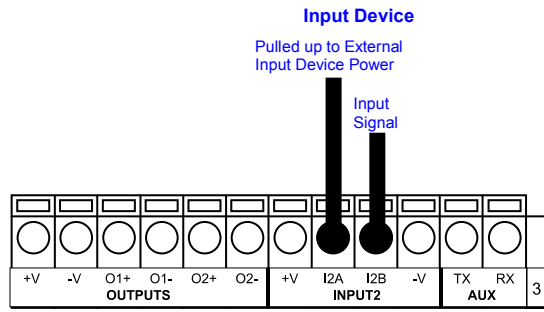

Figure 17 - PNP Input 2 Using External Power

Figure 18 - NPN Input 2 Using External Power
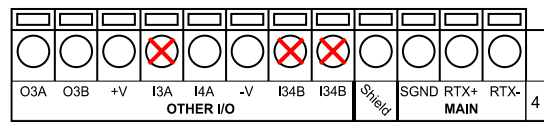

INPUT 3 CONNECTIONS (CBX500 Only)

RESERVED

Figure 19 - Input 3 Using External Power

CAUTION: Do not connect to I3A or I34B signals, they are reserved.

4.6 OUTPUTS

CAUTION: When **Outputs 1** and **2** are connected through the CBX connection box, they become opto-isolated and polarity sensitive and acquire the electrical characteristics listed below. To function correctly, they require setting the <u>Output Type configuration parameters to NPN</u>.

Programming Outputs for NPN or PNP operation

Three general purpose outputs are available and their meaning can be defined by the user. The outputs are programmed using VPM Lite.

1. Start VPM Lite.

2. Select the General icon.

3. Select the Communication button.

4. Configure the output type.

They are typically used either to signal the data collection result or to control an external lighting system.

CBX500/800	Function
+V	Power Source - Outputs
O1+	Output 1 + opto-isolated and polarity sensitive
O1-	Output 1 - opto-isolated and polarity sensitive
O2+	Output 2 + opto-isolated and polarity sensitive
O2-	Output 2 - opto-isolated and polarity sensitive
O3A	CBX500: Strobe / Output 3 (Single pin connection)
O3B	CBX500: Not Used
O3A	CBX800: Strobe + / Output 3 + (Opto-isolated; See Note)
O3B	CBX800: Strobe - / Output 3 -
-V	Power Reference Outputs

The electrical features of the outputs are the following:

Outputs 1 and 2	Output 3
V_{CE} = 30 Vdc max.	Reverse-Polarity and Short-Circuit Protected
I_{CE} = 40 mA continuous max.; 130 mA pulsed max.	V_{OUT} (I_{LOAD} = 0 mA) max = 30 Vdc
$V_{CE\ saturation}$ = 1 Vdc max. @ 10 mA	V_{OUT} (I_{LOAD} = 100 mA) max = 3 Vdc
P_D = 90 mW Max. @ 50 °C ambient temp.	I_{LOAD} max = 100 mA

The output signals are fully programmable. Refer to the Discrete Output tool section in the Impact Reference Guide for further details.

OUTPUT 1 AND 2 CONNECTIONS USING P-Series™ POWER

CAUTION: Power from the Vdc/GND spring clamps is available directly to the Output Device on the +V/-V spring clamps, and does not pass through the Power Switch (ON/OFF) inside the CBX. Disconnect the power supply when working inside the CBX.
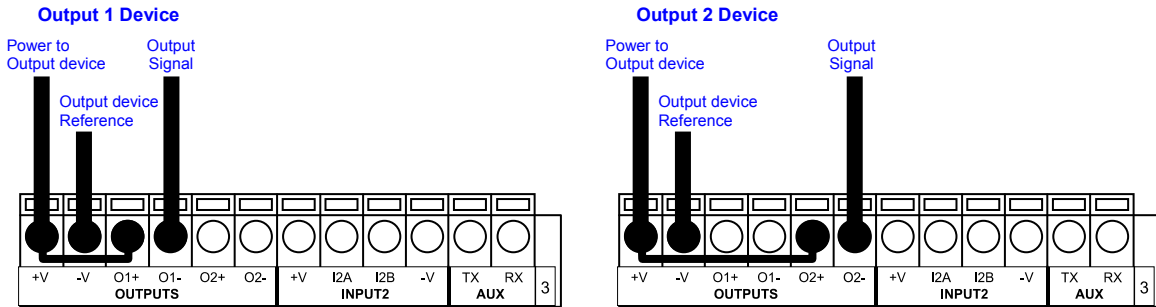

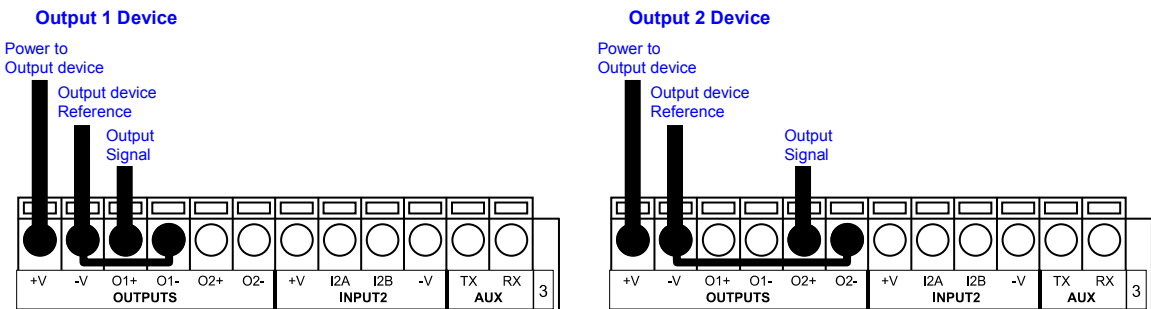Figure 20 - PNP/Open Emitter Output Using P-Series™ Power

Figure 21 - NPN/Open Collector Output Using P-Series™ Power

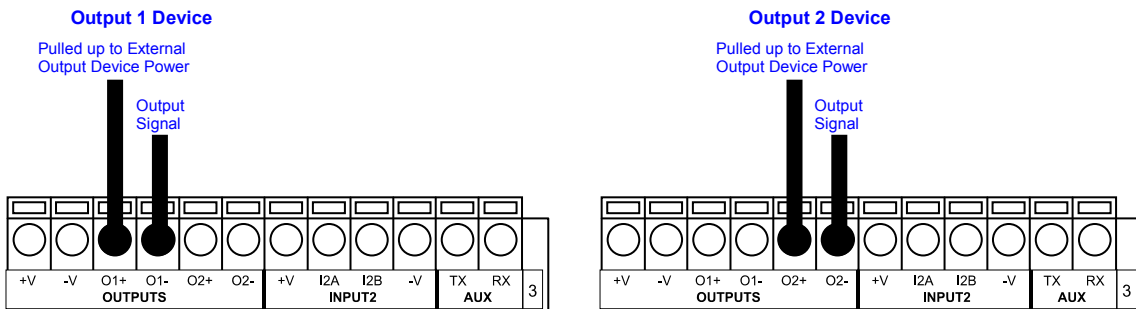## OUTPUT 1 AND 2 CONNECTIONS USING EXTERNAL POWER

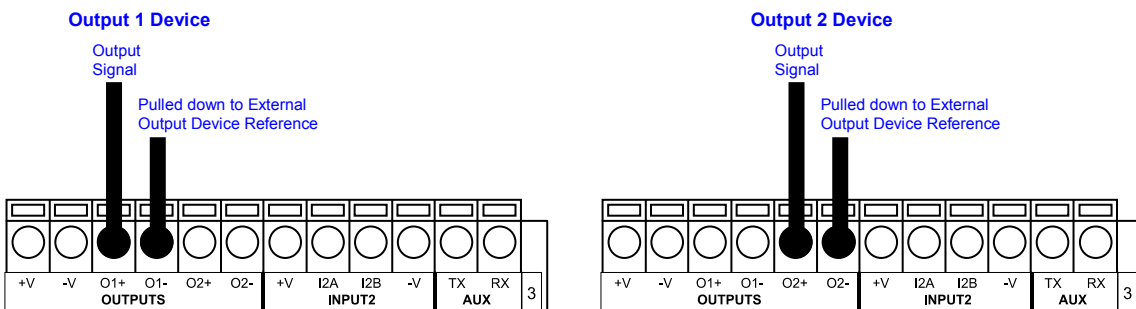Figure 22 - PNP/Output Open Emitter Using External Power

Figure 23 - NPN/Output Open Collector Using External Power

Output 3 is **not opto-isolated** but can be assigned to the same events. By default it is not assigned to any event. The CBX500 or CBX800 must be used to connect this output.

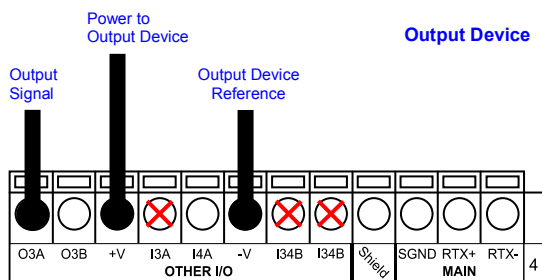**OUTPUT 3 CONNECTIONS USING P-Series™ POWER (CBX500 Only)**

Figure 24 - Output 3 Using P-Series™ Power

OUTPUT 3 CONNECTIONS USING EXTERNAL POWER (CBX500 Only)
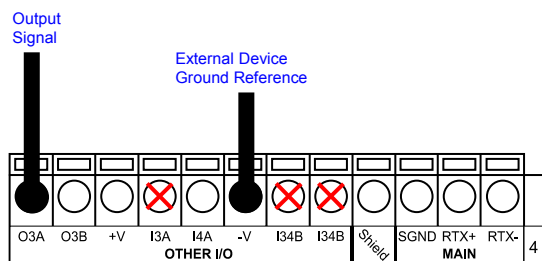

Figure 25 - Output 3 Using External Power

CAUTION: Do not connect to I3A or I34B signals, they are reserved.

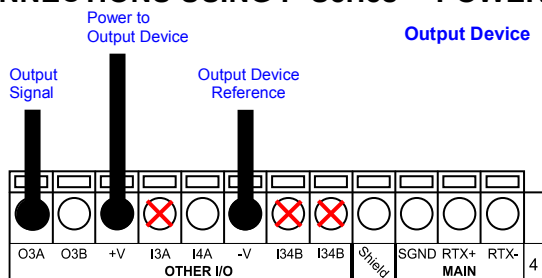**OUTPUT 3 CONNECTIONS USING P-Series™ POWER (CBX800 Only)**

Figure 26 - Output 3 Using P-Series™ Power

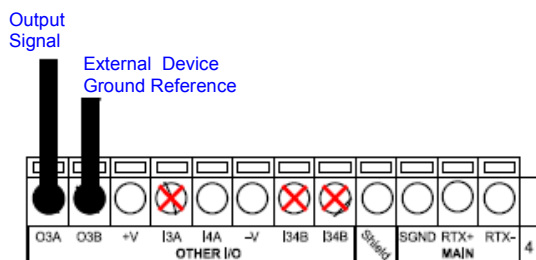**OUTPUT 3 CONNECTIONS USING EXTERNAL POWER (CBX800 Only)**

Figure 27 - Output 3 Using External Power

4.7 ON-BOARD ETHERNET INTERFACE

The on-board Ethernet Interface can be used for TCP/IP communication with a remote or local host computer by connecting the camera to either a LAN or directly to a host PC. There is no need to use a crossover adapter since P-Series™ incorporates an auto-cross function.
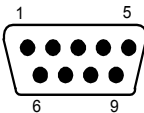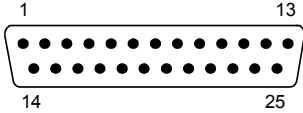
A **CAB-ETH-M0x** cable can be used to connect to a LAN.

On the camera Ethernet interface the following communication channels are available:

- Data Socket
- WebSentinel Socket
- HTTP Server
- Profinet IO

- Image Socket
- Image FTP Client
- Ethernet/IP
- Modbus TCP

4.8 SERIAL INTERFACE

The following table contains the pinout for standard RS232 Serial interface.

RS232 PC-side connections			
9-pin male connector		**25-pin male connector**	
Pin	**Name**	**Pin**	**Name**
2	RX	3	RX
3	TX	2	TX
5	GND	7	GND

5 TYPICAL LAYOUTS

The following typical layouts refer to system <u>hardware configurations</u>. However, they also require the correct setup of the software configuration parameters.

5.1 ETHERNET CONNECTION

The Ethernet connection is possible in two different layouts. In both layouts, before proceeding with the connection, it is necessary to configure the camera Ethernet parameters in VPM Lite. For further details, refer to Configuring the Impact Device or Camera in the Impact Reference Guide.

In a Point-to-Point layout the camera is connected to a local host by using a **CAB-ETH-M0x** cable. There is no need to use a crossover adapter since the P-Series™ camera incorporates an autocross function.

① Ethernet Interface
② External Trigger*
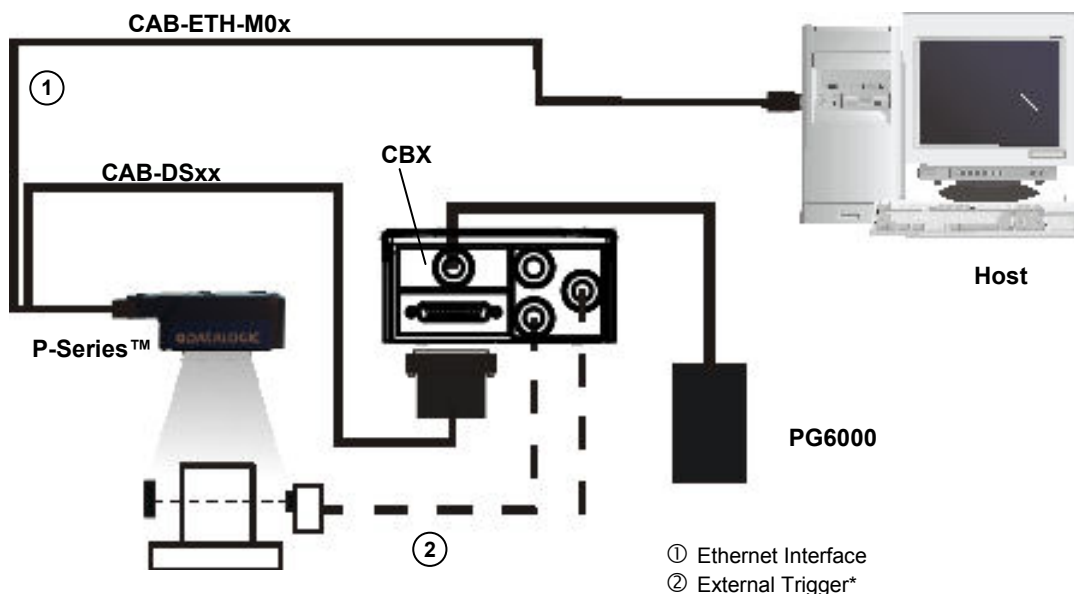
*The external trigger is not needed when a software trigger is supplied by the host.

Figure 28 - Ethernet Point-to-Point Layout

When using a Local Area Network (LAN), one or more P-Series cameras can be connected to the network by using **CAB-ETH-M0x** cables:
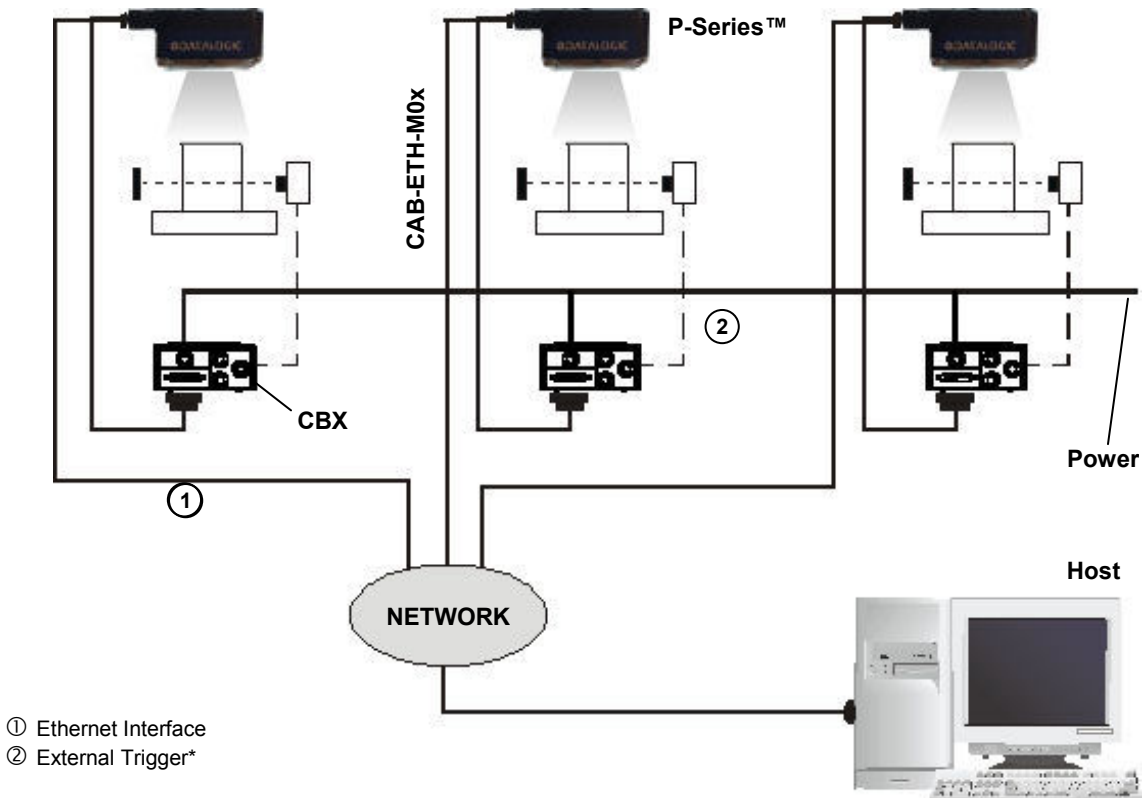
Figure 29 - Ethernet Network Layout

① Ethernet Interface
② External Trigger*

*The external trigger is not needed when a software trigger is supplied by the host.

6 IMAGE CAPTURE FEATURES

6.1 MAXIMUM LINE SPEED AND EXPOSURE TIME CALCULATIONS

The **Shutter Open Time (Exposure Time)** parameter defines the time during which the image will be exposed to the camera sensor to be acquired. This parameter depends heavily on the environmental conditions (external lighting system, image 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 following considerations must be applied only when the internal lighting system is used..

Assuming:

- **X**: Part Resolution (mm)
- T_{exp}: Exposure Time (s)
- **LS**: Line Speed (mm/s)

The essential condition to avoid blurring effects between two adjacent elements in a dynamic reading application is:

$$LS * T_{exp} \leq X$$

The maximum (theoretical) line speed **LS** can be calculated as follows:

$$X / T_{exp\ (max)} = LS_{\ (max)}$$

Example:

Using:

> *Internal Lighting Mode = Power*
> *Exposure Time = 100 μs*
> Part *Resolution (X) = 0.254 mm (10 mils)*

has a maximum line speed of:

$$0.254\ (mm) / 0.0001\ (s) = 2540\ mm/s$$

Likewise, $T_{exp\ (max)}$ is the maximum **Shutter Open Time** value that can be used without blurring for the given application line speed and part resolution. Therefore:

$$X / LS_{\ (max)} = T_{exp\ (max)}$$

$T_{exp\ (max)}$ and $LS_{(max)}$ are represented in the graph below as the curved line for **X** (part resolution). Values above the curve result in blurring. In practice, the application values are somewhere below the theoretical line, (in the green area), due to environmental and other conditions.
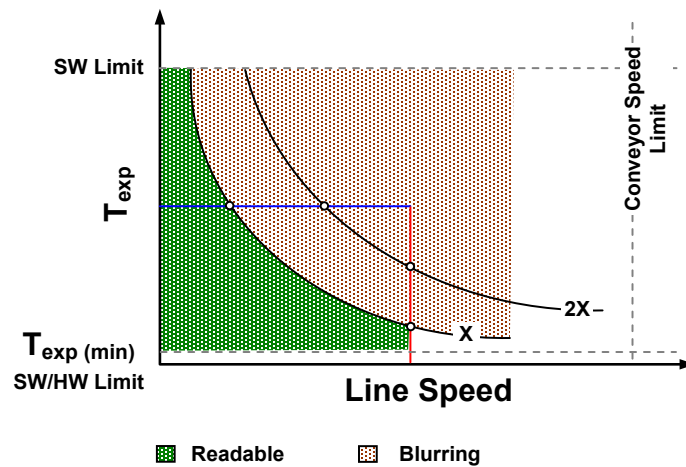
For example, the maximum target speed in the application is also affected by these conditions:

- **Part/Background Contrast**: maximum speed decreases when decreasing image contrast (poor quality images, reflective transparent coverings, different supports and printing techniques).

- **Part Resolution**: maximum speed increases when decreasing code resolution, (i.e. **2X**). There is a decrement of overlapping effects between two adjacent elements.

- **Tilt Angle**: maximum speed decreases when increasing Tilt angle (from 0 to 45 degrees).

$T_{exp\ (min)}$ is the minimum ***Shutter Open Time*** value obtainable for the specific application. It can be evaluated in static conditions and depends on the P-Series camera hardware selected for the application (internal lighting system, optical lens, reading distance) and on any external lighting system. It may also depend on image quality and camera position.

The Internal Illuminator, which is adjusted in VPM Lite – Settings – Camera, sets the internal lighting system operating mode. The 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;

- *Normal*: the built-in LED array is turned on during the shutter open time at the lowest power level.

- *Power*: the built-in LED array is turned on during the shutter open time at the highest power level.

7   SOFTWARE CONFIGURATION

Software configuration of your P-Series camera™ is accomplished using VPM Lite. VPM Lite runs on a host computer connected to the camera with an Ethernet cable (CAB-ETH-M0x) either directly or through a local area network (LAN).

7.1   HOST COMPUTER SYSTEM REQUIREMENTS

- Intel®, AMD®, or VIA® x86-class processor -minimum 1.2 GHz; 64-bit processors are supported with Windows Vista, Windows 7, and Windows 8.1
- Microsoft® Windows Vista, Windows 7, or Windows 8.1
- 1 GB or more of RAM, 2 GB recommended
- 800MB or more of available hard disk space
- 10/100Mbps Ethernet connection
- Monitor display resolution of 1024 x 768 or greater
- A PDF reader is required to read the software and hardware manuals

7.2   STARTUP

After completing the mechanical and electrical connections to P-Series camera™, you can begin software configuration as follows:

1. Power on the P-Series™ camera. Wait for the camera startup. The system bootstrap requires a few seconds to be completed.

2. Run VPM Lite.

3. Click the Connect button in the VPM Lite tool bar. A dialog is displayed so you can choose to connect to the P-Series™ camera. If the camera does not appear in the list, refer to the Impact Reference Guide - General Setup tab.
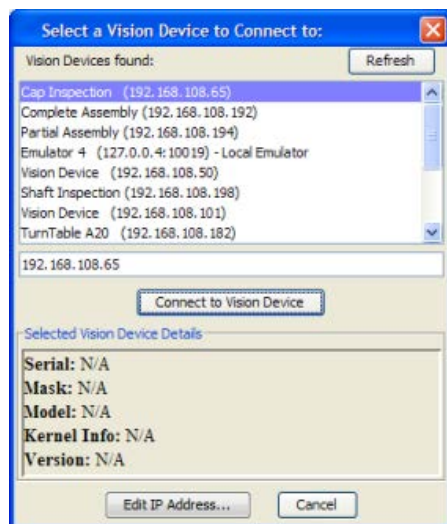
4. When the connection is complete, click the Settings tab.

5. Click the camera icon, click the Setup tab, then click the Setup button below the image window.
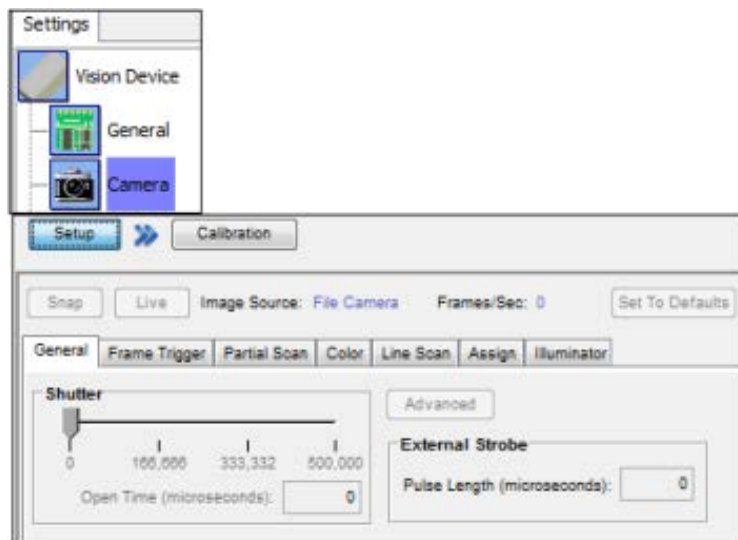
6. Use the General tab to set the Shutter open time.

7. Click the Illuminator tab to configure the P-Series camera's internal illuminator. The illuminator settings will affect the shutter open time range.
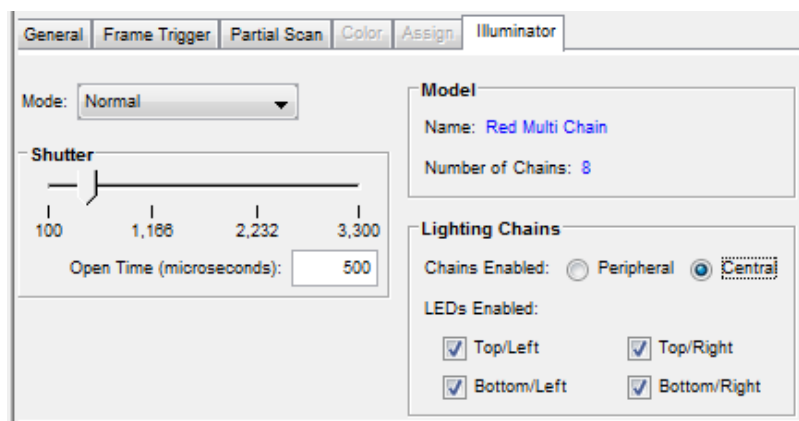
8. Refer to the Impact Reference Guide for details about creating vision programs for the P-Series camera.

7.2.1 Calibration

VPM Lite provides calibration software to insure that the measurements indicated in VPM Lite tools accurately relate to the inspected object's measurements. You may calibrate a camera using a calibrated target, a part with known dimensions, or you can enter the camera's units-per-pixel factor manually.
Refer to the Calibration Panel section of the Impact Reference Guide for details.

Under-exposure:

To correct this result it is recommended to change the parameters in the following order:

1. increase the **Shutter Open Time**
2. increase the **Gain**

> *In general, a longer shutter open time corresponds to a lighter image but is susceptible to blurring due to part movement. Shutter open time is also limited by the lighting. **Longer shutter open times can be set if the power strobe level is lowered.***
>
> **NOTE**
>
> *High gain settings may produce a grainy image that may affect the inspection process.*

Figure 30 - Example Under Exposure: Too Dark

Over-exposure:

To correct this result, change the parameters in the following order:

1. decrease the **Gain**
2. decrease the **Exposure Shutter Open Time**
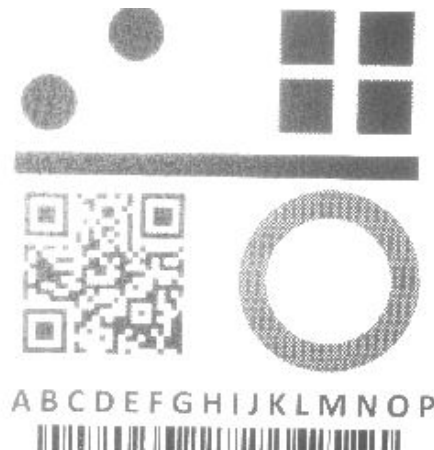

Figure 31 - Example Over Exposure: Too Light
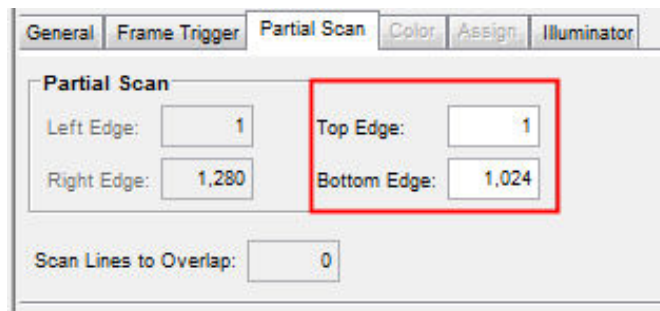
7.2.2   Partial Scan

In order to satisfy very high throughput applications, higher frame rates can be achieved using the powerful *Partial Scan* parameters in the Camera setup menu.

Partial Scan allows defining a region or window within the camera Field of View. The Top and Bottom Edge parameters allow you to precisely define the image window to be processed.

In the camera the frame rate is dependent on the number of lines (or rows) in the defined window.

The smaller the window, the shorter the frame period, and consequently the higher the frame rate. In general the Image Processing time can be reduced by reducing the window dimensions.

8 MAINTENANCE

8.1 CLEANING

Clean the lens cover periodically for continued correct operation of the camera.

Dust, dirt, etc. on the lens cover may alter the reading performance.

Repeat the operation frequently in particularly dirty environments.

Use soft material and alcohol to clean the lens cover and avoid any abrasive substances.

9 TROUBLESHOOTING

9.1 GENERAL GUIDELINES

- When wiring the device, pay careful attention to the signal name (acronym) on the CBX500/800 spring clamp connectors. If you are connecting directly to the P-Series™ M16 19-pin connector, pay attention to the pin number of the signals.

- If you need information about a certain camera parameter you can refer to the Impact Reference Guide.

- If you're unable to fix the problem and you're going to contact your local Datalogic office or Datalogic Partner, we suggest providing (if possible): software version, Serial Number, and Order Number of your camera. You can get some of this information while VPM Lite is connected to the camera. The software version is shown in the About dialog, and the Serial Number can be obtained from the Device Connection dialog.

TROUBLESHOOTING GUIDE	
Problem	**Suggestion**
Power ON: the "POWER" LED is not lit.	- Is power connected? - If using a power adapter (like PG6000), is it connected to wall outlet? - If using rail power, does rail have power? - If using CBX, does it have power (check switch and LED)? - Check if you are referring to the M16 19-pin connector or to the CBX spring clamp connectors. - Measure Voltage either at pin **A** and pin **L** (for 19-pin connector) or at spring clamp **Vdc** and **GND** (for CBX).
Using Input 1 (External Trigger): A trigger signal is connected to the camera, but it is not acquiring images or running tasks.	- Check if you are referring to the 19-pin connector or to the CBX spring clamp connectors. - Is the sensor connected to Input 1 or Input 2? - Is power supplied to the photo sensor? - For NPN configuration, is power supplied to one of the two I1 or I2 signals (A or B)? - For PNP configuration, is one of the two I1 or I2 signals grounded (A or B)? - Are the photo sensor LEDS (if any) working correctly? - Is the sensor/reflector system aligned (if present)? - In VPM Lite, check the Debounce settings (Settings – General – Communication). - Is the camera online?

TROUBLESHOOTING GUIDE	
Problem	**Suggestion**
The Image is not clear:	verify the Focus procedure
Image focused but tool measurements are inaccurate:	verify the image calibration procedure.

TROUBLESHOOTING GUIDE	
Problem	**Suggestion**
Communication: camera is not transmitting anything to the host.	• Is the Ethernet cable wiring correct? • Is the Ethernet cable wiring connected? • Are the host IP address settings the compatible with the camera settings?
Communication: data transferred to the host are incorrect, corrupted or incomplete.	• Are the host IP address settings the same as the camera settings? • Is the Ethernet cable intermittent?
How do I obtain my camera Serial Number?	• The camera Serial Number consists of the letter "C" followed by a series of numbers. It is printed on the rear of the camera.

10 TECHNICAL FEATURES

ELECTRICAL FEATURES	
Power Supply Voltage Consumption	10 to 30 Vdc 0.7 to 0.2 A
Communication Interfaces Ethernet	10/100 Mbit/s (supports application protocols: TCP/IP, EtherNet/IP, Profinet IO, Modbus TCP)
RS232	2400 to 115200 bit/s
Inputs Input 1(External Trigger) and Input 2	Opto-coupled and polarity insensitive
Max. Voltage	30 Vdc
Max. Input Current	10 mA
Outputs * Output 1 and 2	• NPN or PNP short circuit protected (configure in VPM-Camera Setup) • Opto-isolated only when connected to CBX500 or CBX800 connection box
Output 3	• NPN or PNP short circuit protected (configure in VPM-Camera Setup) • Opto-isolated only when connected to CBX800 connection box • Strobe signal connection shared with Output 3. If the Strobe Pulse Length is zero, Output 3 is active. (Configure in VPM – Impact)
Vout (Iload = 0 mA) Max.	30 Vdc
Vout (Iload = 100 mA) Max.	3 Vdc
Iload Max	100 mA

OPTICAL FEATURES		
Image Sensor	CMOS sensor with Global Shutter	
	P10	**P15**
Image Format Frame Rate	640 x 480 120 frames/sec	1280 x 1024 58 frames/sec
LED Safety	to EN 62471	
Lighting System	Internal Illuminator and External Strobe (Output 3)	

ENVIRONMENTAL FEATURES	
Operating Temperature	0 to 50 °C (32 to 122 °F) **
Storage Temperature	-20 to 70 °C (-4 to 158 °F)
Max. Humidity	90% non-condensing
Vibration Resistance EN 60068-2-6	14 mm @ 2 to 10 Hz; 1.5 mm @ 13 to 55 Hz; 2 g @ 70 to 200 Hz; 2 hours on each axis
Bump Resistance EN 60068-2-29	30g; 6 ms; 5000 shocks on each axis
Shock Resistance EN 60068-2-27	30g; 11 ms; 3 shocks on each axis
Protection Class EN 60529	IP65/IP67 ***

PHYSICAL FEATURES	Connector position 0°	Connector position 90°
Dimensions	95 x 54 x 43 mm (3.7 x 2.1 x 1.7 in.)	75 x 54 x 62 mm (3.0 x 2.1 x 2.4 in.)
Weight	about 238 g. (8.4 oz.)	
Material	Aluminum	

USER INTERFACE	
LED Indicators	Power, Busy/Trigger, Out 1; Out 2; Out 3, Online
Keypad Button	Reset; Camera Button Event (internal software event only)

* when connected to the CBX connection boxes the electrical features for Output 1 and 2 become the following:
V_{CE} = 30 Vdc max.; I_{CE} = 40 mA continuous max.; 130 mA pulsed max.; $V_{CE\ saturation}$ = 1 Vdc max. @ 10 mA; P_D = 90 mW Max. @ 50 °C ambient temp.

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

*** when correctly connected to IP67 cables with seals.

11 ALTERNATIVE CONNECTIONS

The connector pinouts and notes given in this chapter are for custom cabling applications.

11.1 POWER, COM AND I/O CONNECTOR

The CAB-DSxx-S cable has an M12 17-pin connector on the camera end and a 25-pin male D-sub connector on the other end.
Note: Do not disconnect the cable while power is on.

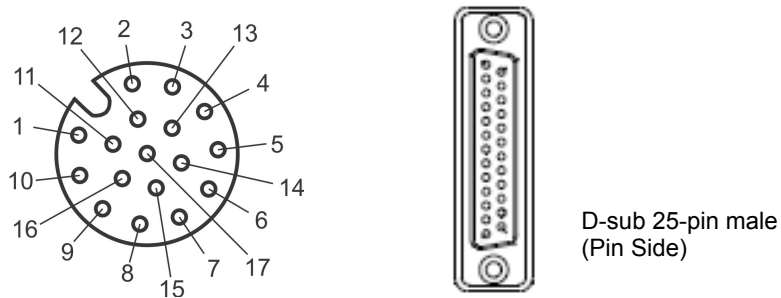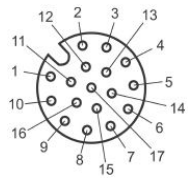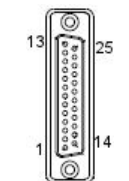The details of the connector pins are indicated in the following table.

Figure 32 – M12 17-pin male COM, I/O and Power Connector

17-Pin M12		25-Pin D-sub	Name: Function
1	Red	9-13	Vdc: Power Supply Input voltage +
2	Blk	7-25	GND: Power Supply Input voltage -
Connector Case		1 (Shield)	CHASSIS: Connector case - electrical connection to chassis
6	Org	18	I1A: External Trigger A (Note 1)
5	Grn-Blk	19	I1B: External Trigger B (Note 1)
13	Gry	6	I2A: Input 2A (Note 1)
3	Grn-Red	10	I2B: Input 2B (Note 1)
9	Pur	8	O1: Output 1 (Notes 2, 3)
8	Wht-Red	11	O2: Output 2 (Notes 2, 3)
16	Blk-Wht	14-16	O3: Output 3 (Notes 2, 4, 5)
14	Yel-Blu	20	RESERVED
4	Yel-Wht	21	RESERVED
17	Yel	2	TX: RS232 Transmit
11	Brn	3	RX: RS232 Receive
12	Pnk	4	RESERVED
10	Grn	5	RESERVED
M12 17-pin male (Pin Side)		D-sub 25-pin male (Pin Side)	NOTES : 1: Polarity Insensitive 2: Short-circuit protected; NPN or PNP (configure in VPM-Camera Setup) 3: Opto-isolated only when connected to CBX500 or CBX800 connection box 4: Opto-isolated only when connected to CBX800 connection box 5: Strobe signal connection shared with Output 3. If the Strobe Pulse Length is zero, Output 3 is active. (Configure in VPM – Impact – General)

In order to meet EMC requirements:

- connect the camera chassis to the plant earth ground by means of a flat copper braid shorter than 100 mm;

- connect your cable shield to the locking ring nut of the connector.

11.2 ON-BOARD ETHERNET CONNECTOR

A Standard M12 D-Coded female connector is provided for the on-board Ethernet connection. This interface is IEEE 802.3 10 BaseT and IEEE 802.3u 100 BaseTx compliant.
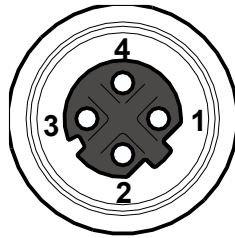

Figure 33 - M12 D-Coded Female Ethernet Network Connector

On-Board Ethernet Network Connector Pinout		
Pin	**Name**	**Function**
1	TX +	Transmitted data (+)
2	RX +	Received data (+)
3	TX -	Transmitted data (-)
4	RX -	Received data (-)

11.3 OUTPUTS

Three general purpose **non opto-isolated** but short circuit protected outputs are available on the M12 17-pin connector.

The pinout is the following:

Pin	Name	Function
9	O1	Configurable digital output 1
8	O2	Configurable digital output 2
16	O3	Configurable digital output 3
2	GND	Output reference signal

The electrical features of the three outputs are the following:

Reverse-Polarity and Short-Circuit Protected

V_{OUT} (I_{LOAD} = 0 mA) max = 30 Vdc

V_{OUT} (I_{LOAD} = 100 mA) max = 3 Vdc

I_{LOAD} max = 100 mA

The output signals are fully programmable using the Discrete Output tool in VPM.
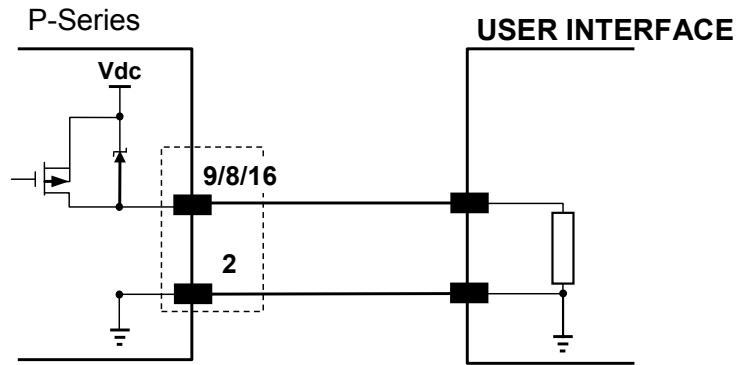
P-Series   **USER INTERFACE**

Figure 34 - PNP Output Connection

P-Series   **USER INTERFACE**
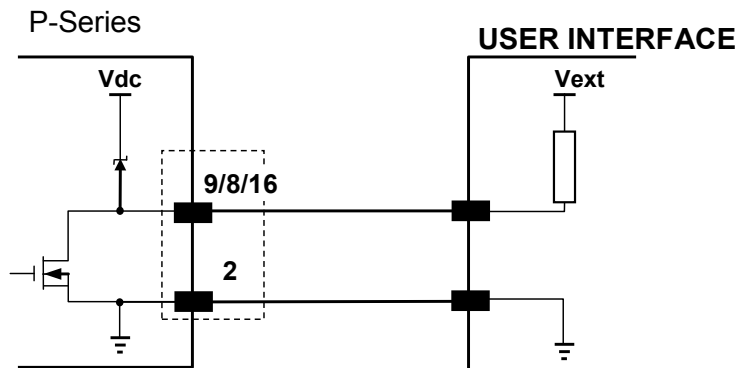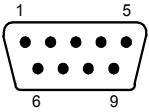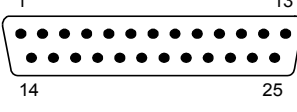

Figure 35 - NPN Output Connection

CAUTION: For NPN output connections, the external interface voltage (Vext) must not exceed the P-Series power supply source voltage (Vdc) otherwise correct output functioning cannot be guaranteed.

11.4 DATALOGIC SIL SPOT RED FLOOD STROBE

To use the Datalogic SIL strobe with the P-Series camera and a CBX500/800, make the following connections to the CBX box. Output 3 must be configured as shown (VPM Lite – General – Communication). External strobe length is configured in VPM – Camera – General – Setup.

SIL Strobe Wire Color	CBX500	CBX800
Brown	V+	V+
Blue	V-	V-
Black	O3A (Output 3 configured as PNP)	O3B (Output 3 configured as NPN)
		Also add a jumper between V+ and O3A

11.5 RS-232 SERIAL CONNECTOR

RS232 PC-side connections			
9-pin male connector		**25-pin male connector**	
Pin	**Name**	**Pin**	**Name**
2	RX	3	RX
3	TX	2	TX
5	GND	7	GND

GLOSSARY

Barcodes (1D Codes)
A pattern of variable-width bars and spaces which represents numeric or alphanumeric data in machine-readable form. The general format of a barcode symbol consists of a leading margin, start character, data or message character, check character (if any), stop character, and trailing margin. Within this framework, each recognizable symbology uses its own unique format.

BIOS
Basic Input Output System. A collection of ROM-based code with a standard API used to interface with standard PC hardware.

Bit
Binary digit. One bit is the basic unit of binary information. Generally, eight consecutive bits compose one byte of data. The pattern of 0 and 1 values within the byte determines its meaning.

Bits per Second (bps)
Number of bits transmitted or received per second.

Bright Field Illumination
Lighting of surfaces at high (narrow) angles used to provide maximum reflection of the light to the camera's lens. This is effective on surfaces that absorb light or are not highly reflective and also on low contrast codes.

Byte
On an addressable boundary, eight adjacent binary digits (0 and 1) combined in a pattern to represent a specific character or numeric value. Bits are numbered from the right, 0 through 7, with bit 0 the low-order bit. One byte in memory can be used to store one ASCII character.

Dark Field Illumination
Lighting of surfaces at wide angles used to avoid direct reflection of the light into the camera's lens. Typically this type of lighting is used in solutions to enhance reflectance of the uneven surface. It is also used with very reflective surfaces.

Decode
To recognize a barcode symbology *(e.g.,* Codabar, Code 128, Code 3 of 9, UPC/EAN, etc.) and analyze the content of the barcode scanned.

Depth of Field
The difference between the minimum and the maximum distance of the object in the field of view that appears to be in focus.

Diffused Illumination
Distributed soft lighting from a wide variety of angles used to eliminate shadows and direct reflection effects from highly reflective surfaces.

EEPROM
Electrically Erasable Programmable Read-Only Memory. An on-board non-volatile memory chip.

Element
The basic unit of data encoding in a 1D or 2D symbol. A single bar, space, cell, dot.

Exposure Time
For digital cameras based on image sensors equipped with an electronic shutter, it defines the time during which the image will be exposed to the sensor to be acquired.

Flash
Non-volatile memory for storing application and configuration files.

Host
A computer that serves other terminals in a network, providing services such as network control, database access, special programs, supervisory programs, or programming languages.

Image Processing
Any form of information processing for which the input is an image and the output is, for instance, a set of features of the image.

Image Resolution
The number of rows and columns of pixels in an image. The total number of pixels of an image sensor.

Image Sensor
Device converting a visual image to an electric signal. It is usually an array of CCD (Charge Coupled Devices) or CMOS (Complementary Metal Oxide Semiconductor) pixel sensors.

Internal Illuminator
The strobe illuminator that is an integral part of the lens cover for the P-Series.

IEC
(International Electrotechnical Commission): Global organization that publishes international standards for electrical, electronic, and other technologies.

IP Address
The terminal's network address. Networks use IP addresses to determine where to send data that is being transmitted over a network. An IP address is a 32-bit number referred to as a series of 8-bit numbers in decimal dot notation (*e*.g., 130.24.34.03). The highest 8-bit number you can use is 254.

ISO
(International Organization for Standardization): A network of the national standards institutes of several countries producing world-wide industrial and commercial standards.

LED (Light Emitting Diode)
A low power electronic light source commonly used as an indicator light. It uses less power than an incandescent light bulb but more than a Liquid Crystal Display (LCD).

LED Illuminator
LED technology used as an extended lighting source in which extra optics added to the chip allow it to emit a complex radiated light pattern.

Matrix Symbologies (2D Codes)
An arrangement of regular polygon shaped cells where the center-to-center distance of adjacent elements is uniform. Matrix symbols may include recognition patterns which do not follow the same rules as the other elements within the symbol.

RAM
Random Access Memory. Data in RAM can be accessed in random order, and quickly written and read.

Shutter Open Time (Exposure Time)
The time during which the image to be acquired is exposed to the camera's image sensor.

Symbol Verification
The act of processing a code to determine whether or not it meets specific requirements.

Transmission Control Protocol/Internet Protocol (TCP/IP)
A suite of standard network protocols that were originally used in UNIX environments but are now used in many others. The TCP governs sequenced data; the IP governs packet forwarding. TCP/IP is the primary protocol that defines the Internet.

Vision Program Manager Lite (VPM Lite)
The Impact software module that provides tools to configure the P-Series camera and create vision programs for inspection and control.

INDEX

T