P2X-Series™

PRODUCT REFERENCE GUIDE

Industrial Smart Camera

DATALOGIC

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Patents

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

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

Utility patents: EP1172756B1, EP2517148B1, EP2616988B1, EP2649555B1, EP3016028B1, EP3092597B1, IT1404187, JP5947819B2, US10229301, US6808114, US6877664, US6997385, US7387246, US7433590, US7433590, US8245926, US8888003, US8915443, US9122939, US9349047, US9361503, US9396404, US9495607, US9798948, US10095951, US10133895, US10229301, US10540532, ZL200980163411.X, ZL201080071124.9, ZL201180044793.1, ZL201280010789.8

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PREFACE

ABOUT THIS MANUAL

This Product Reference Guide (PRG) is provided for users seeking advanced technical information, including connection, programming, maintenance and specifications. The Quick Reference Guide (QRG) and other publications associated with this product can be downloaded free of charge from the website listed on the back cover of this manual.

Manual Conventions

The following conventions are used in this document:

"User" refers to anyone using a P2x-Series™ camera.

"Camera" refers to the P2x-Series™ camera.

"You" refers to the System Administrator or Technical Support person using this manual to install, configure, operate, maintain or troubleshoot a P2x-Series™ camera.

The symbols listed below are used in this manual to notify the reader of key issues or procedures that must be observed when using the reader:

NOTE

Notes contain information necessary for properly diagnosing, repairing and operating the camera.

CAUTION

The CAUTION symbol advises you of actions that could damage equipment or property.

WARNING

The WARNING symbol advises you of actions that could result in harm or injury to the person performing the task.

TECHNICAL SUPPORT

Support Through the Website

Datalogic provides several services as well as technical support through its website. Log on to (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.

Reseller Technical Support

An excellent source for technical assistance and information is an authorized Datalogic reseller. A reseller is acquainted with specific types of businesses, application software, and computer systems and can provide individualized assistance.

All necessary firmware is installed on the P2x-Series™ camera at the factory. Vision Program Manager (VPM) 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.

NOTE

Throughout this manual, the name "VPM" is used to refer to the software installed on the camera.

COMPLIANCE

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

Power Supply

ATTENTION: READ THIS INFORMATION BEFORE INSTALLING THE PRODUCT

This unit is intended to be powered by an external power supply ES1, PS2 according to IEC 62368-1:2014.

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;

• for CBX connections, connect pin "Earth" to a good Earth Ground;

• for direct connections, connect your cable shield to the locking ring nut of the connector.

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 20th, 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 S.r.l. 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.

Led Safety

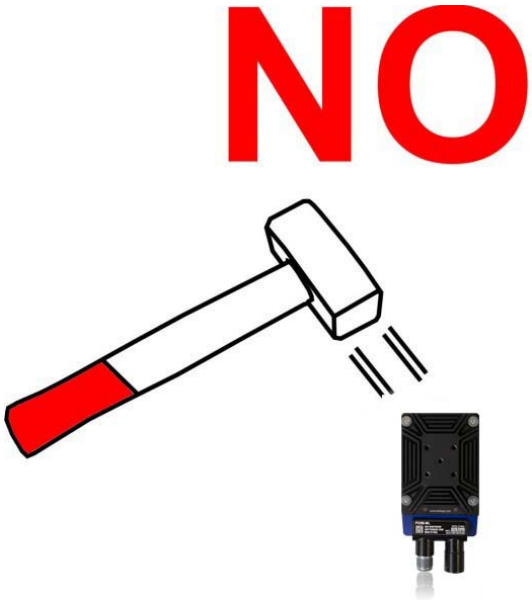
For all Datalogic P2X compatible internal illuminators, LED emission is classified as Risk Group 1 according to EN 62471: 2010.

HANDLING

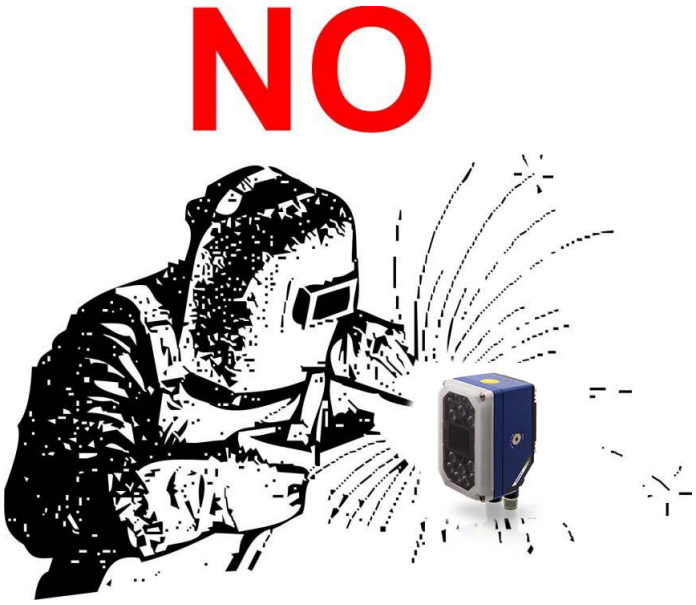
The P2x-Series™ camera is designed to be used in an industrial environment and is built to withstand vibration and shock when correctly installed. However, it is also a precision product and it must be handled correctly before and during installation to avoid damage.

- 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.

CHAPTER 1
INTRODUCTION

GENERAL VIEW

CAUTION

Disconnect power before removing the cover.

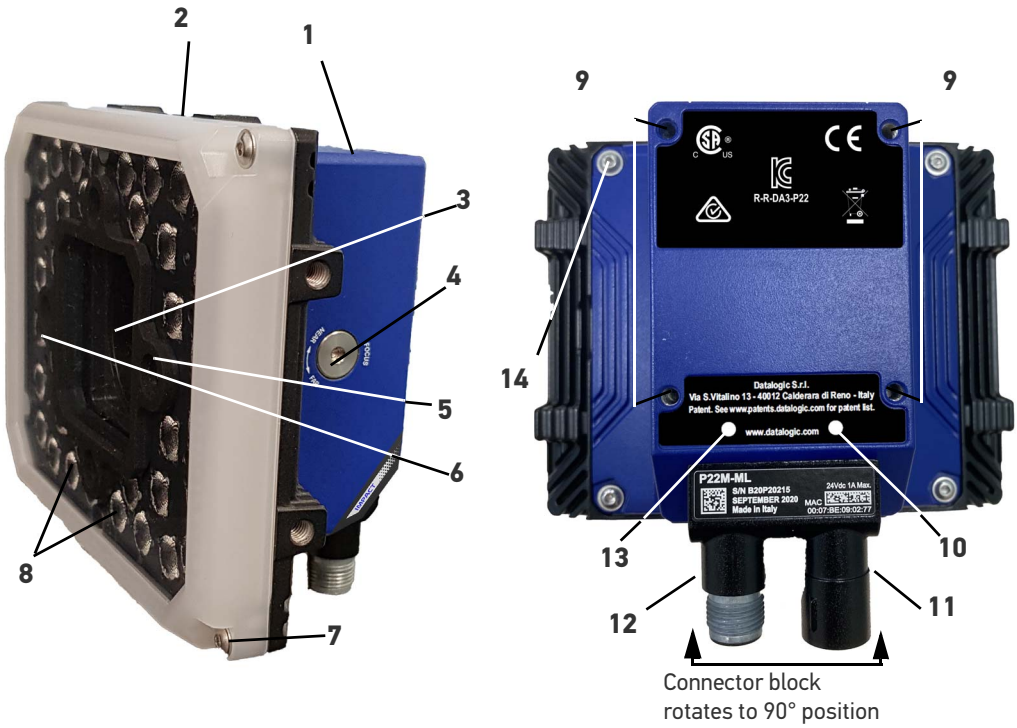
P2x-Series™ (14 LEDs ILLUMINATOR)

Connector block rotates to 90° position

1	Lens cover	8	Lens
2	Button (Camera Reset - Loader)	9	Bracket Mounting Holes (4)
3	Focus Adjustment Screws (4)	10	Gigabit Ethernet Connection LED
4	Red Spot[1]	11	Power - Serial Interfaces - I/O Connector
5	Green Spot[1]	12	Gigabit Ethernet Connector
6	Internal Illuminator[1]	13	Power On LED
7	Lens Cover Screws (4)		

1. Not included in Configuration A - External Lighting.

P2x-Series™ (36 LEDs ILLUMINATOR)

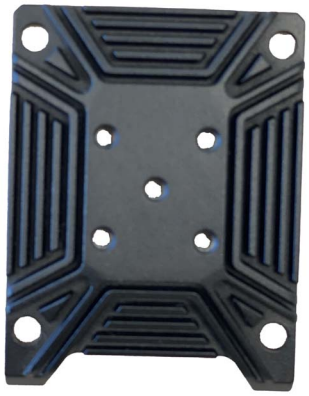


1	Button (Camera Reset - Loader)	8	Internal Illuminator
2	Lens Cover	9	Bracket Mounting Holes (4)
3	Lens	10	Gigabit Ethernet Connection LED
4	Focus Adjustment Screw (on side)	11	Gigabit Ethernet Connector
5	Red Spot	12	Power - Serial Interfaces - I/O Connector
6	Green Spot	13	Power On LED
7	Lens Cover Screws	14	Illuminator screws

NOTE

The 36 LEDs illuminator can be mounted horizontally and vertically.

Heatsink



The heatsink is mounted on the backside of the camera case.

CAUTION

Do not remove the heatsink from the camera body to avoid overheating.

Product Description

The P2x-Series™ cameras are Datalogic industrial compact 2D cameras produced to be a high performance affordable solution for all machine vision applications.

The P2x-Series™ cameras are designed to be flexibly assembled for all machine vision applications. Users can choose between:

- two different resolutions (qHD or 2MP)
- monochrome or color cameras

Cameras are licensed to connect to VPM. The Basic level is included on all the cameras.

The camera is contained in an aluminum housing. Mechanical dimensions are:

- 14LEDs illuminator

109 x 54 x 56 mm and it weighs about 380 g including the internal illuminator, lens and protective cover

- 36LEDs illuminator

116 x 126 x 70 mm and it weighs about 640 g, including the internal illuminator, lens and protective cover.

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

Rugged construction, IP67 and IP65 protection and max 50°C operative temperature make the P2x-Series™ the ideal product for industrial environments where protection against harsh external conditions is required.

- Compact Industrial Smart Camera Series
- Right-angle IP67 and IP65 rated enclosure with rotating, sealed connectors
- Embedded interchangeable lenses and illuminators
- Built-in digital I/Os, Serial, and Gigabit Ethernet interfaces
- A variety of powerful Internal Lighting Systems
- Frame Rate up to 60 frames/sec (sensor)
- Supply voltage 24 Vdc ± 10%

Applications include:

Automotive

- Component verification
- Part Gauging
- Robot Guidance
- Laser Guidance
- Automotive Part Color
- Assembly Traceability

Electronics

- Measurements
- Positioning/Guidance
- Plating (Color)
- Assembly Traceability

Medical & Pharmaceutical

- Pharmaceutical Traceability
- Cap/Sealing inspection
- Medical instruments

Intralogistics

- Print and Apply

Food & Beverage

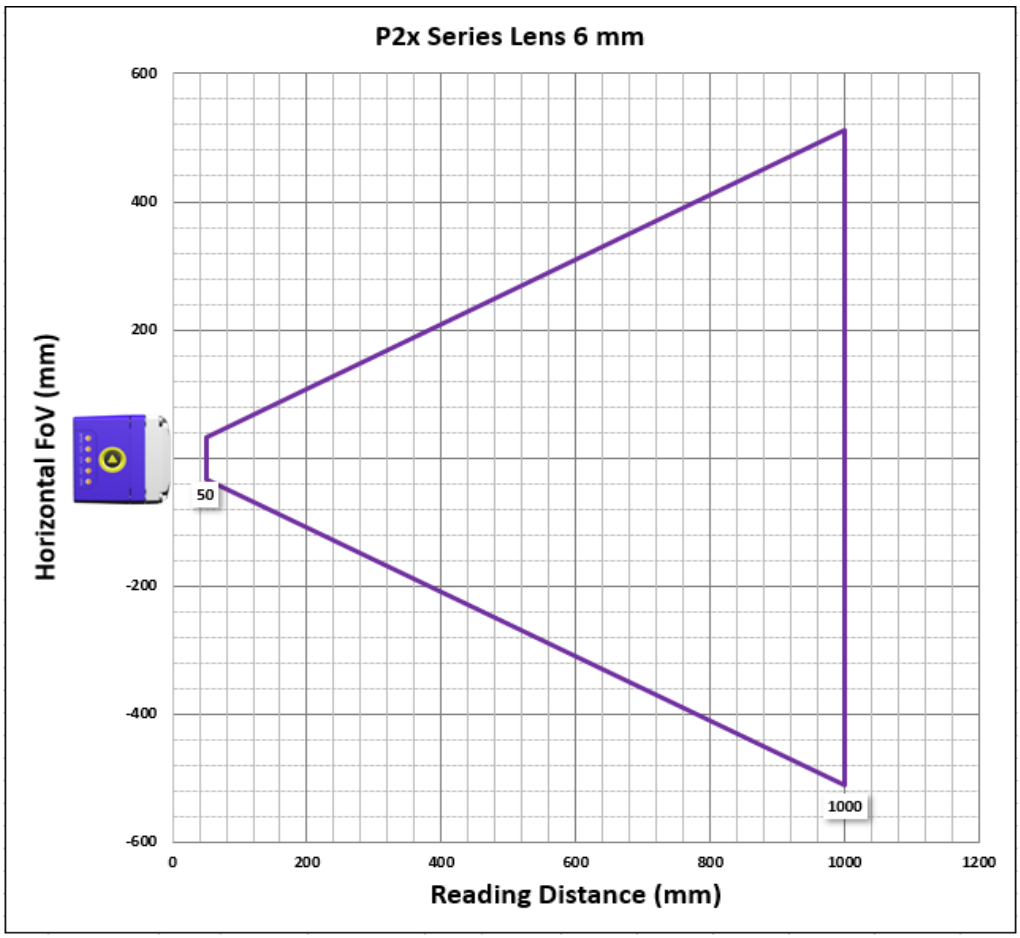
- Label inspection
- Expiration Date/Lot number

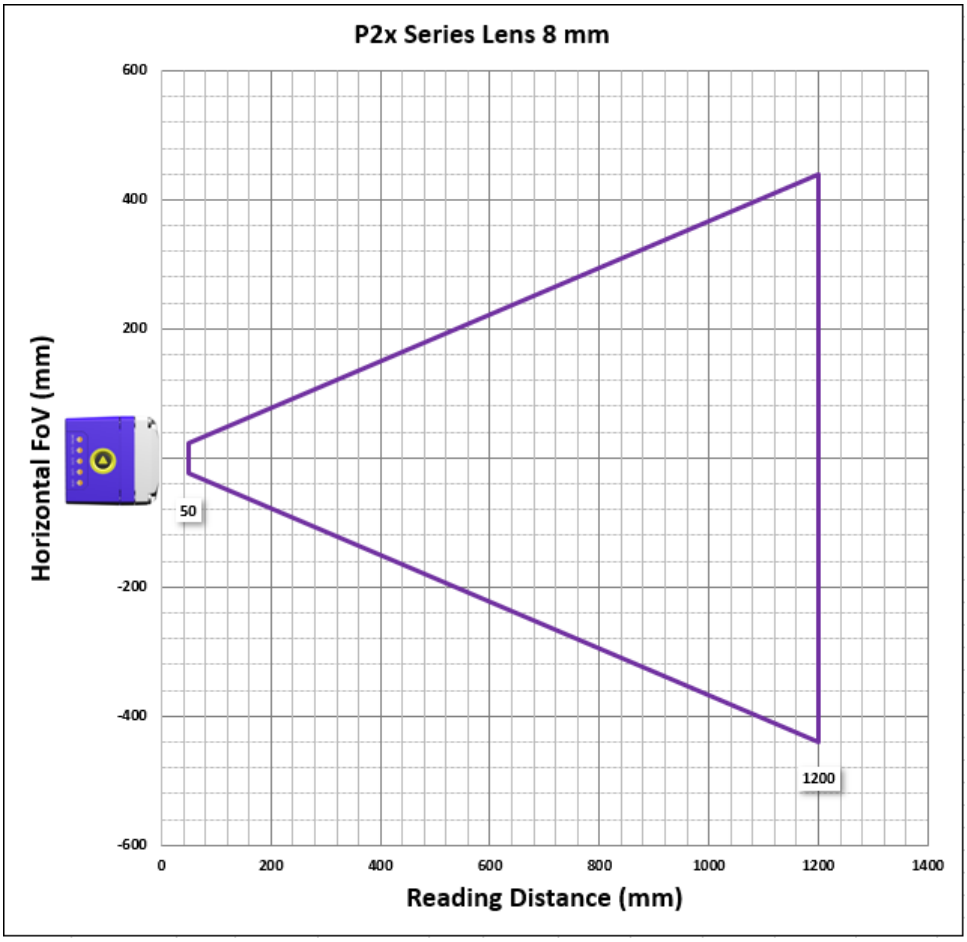
T&L

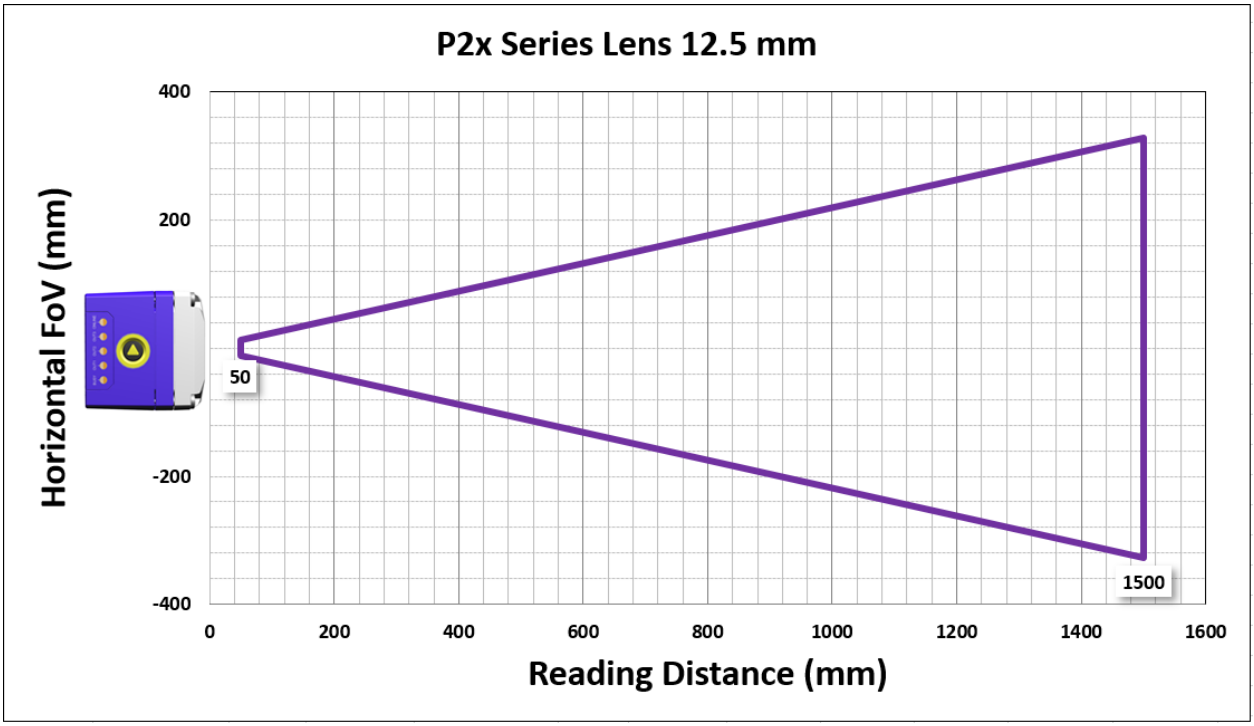
- Object detection

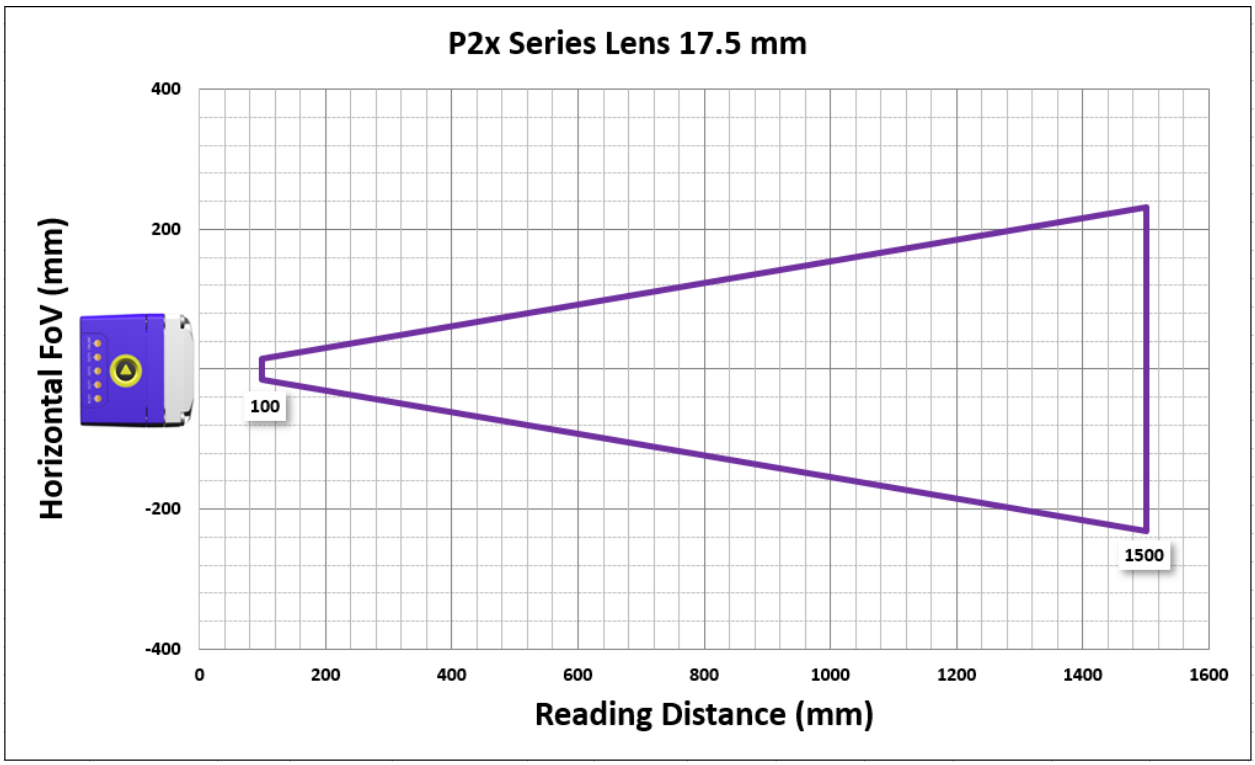
The following diagrams list the operating distances for various cameras using a 14 LEDs illuminator or the spacer. The operating distance using a 36 LEDs illuminator is 15 mm shorter.

To calculate the Vertical Field of View use this formula: $V_{fov} = H_{fov} * 9/16$




P2x Series Lens 8 mm
Horizontal FoV (mm)
600
400
200
-200
-400
-600
0
200
400
600
800
1000
1200
1400
Reading Distance (mm)
50
1200


P2x Series Lens 12.5 mm
Horizontal FoV (mm)
400
200
-200
-400
0
200
400
600
800
1000
1200
1400
1600
Reading Distance (mm)
50
1500



Indicators and Keypad Button

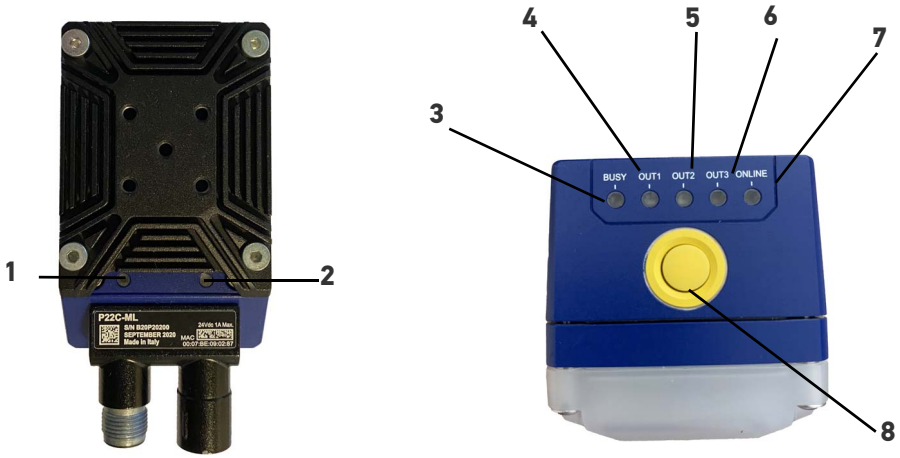


Figure 1- Indicators

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

1	Power	On – camera is connected to power
2	ETH	On – Gigabit Ethernet link is established. Blinking - data transmission
3	Busy	LED blinks during task execution and flash memory access
4	Out 1	On – Output 1 is on
5	Out 2	On – Output 2 is on
6	Out 3	On – Output 3 is on
7	Online	On – Loaded tasks will be executed based on their trigger parameters

8	Button	Camera Reset: restores the camera settings deleting the .xml settings file and resetting the camera's Mask and IP Address to the factory default (192.168.0.128). Loader: the device will enter the Loader program sequence and the LEDs will begin to cycle through various patterns. Camera Button Event: Press and release the button (Internal software event only)

To Reset the Camera

1. Turn on camera power while keeping pressed the Camera reset button (yellow).
2. When the five LEDs are blinking, release the Camera Reset button.
3. Within two seconds press and release the button again.
4. The device will beep and restart automatically.
5. The IP address will be reset to 192.168.0.128 and all settings will be reset to default. Vision programs are preserved, but no longer loaded on startup.

To enter the Loader program sequence

1. Turn on camera power while keeping pressed the Loader button (yellow).
2. When the five LEDs stop blinking, release the Loader button.
3. The device restarts automatically.

Lighting System and Lens Notes for 14 and 36 LEDs illuminators

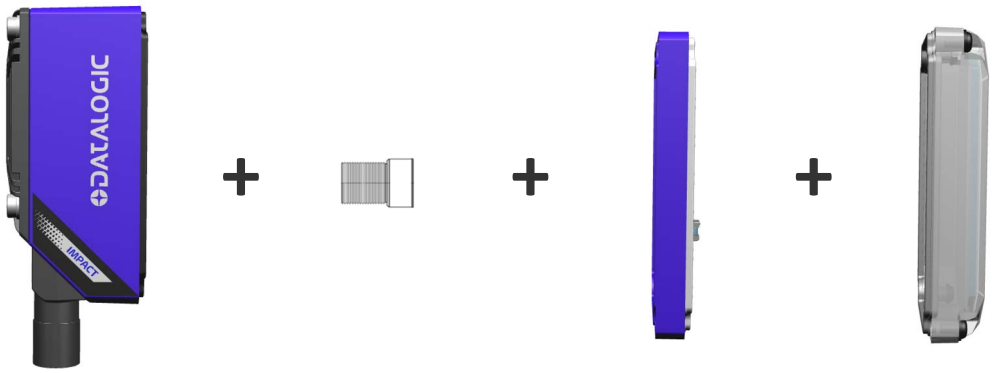
The following table shows the lenses and illuminators for the P2x-Series. The blue checkbox indicates the recommended combinations, the green check-box indicates the compatible combinations. Illuminators are enabled in VPM – Camera Setup.

		6 MM	8 MM	12.5 MM	17.5 MM
Wide Angle Lighting	LTP 110-600 SN14L 60D RED 625nm LTP 112-600 SN36L 60D RED 625nm	☑	☑	☑	☑
	LTP 110-601 SN14L 60D WHT white LTP 112-601 SN36L 60D WHT white	☑	☑	☑	☑
	LTP 110-602 SN14L 60D BLU 475nm LTP 112-602 SN36L 60D BLU 475nm	☑	☑	☑	☑

		6 MM	8 MM	12.5 MM	17.5 MM
Narrow Angle Lighting	LTP 110-350 SN14L 35D RED 625nm LTP 112-350 SN36L 35D RED 625nm			☑	☑
	LTP 110-351 SN14L 35D WHT white LTP 112-351 SN36L 35D WHT white			☑	☑
	LTP 110-352 SN14L 35D BLU 475nm LTP 112-352 SN36L 35D BLU 475nm			☑	☑

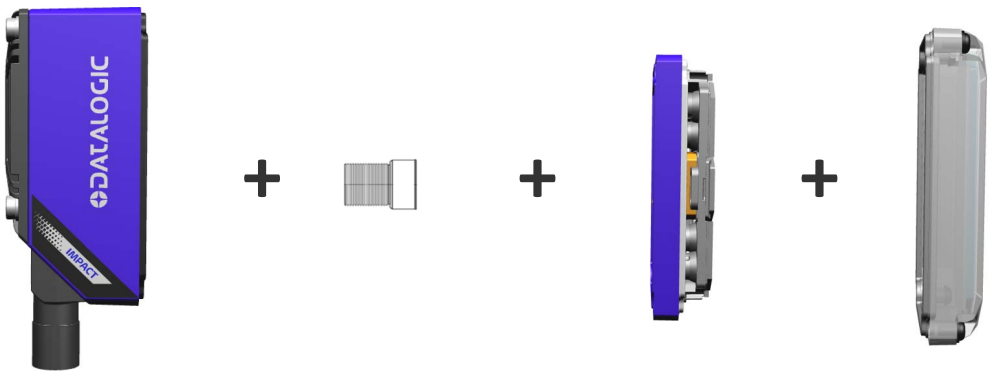
Necessary camera components

Configuration A - External Lighting



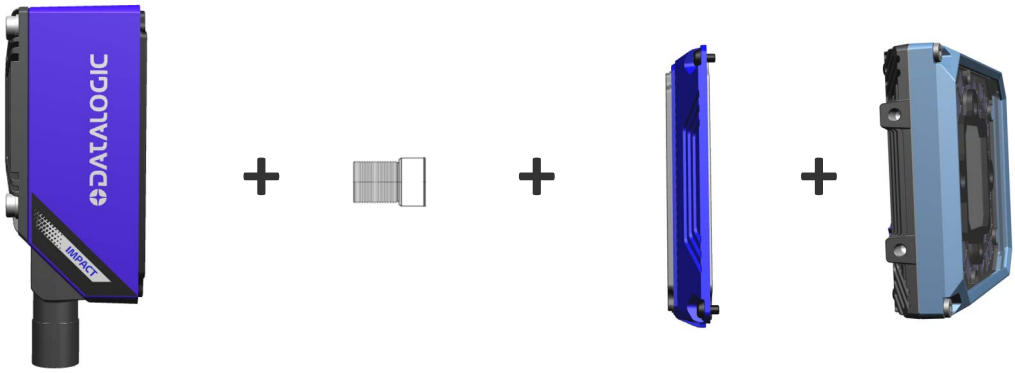
Body + Lens + Spacer + Cover

Configuration B1 - 14 LEDs Illuminator



Body + Lens + LTP 14 LED + Cover

Configuration B2 - 36 LEDs Illuminator



Body | Lens | Adapter | LTP 36 LED

Basic components

ACCESSORY	DESCRIPTION	PART NUMBER
Bases (Body, Spacer and Cover)		
P20M 100-00 ML	P20M-ML 960x540 Mono Micro Lens	937710021
P20C 000-000 ML	P20C-ML 960x540 Color Micro Lens	937710022
P22M 700-00 ML	P22M-ML 1920x1080 Mono Micro Lens	937710023
P22C 600-000 ML	P22C-ML 1920x1080 Color Micro Lens	937710024

Accessories

ACCESSORY	DESCRIPTION	PART
Covers		
	Cover Polarizer LT 14L M320/P2	93ACC0273
	Cover Polarizer LT 36L M320/P2	93ACC0274
	Cover Standard LT 14L M320/P2	93ACC0271
	Cover Standard LT 36L M320/P2	93ACC0272
Filters		
	Filter Yag Cut LT 14L M320/P2	95A900018
	Filter Yag Cut LT 36L M320/P2	95A900022
Lenses		
	LNP 601-010 ML 6MM FF4 1/3”	95A900010
	LNP 603-040 ML 8MM FF4 1/3”	95A900011
	LNP 606-040 ML 12.5MM FF4 1/3”	95A900012
	LNP 608-040 ML17.5MM FF4 1/3”	95A900013
	LNP Micro Lens Kit M320/P2	95A900014
Light		
	LTP 110-600 SN14L 60D RED 625nm	95A900023
	LTP 110-601 SN14L 60D WHT white	95A900024
	LTP 110-602 SN14L 60D BLU 475nm	95A900025
	LTP 110-350 SN14L 35D RED 625nm	95A900026
	LTP 110-351 SN14L 35D WHT white	95A900027
	LTP 110-352 SN14L 35D BLU 475nm	95A900028
	LTP 112-600 SN36L 60D RED 625nm	95A900031
	LTP 112-601 SN36L 60D WHT white	95A900032

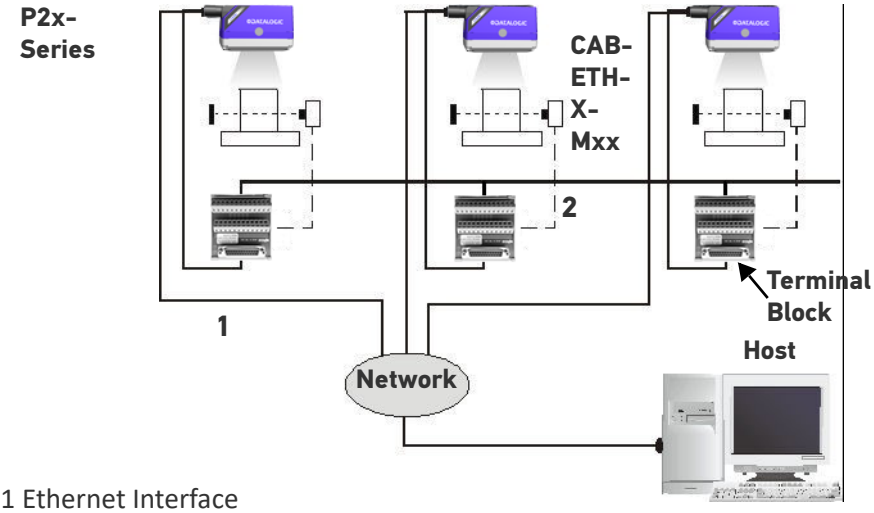
ACCESSORY	DESCRIPTION	PART
	LTP 112-602 SN36L 60D BLU 475nm	95A900033
	LTP 112-350 SN36L 35D RED 625nm	95A900034
	LTP 112-351 SN36L 35D WHT white	95A900035
	LTP 112-352 SN36L 35D BLU 475nm	95A900036
Adapter		
	Adapter LL ML LT 36L M320/P2	95A900038
Cables		
CAB-DS01-S	M12 17P Cable 1M	93A050058
CAB-DS03-S	M12 17P Cable 3M	93A050059
CAB-DS05-S	M12 17P Cable 5M	93A050060
CAB-DS10-S	M12 17P Cable 10M	93A051390
CAB ETH-X-M01	M12 Giga Eth Cable 1M IP67	93A050122
CAB ETH-X-M03	M12 Giga Eth Cable 3M IP67	93A050123
CAB ETH-X-M05	M12 Giga Eth Cable 5M IP67	93A050124
CAB ETH-X-M10	M12 Giga Eth Cable 10M IP67	93A050140
CAB-ETH-X-RJ	ADAPTER CAB GETH-X to RJ45	93A050128
CAB-ETH-X-D	ADAPTER CAB GETH-X to ETH-D	93A050129
Bracket		
	BK-32-000 STD FIX BRACKET M320/P2 BODY	93ACC0282
	BK-32-010 PIVOT FIX BRACKET M320/P2 BODY	93ACC0283
Connectivity		
I/O BOARD	I/O Board, P/A/T-Series, Female DB25, DIN Rail Mountable	95A906346
CBX500	Modular Connection Box	93A301068
CBX800	Gateway	93A301077
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		
Licenses		
	License, Enhanced, Smart Camera	95A900008
	License, Pro, Smart Camera	95A900009
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

CHAPTER 2
RAPID CONFIGURATION

STEP 1- CONNECT THE SYSTEM

In the typical layout shown in the figure below, an Ethernet host is connected to three cameras. Before proceeding with the connection, it is necessary to configure the camera Ethernet parameters in VPM. For more information, see Impact Reference Guide. 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 Terminal Block is used to facilitate the connection between the camera, external trigger, and optional input and output devices.



1 Ethernet Interface

2 External Trigger*

Figure 1- P2x-Series™ Stand Alone Layout to Ethernet Host

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

- Power Supply Connection
  Use the PG600x AC/DC Power Supply Unit (3 versions for European, UK or US plug).
- Terminal Block Connection
  Use CAB-DSxx-S between the P2x-Series™ camera and the Terminal Block for power, external trigger device (photocell), and additional I/O connections.

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

NOTE

The P2x-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 P2x-Series™

The table below gives the pinout of the CBX500/CBX800 terminal block connectors. Use this pinout when the P2x-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 + or - (polarity insensitive)	O3B	CBX800: Strobe - / Output 3- (See Note)
I2B	Input 2 + or - (polarity insensitive)	RS232 Interface	
-V	Power Reference - Inputs	TX	Transmit
Shield		RX	Receive
Shield	Network Cable Shield	SNGD	Signal Ground

NOTE

The strobe signal connection is shared with Output 3. Output 3 is active only if the External Strobe is disabled. (Configure in VPM – Settings – Camera – General)

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

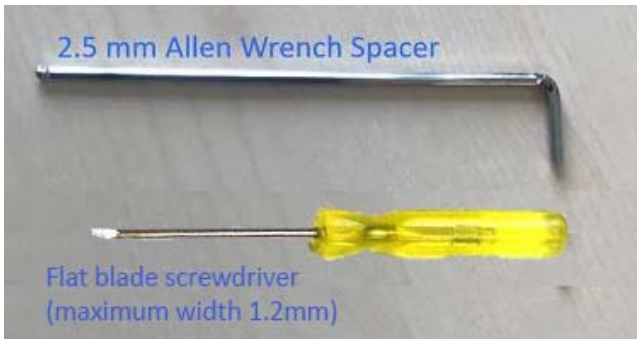
Continue with this step if the camera has no lens or internal illuminator, or you want to use a lens or illuminator with different characteristics.

If the camera already contains the correct lens and illuminator, continue with Step 3.

CAUTION

Disconnect power before removing the cover.

Toolset required



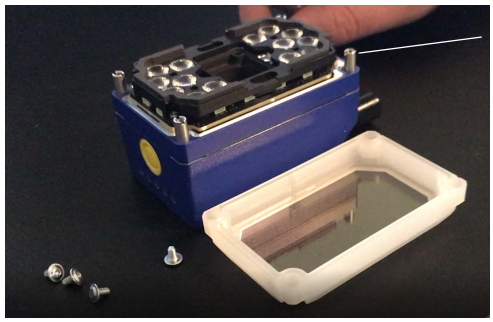
To remove the cover

1. Using the 2.5 mm Allen Wrench remove the Lens cover screws and carefully remove the cover. Be sure the sealing gasket stays with the cover.

2. To unmount the cover properly, it is recommended to gently lever the cover from its corners using a flat blade screwdriver between the cover and the body of the reader.

Threaded Spacers

Cover Screws



NOTE

When removing the cover, the Lens cover screws might stick to the threaded spacers. Reassemble the cover screws increasing slightly the tightening torque (maximum 0.8 N m) then, unscrew them again. Repeat the operation until the Lens cover screws are unblocked.

Be careful, overtightening may damage the Lens cover screws.

NOTE

When removing the cover to replace it, the Poron filter holder might stick to the removed window. Make sure to reassemble it.

Figure 2 - Removing the cover (14 and 36 LEDs models)

NOTE

Make sure the new cover is free of dust, dirt and fingerprints. If necessary, wipe it clean using soft material and alcohol. Avoid any abrasive substances.

To replace the cover

CAUTION

The reader must be disconnected from the power supply during the procedure.

CAUTION

Make sure to operate in a dust-free environment during the cover replacement procedure.

1. The cover has a predefined mounting direction. Make sure to align the identification grooves to the right side. For the 36 LEDs model, the illuminator has one pin different from the other three: make sure to align this special pin with the correspondent cover seat.

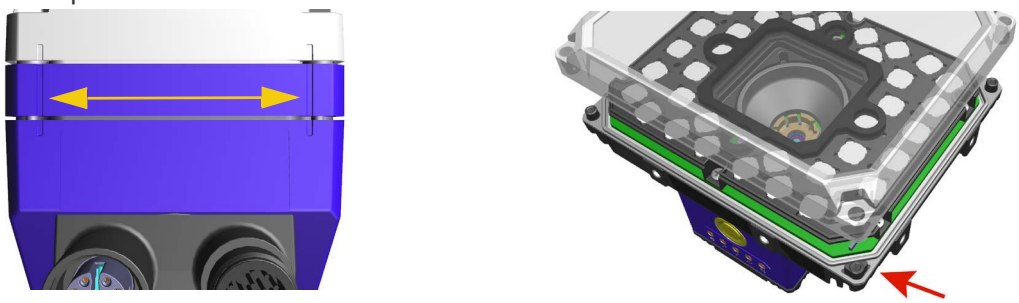


Figure 3 - Aligning the cover (14 and 36 LEDs models)

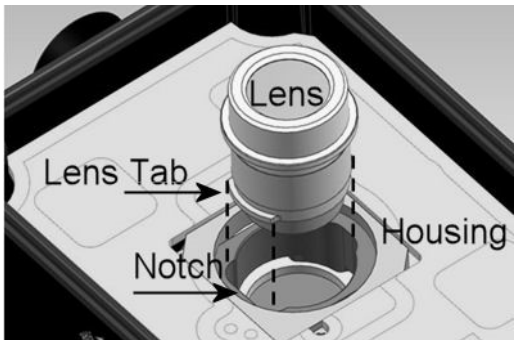
2. Place the new cover on the reader and press the cover frame edges.

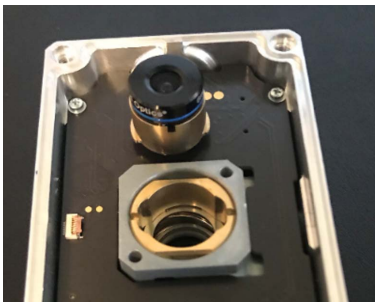
CAUTION

To avoid damage, do not press on the window.

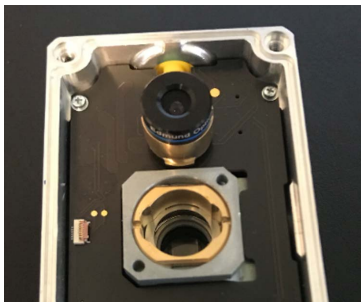
3. Insert the four screws and loosely tighten them in a clockwise direction.
4. Finally tighten the screws to a maximum torque of 0.8 N m.

To remove the camera micro-lens





Lens release position



Lens lock position

Adjust the focus to "NEAR" to easily handle the micro-lens.

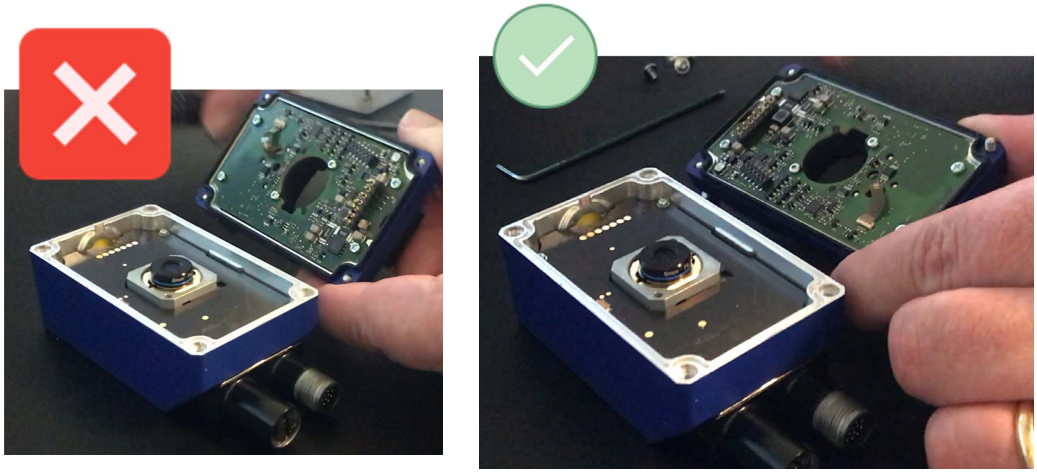
NOTE

1. Remove the cover and the illuminator. See "To remove the cover" on page 13.
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 micro-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. Mount the illuminator or the spacer.
7. Carefully replace the cover. See "To replace the cover" on page 14.

(14 LEDs ILLUMINATOR) To remove and replace the internal illuminator



CAUTION

Keep the connector aligned to the contact.

1. Remove the four lens cover screws and carefully remove the cover. See “To remove the cover” on page 13.
2. Unscrew the four threaded spacers using the flat blade screw-driver, then remove the illuminator.
3. Align the new illuminator with the camera case and gently press down until the illuminator is tight to the case.
4. Tighten the four new illuminator threaded spacers. Maximum tightening torque 1.2 N m
5. Replace the cover screws. See “To replace the cover” on page 14.

NOTE

Configure an Internal Illuminator in VPM - Camera Setup (See “Startup” on page 46.)

(36 LEDs Illuminator) To remove and replace the internal illuminator

Two mounting options are available for the 36 LEDs Illuminator: vertical or landscape position.

1. Place the camera on a flat-surface, such as the illuminator side faces downwards. Remove the four illuminator screws and the illuminator.
2. Turn the camera case as the illuminator side faces upwards.
   Align the new illuminator with the case and gently press down until the illuminator is tight to the case.
3. Turn the camera upside down. Hold it firmly with both hands to be sure that the illuminator stays with the case.
4. Replace the four illuminator screws. Maximum tightening torque 0.8 N m.

NOTE

Configure an Internal Illuminator in VPM - Camera Setup (See “Startup” on page 46.)

To replace the optional Yag Cut lens filter

CAUTION

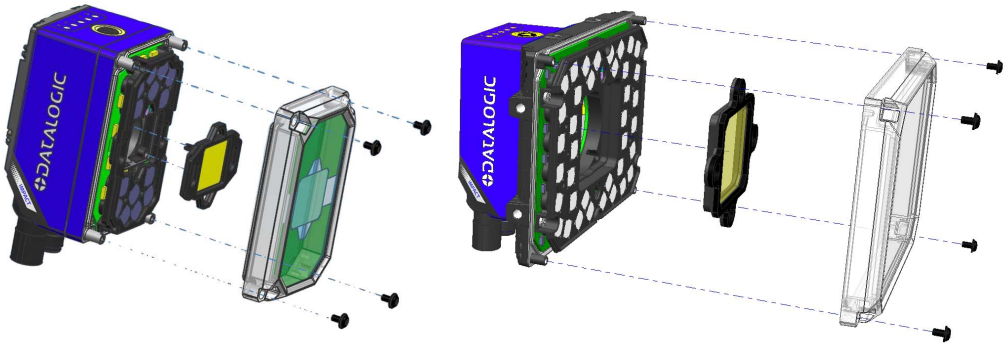
The reader must be disconnected from the power supply during the procedure.

CAUTION

Make sure to operate in a dust-free environment during the cover replacement procedure.

1. Remove the four cover screws and carefully remove the cover. See “To remove the cover” on page 13.
2. Gently squeeze the clips on each side of the filter holder while you gently pull straight up from the illuminator.
3. Align the Poron filter holder to the lens. Gently squeeze the clips on each side of the filter while you gently press straight down on the filter. The filter is equipped with two pins at the bottom that guide its insertion into the product.

Poron Filter for 14 and 36 LEDs models



NOTE

You can mount the filter in two equivalent directions by rotating it 180°.

CAUTION

Make sure that the filter is correctly placed without any tilt before mounting the cover back on the reader body.

4. Finally, mount the cover back on the reader body. See “To replace the cover” on page 14.

STEP 3 – MOUNT AND POSITION THE CAMERA

Use the P2x-Series™ mounting brackets to obtain the most suitable position for the camera. The most common mounting configurations are shown in the figures below.

14 LEDs Illuminator

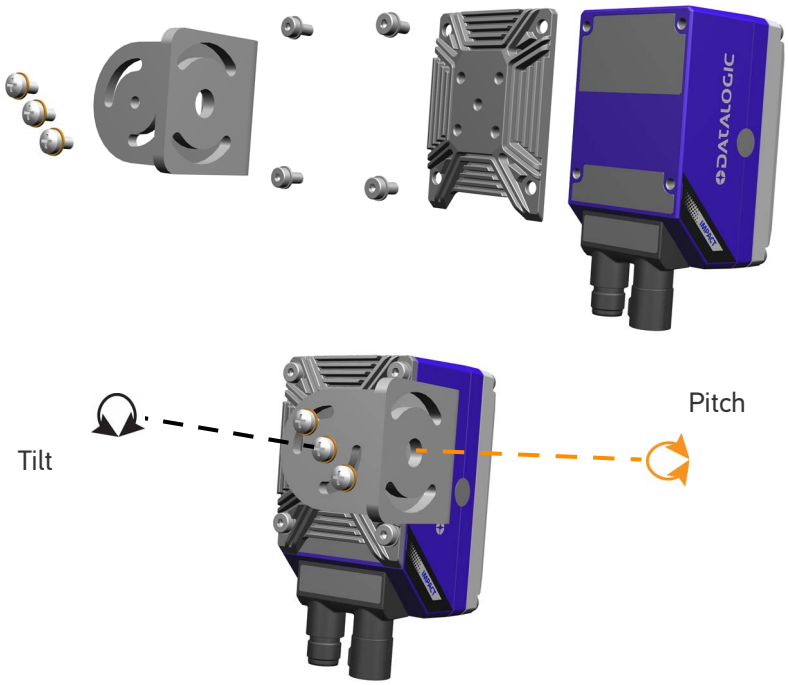


Figure 4- 14 LEDs Illuminator with STD Fix Bracket

NOTE

This mounting position is valid also for Configuration A - External Lighting.
See "Configuration A - External Lighting" on page 8

36 LEDs Illuminator

Position 1

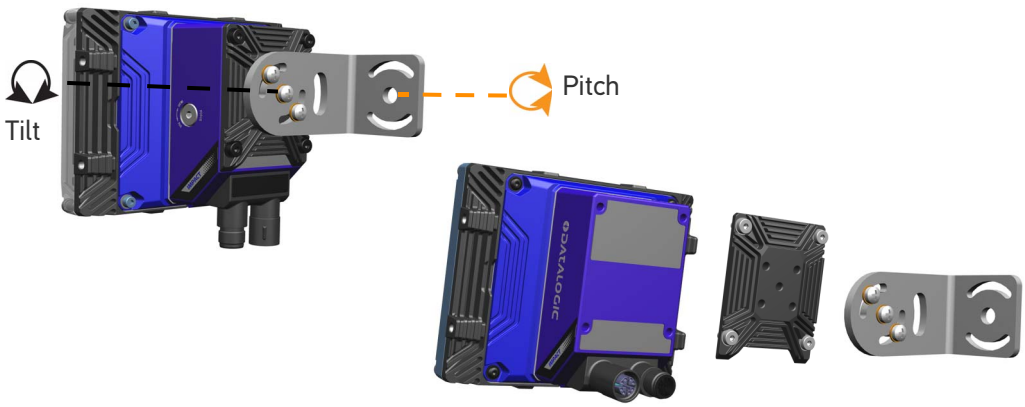


Figure 5 - 36 LEDs Illuminator with STD Fix Bracket

Position 2

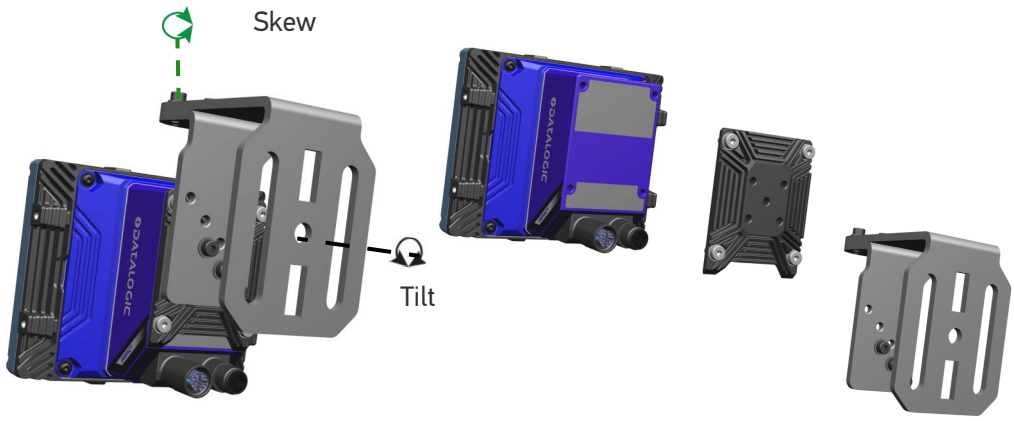


Figure 6 - 36 LEDs Illuminator, front extended positioning with Pivot Fix Bracket

Position 3

Figure 7 - 36 LEDs Illuminator, side extended positioning with Pivot Fix Bracket

Position 4

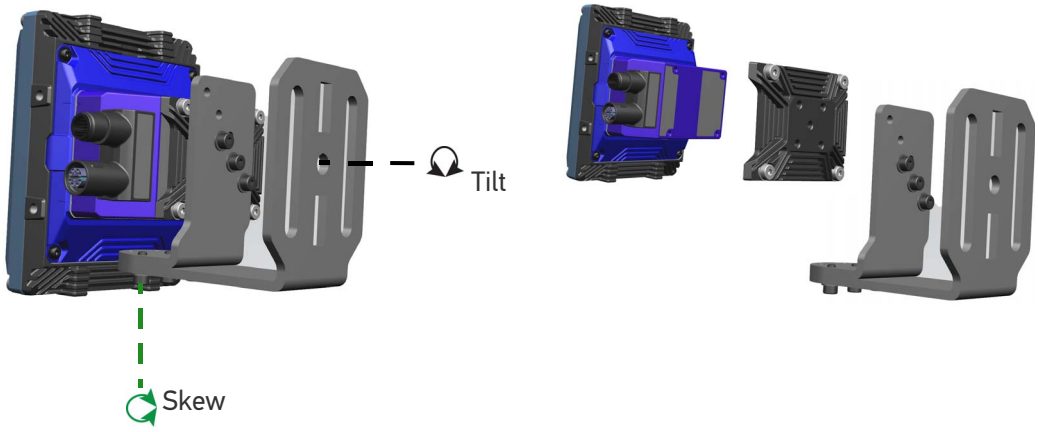


Figure 8 - 36 LEDs Illuminator, compact positioning with Pivot Fix Bracket

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

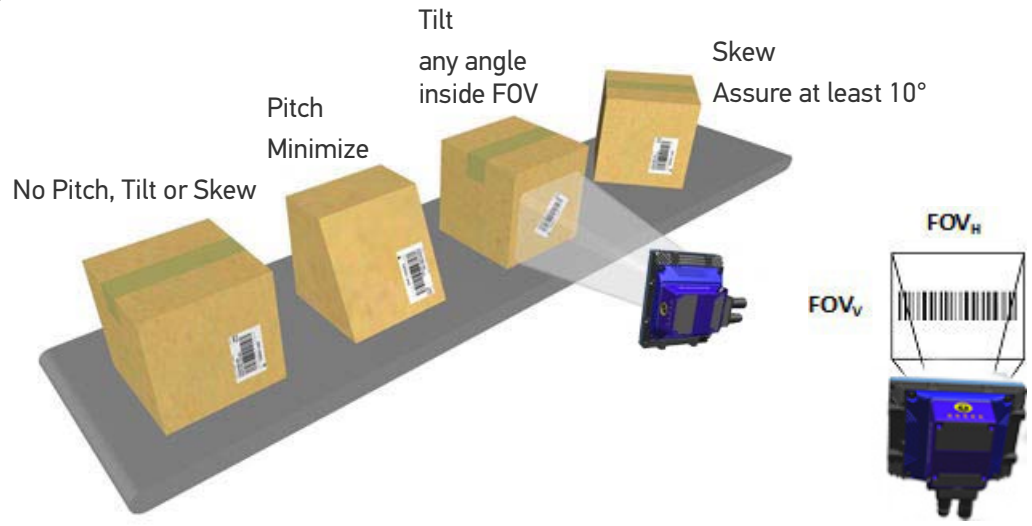


Figure 9 - Pitch, Tilt and Skew Angles

STEP 4 – FOCUS THE CAMERA

To adjust the P2x-Series™ lens, use VPM 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. (See “STEP 2 – Install the lens and illuminator” on page 13.)
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 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 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.

CHAPTER 3
INSTALLATION

PACKAGE CONTENTS

Verify that the P2x-Series™ camera and all the parts supplied with the equipment are present and intact when opening the packaging; the list of parts includes:

1. P2x-Series™ camera (base + spacer + camera)
2. Quick Reference Guide
3. Mounting Kit

- Mounting Screws (4 + 3) and washers
- Heatsink
- STD Fix Bracket

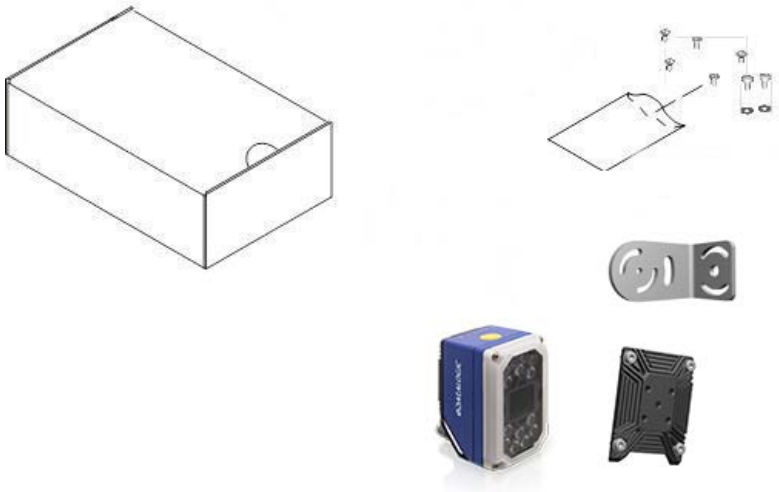


Figure 1- Package Contents

MECHANICAL DIMENSIONS

The P2x-Series™ cameras can be installed to operate in different positions. The four screw holes (M4 x 6) on the body of the camera are for mounting the heatsink to the camera and this latter to the provided brackets. The diagram below gives the overall dimensions of the camera and may be used for its installation.

P2x-Series™ (14 LEDs ILLUMINATOR)

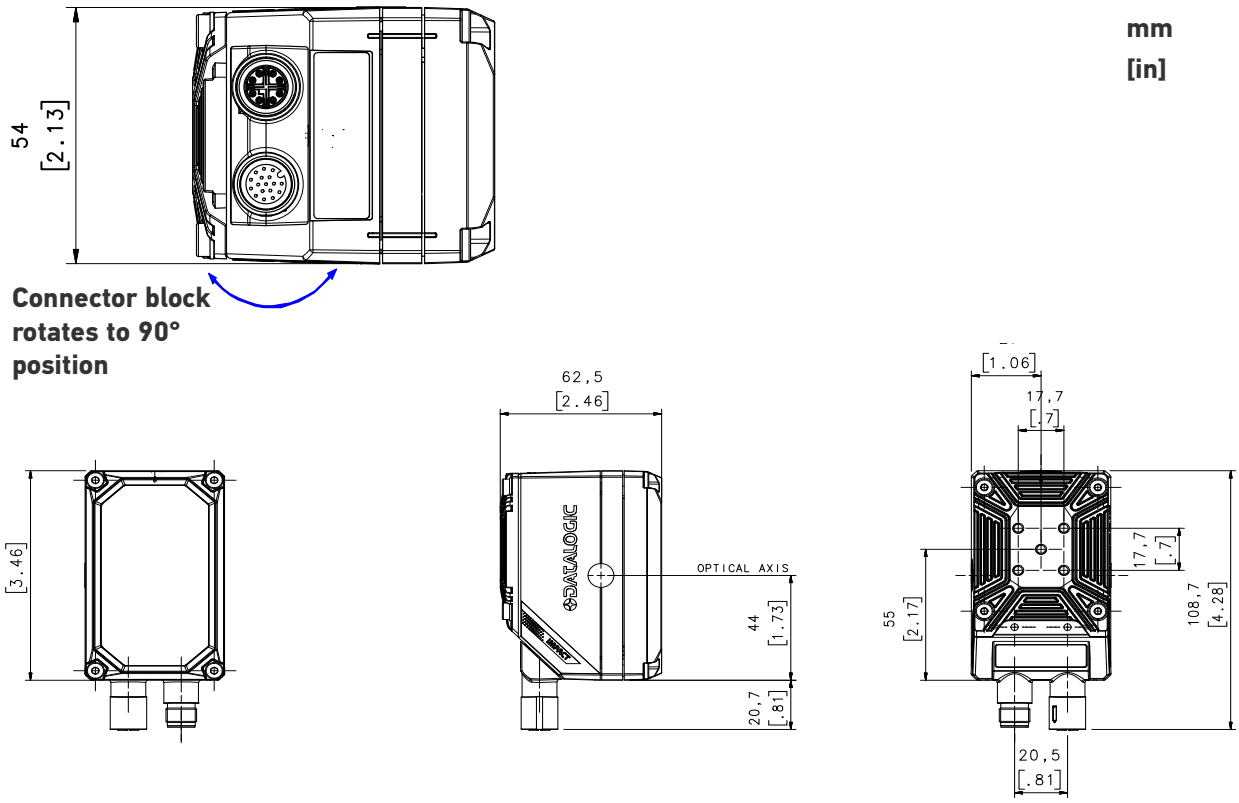


Figure 2 - Overall Dimensions with Connector at 0°

mm
[in]

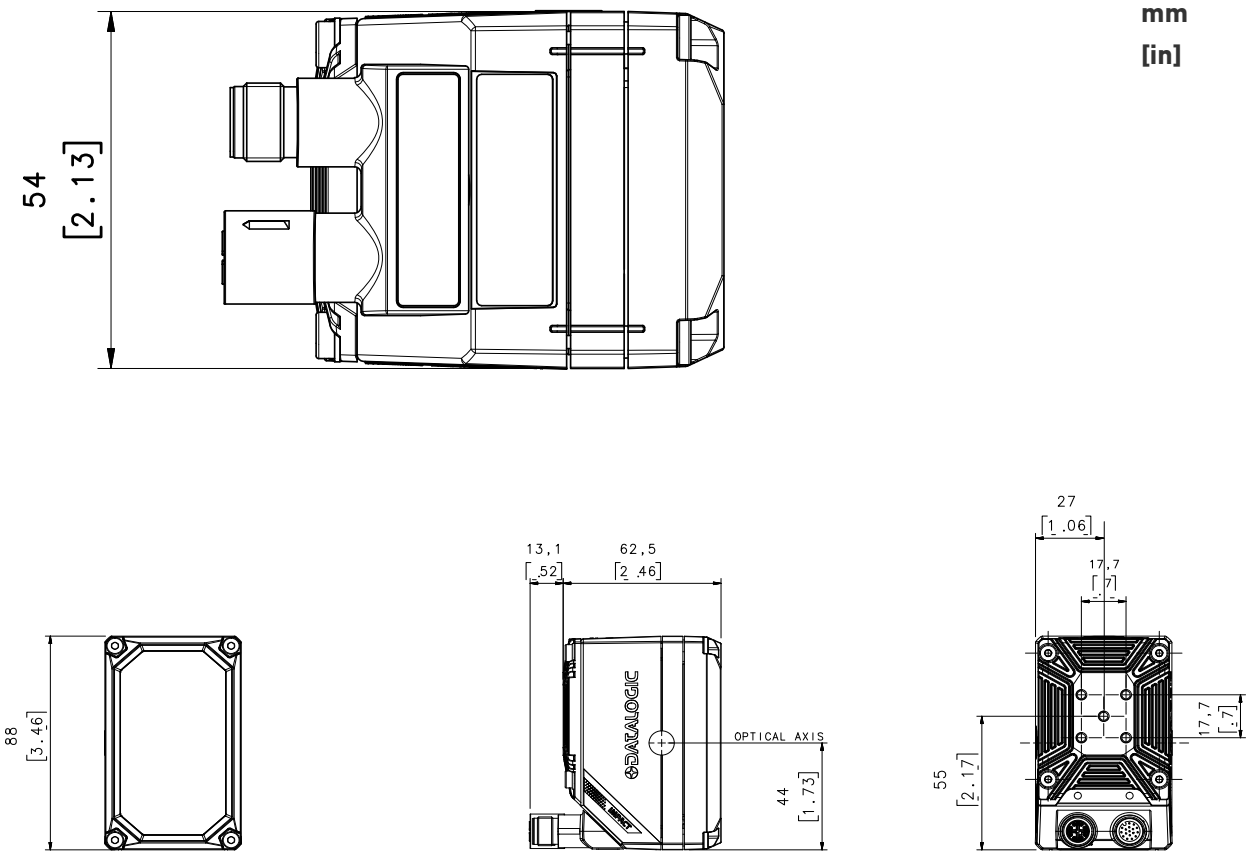


Figure 3 - Overall Dimensions with Connector at 90°

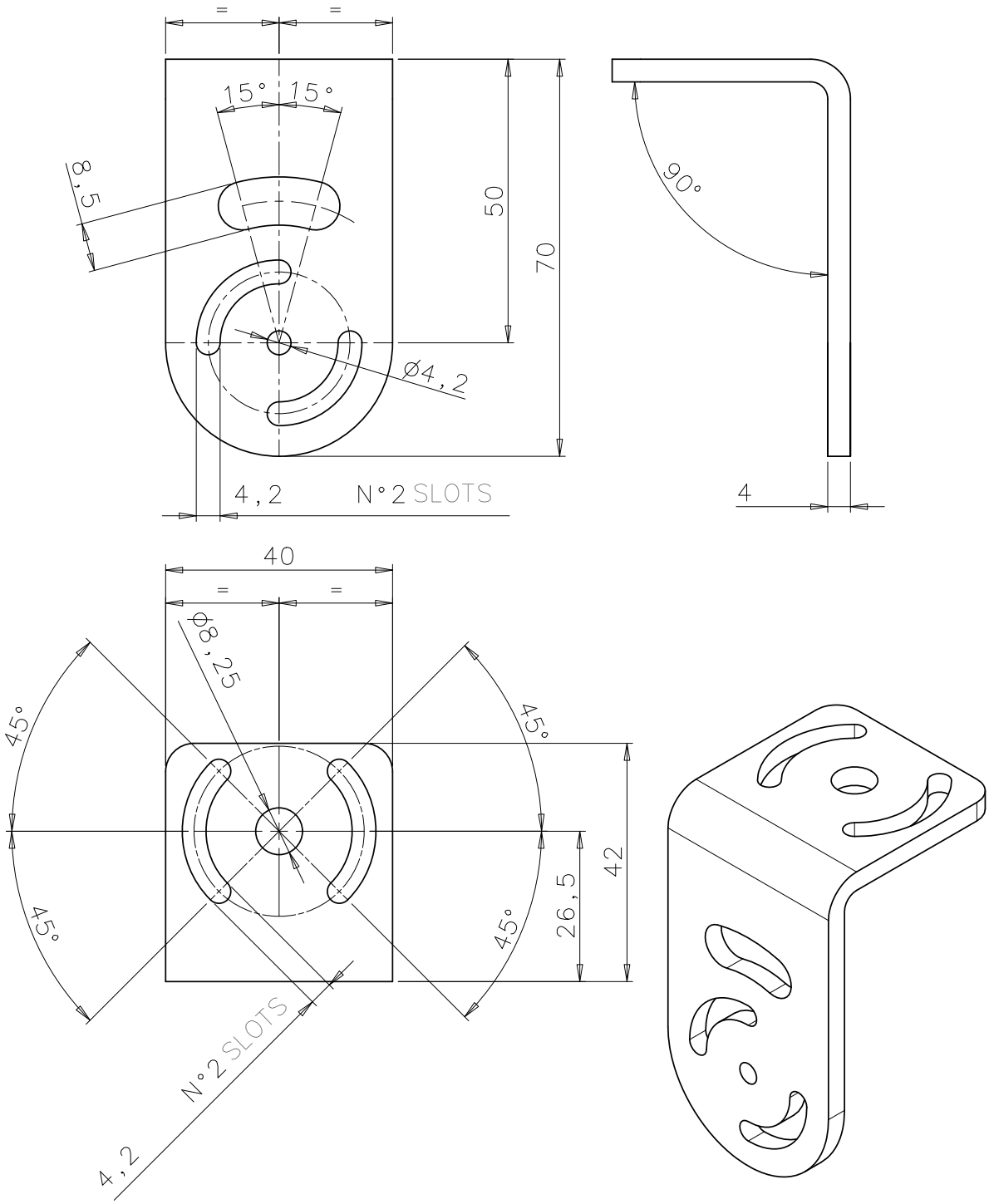


Figure 4- STD Fix Bracket Overall Dimensions

P2x-Series™ (36 LEDs ILLUMINATOR)

The P2x-Series ™ cameras 36 LEDs can be mounted horizontally and vertically.

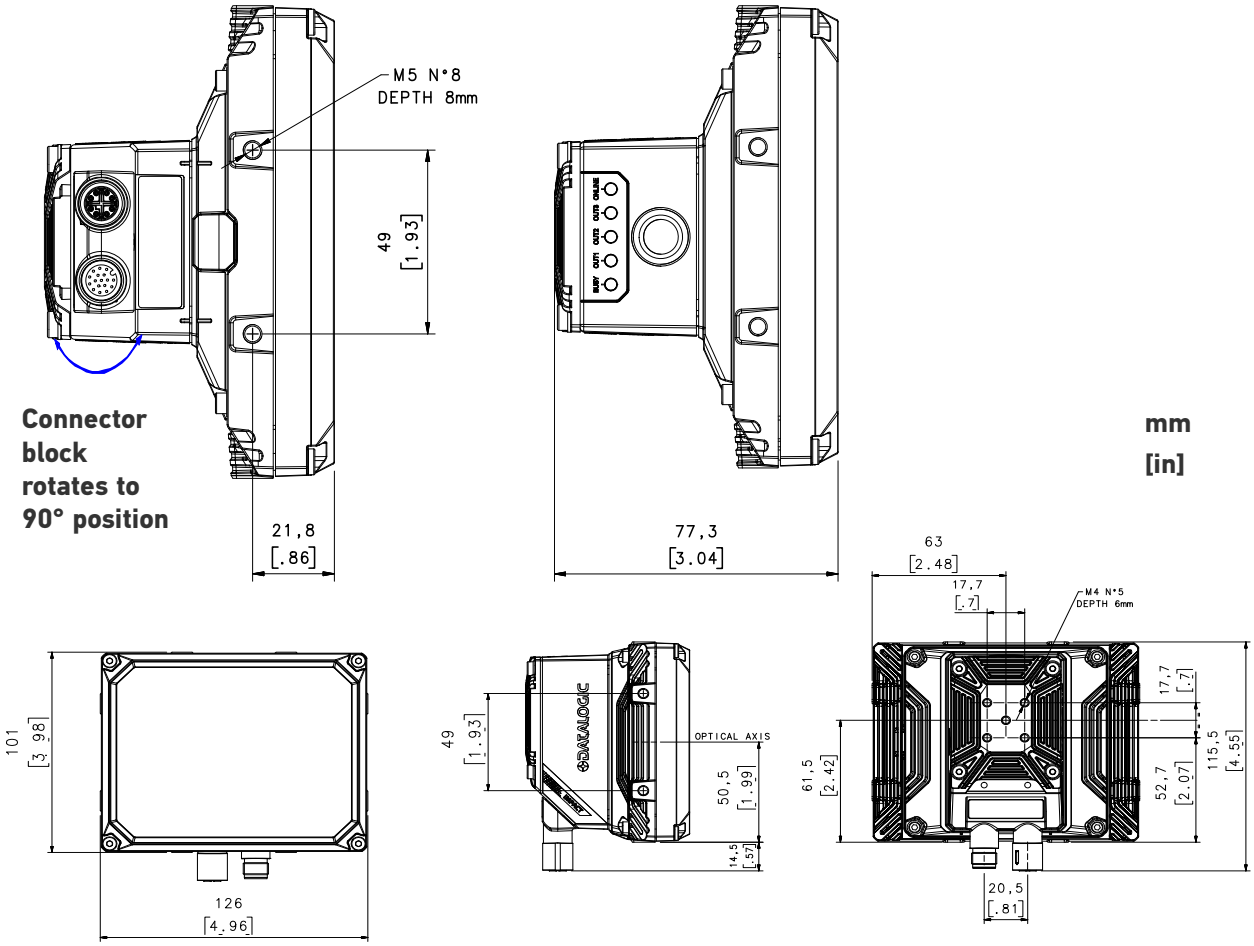


Figure 5 - Overall Dimensions with Connector at 0°

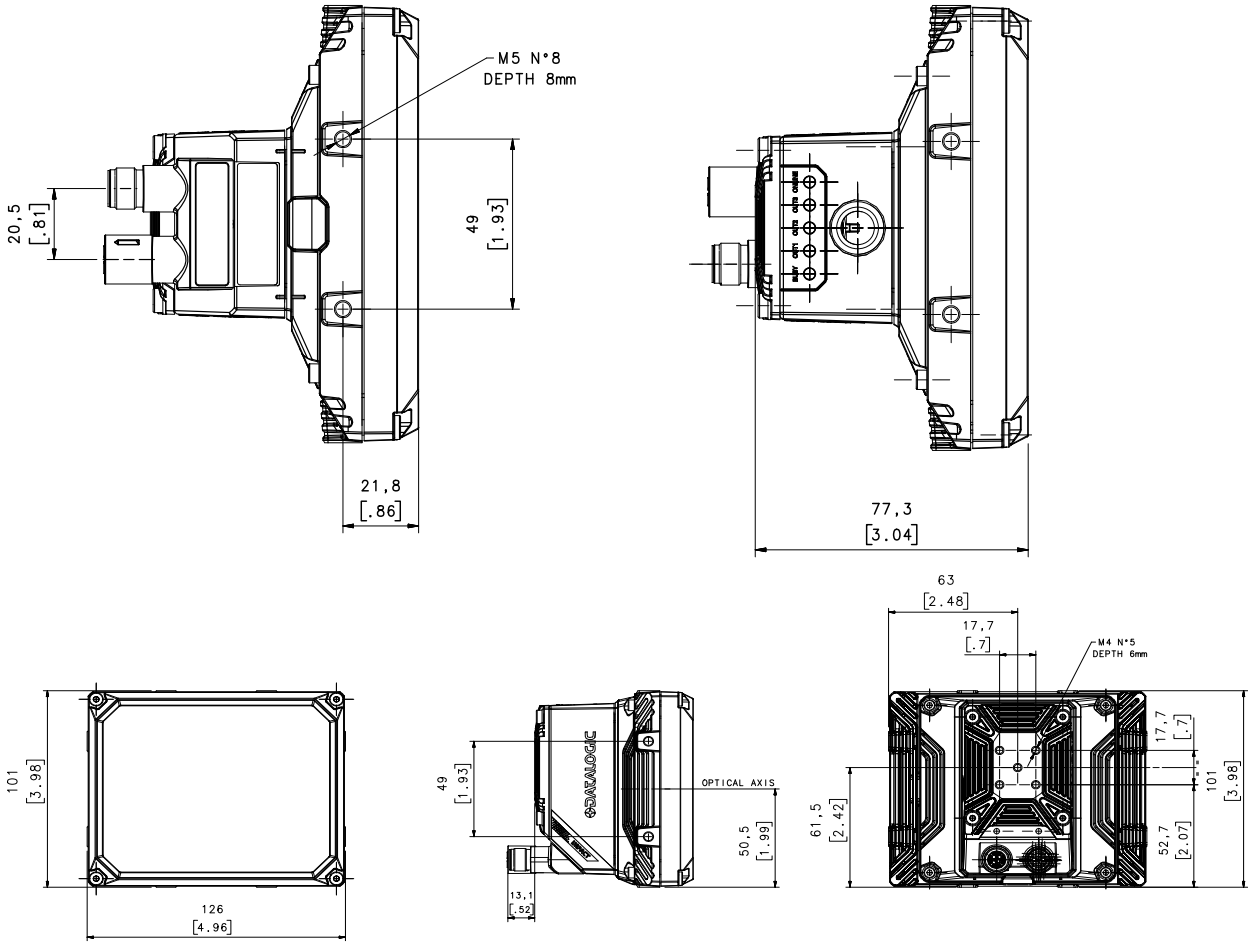


Figure 6 - Overall Dimensions with Connector at 90°

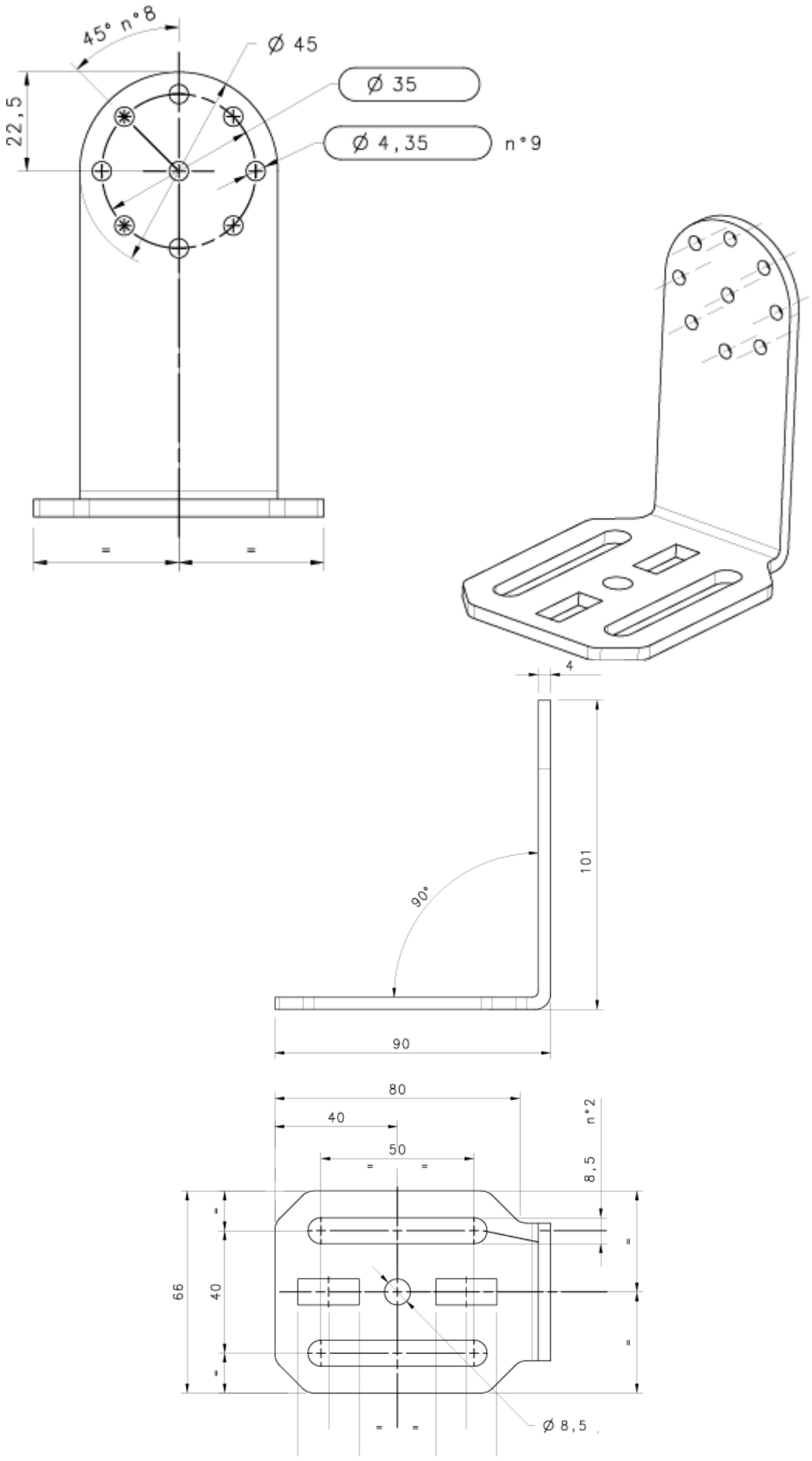


Figure 7 - Pivot Fix Bracket for 36 LEDs Illuminator - large (BK-32-010)

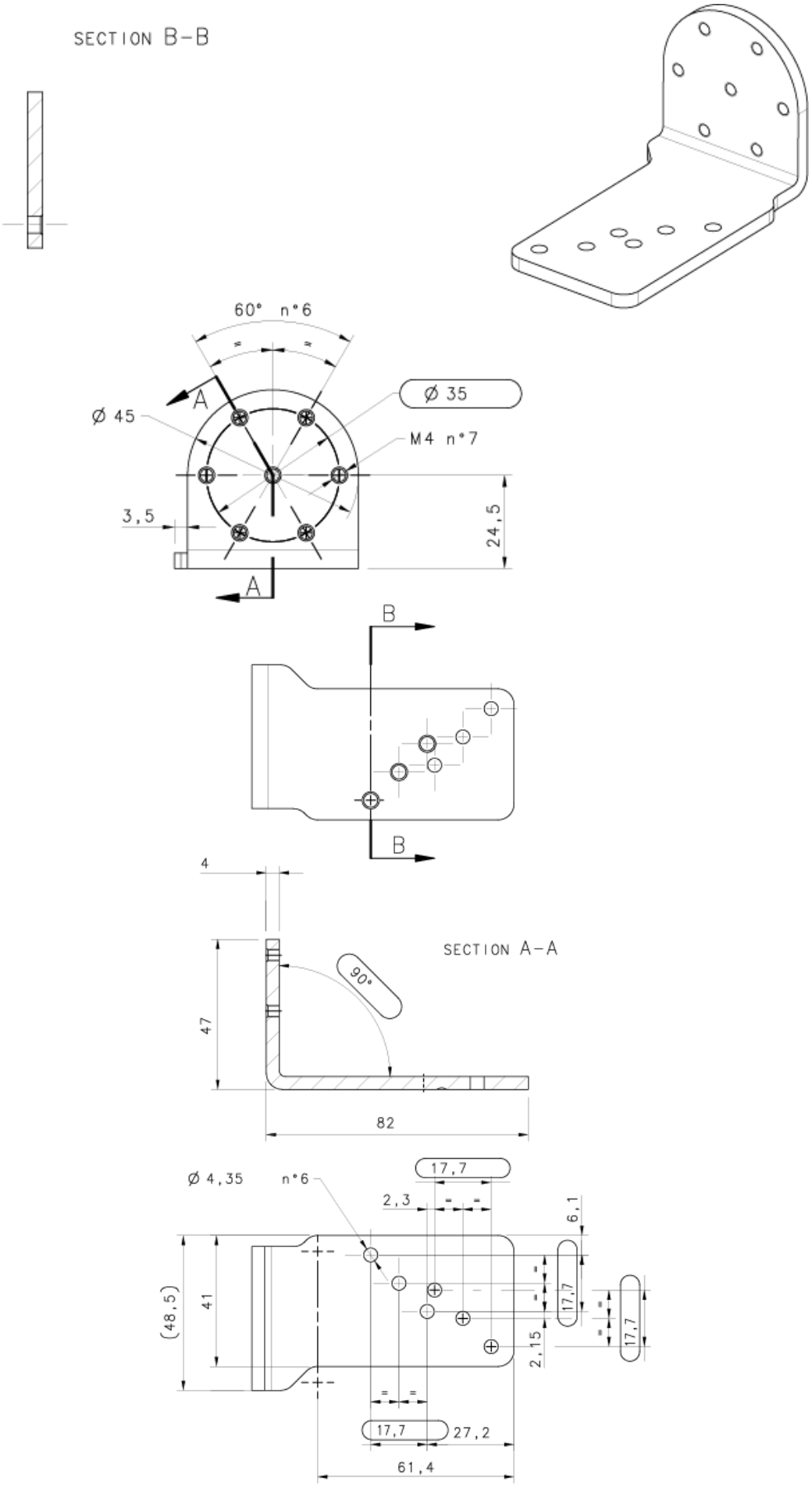


Figure 8 - Pivot Fix Bracket for 36 LEDs Illuminator - small (BK-32-010)

MOUNTING AND POSITIONING THE P2X-SERIES™

NOTE **The position of the device can be monitored. The device alerts the user in case of orientation changes and mechanical shocks. (E.g. The frame where the P2x-series is mounted is subject to bumps and high vibrations).**

Mounting Brackets

Figure 9 - STD Fix Bracket

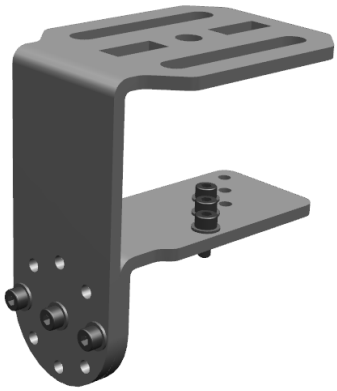


Figure 10 - Pivot Fix Bracket for the 36 LEDs Illuminator

NOTE **The Pivot Fix Bracket is included in the 36LEDs illuminator's box.**

Use the P2x-Series™ mounting brackets to obtain rotation on the various axes of the camera as shown in the diagram below:

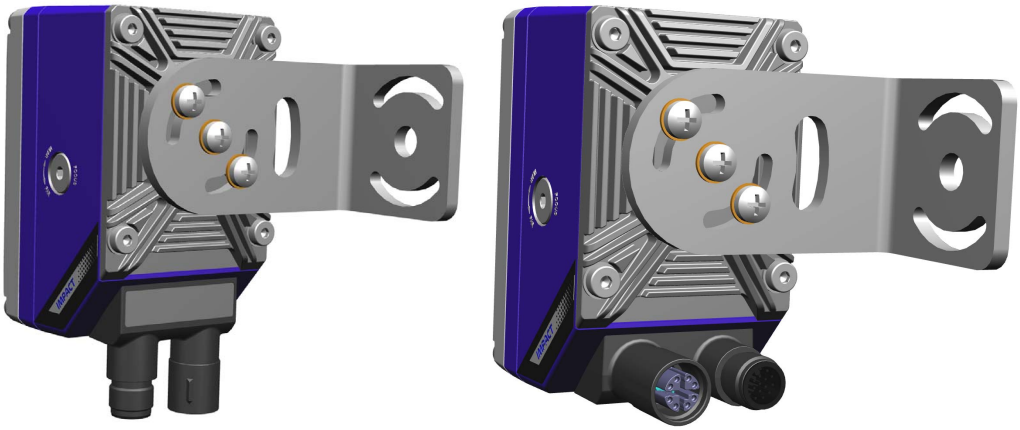


Figure 11 - 14 LEDs Illuminator with STD Fix Bracket (connectors at 0° and 90°)

NOTE **This mounting position is valid also for Configuration A - External Lighting.**
See "Configuration A - External Lighting" on page 8

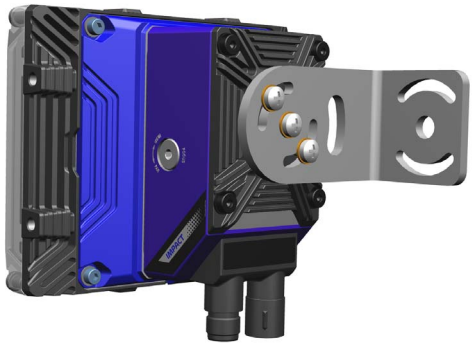


Figure 12 - 36 LEDs Illuminator with STD Fix Bracket

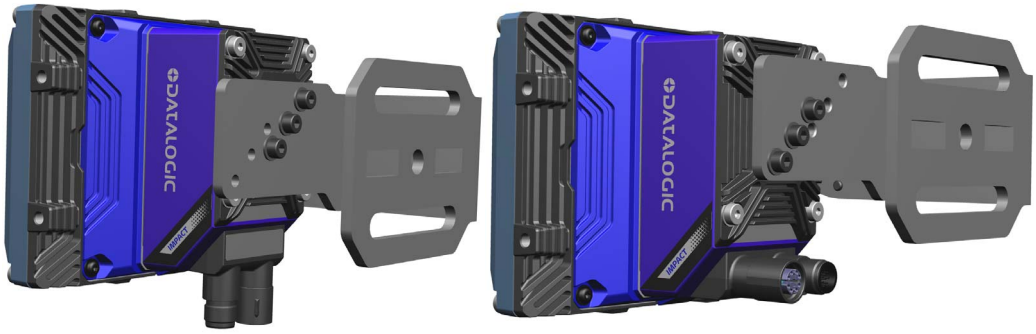


Figure 13 - 36 LEDs Illuminator side positioning with Pivot Fix Bracket (connectors at 0° and 90°)

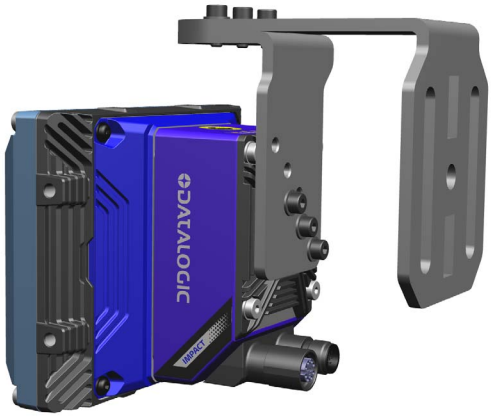


Figure 14 - 36 LEDs Illuminator front extended positioning with Pivot Fix Bracket (illuminator horizontally mounted)

CHAPTER 4
ELECTRICAL CONNECTIONS

ON BOARD GIGABIT ETHERNET INTERFACE

The on-board Gigabit 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.

On-board Gigabit Ethernet Connector

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

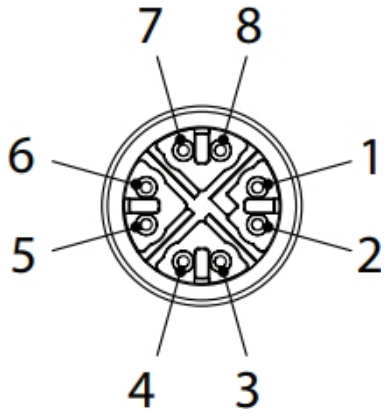


Figure 1 - M-12 X-Coded Female Ethernet Network Connector

ON-BOARD GIGABIT ETHERNET NETWORK CONNECTOR PINOUT		
Pin	Name	Function
1	DA+	Bidirectional data DA+
2	DA-	Bidirectional data DA-
3	DB+	Bidirectional data DB+
4	DB-	Bidirectional data DB-
5	DD+	Bidirectional data DD+
6	DD-	Bidirectional data DD-
7	DC-	Bidirectional data DC+
8	DC+	Bidirectional data DC-

RS232 INTERFACE

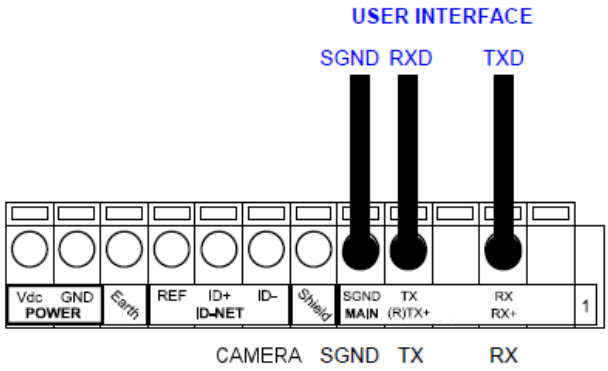
The signals relative to the following serial interface types are available on the CBX spring clamp terminal blocks.

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

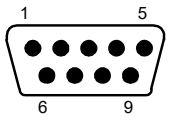
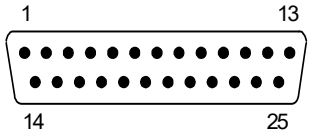
The following pins are used for RS232 interface connection:

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.).



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

RS485 Full-Duplex Interface

The Impact software does not support RS485 protocol.

Auxiliary RS232 Interface

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

NOTE

Do not make any connections to the Aux Interface.

TERMINAL BLOCK CONNECTIONS

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

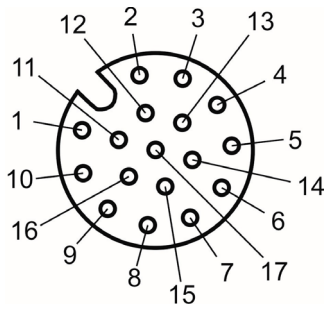
Power, COM and I/O Connector

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.

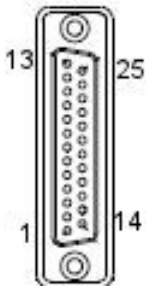
CAUTION

Do not disconnect the cable while power is on.

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



M12 17-pin COM (female end), I/O and Power Connector



D-sub 25-pin (pin end)

I/O Terminal Block (95A906346)

17-PIN M12	D-SUB/ TERMINAL BLOCK PIN	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 + or - (Polarity Insensitive)
5 Grn-Blk	19	I1B: External Trigger + or - (Polarity Insensitive)
13 Gry	6	I2A: Input 2 + or - (Polarity Insensitive)
3 Grn-Red	10	I2B: Input 2 + or - (Polarity Insensitive)
9 Pur	8	O1: Output 1 (Note 1; Opto-isolated only when connected to CBX500 or CBX800 connection box)
8 Wht-Red	11	O2: Output 2 (Note 1; Opto-isolated only when connected to CBX500 or CBX800 connection box)
16 Blk-Wht	14 & 16	O3: Output 3 (Notes 1, 2; Opto-isolated only when connected to CBX800 connection box)
14 Yel-Blu	20	Reserved
4 Yel-Wht	21	Reserved
17 Yel	2	TX: RS232 Transmit
11 Bm	3	RS: RS232 Receive
12 Pnk	4	Reserved
10 Gm	5	Reserved

17-PIN M12	D-SUB/ TERMINAL BLOCK PIN	NAME: FUNCTION
		NOTES: 1: Short-circuit protected; NPN or PNP (configure in VPM – Camera Setup) 2: Strobe signal connection shared with Output 3. Output 3 is active only if the External Strobe is disabled (Configure in VPM – Settings – Camera – 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.

CBX ELECTRICAL CONNECTIONS

All P2x-Series™ configurations 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

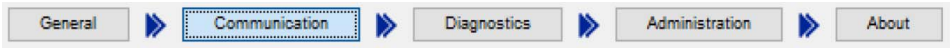
If you require direct wiring to the camera, See "Outputs" on page 44.

NOTE

When **Outputs 1** and **2** are connected through the CBX connection box, you must set the Output Type configuration parameters to NPN.

The outputs are programmed using VPM.

1. Start VPM
2. Select the General icon.
3. Select the Communication button.



4. Select NPN for the output type.

The following table 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 + or - (polarity insensitive)
I1B	External Trigger + or - (polarity insensitive)
-V	Power Reference - External Trigger
+V	Power Source - Inputs
I2A	Input 2 + or - (polarity insensitive)
I2B	Input 2 + or - (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
CBX500: O3A	Strobe / Output 3 (Single pin connection)
CBX500: O3B	Not Used
CBX800: O3A	Strobe + /Output 3 +(Opto-isolated; See Note)
CBX800: O3B	Strobe -/Output 3 -
RS232 Interface	
TX	Auxiliary Interface TX
RX	Auxiliary Interface RX
SNGD	Auxiliary Interface Reference

NOTE

The strobe signal connection is shared with Output 3. Output 3 is active only if the External Strobe is disabled. (Configure in VPM – Settings – Camera – General)

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.

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 2.

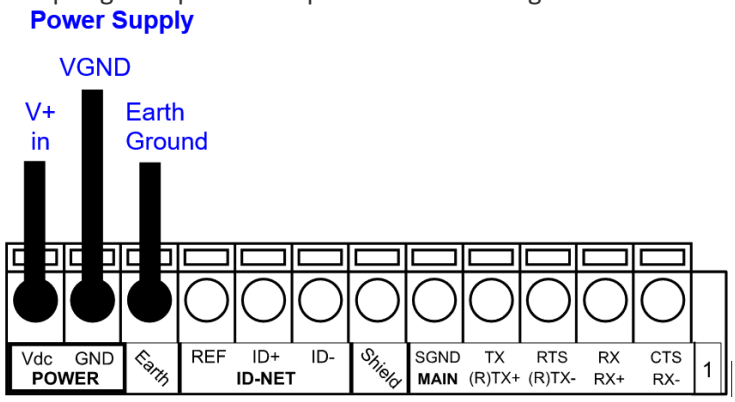


Figure 2- Power Supply Connections

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.

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.

An anti-disturbance filter is implemented in software on both inputs so that the default minimum pulse duration is ≅ 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 are 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 P2x-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 all power supplies when working inside the CBX.

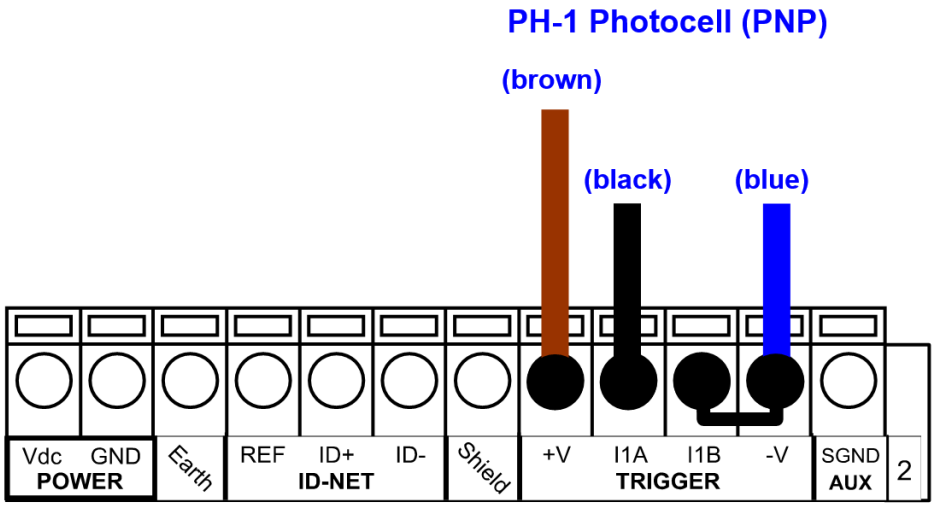


Figure 3 - PH-1 External Trigger Using P2x-Series™ Power

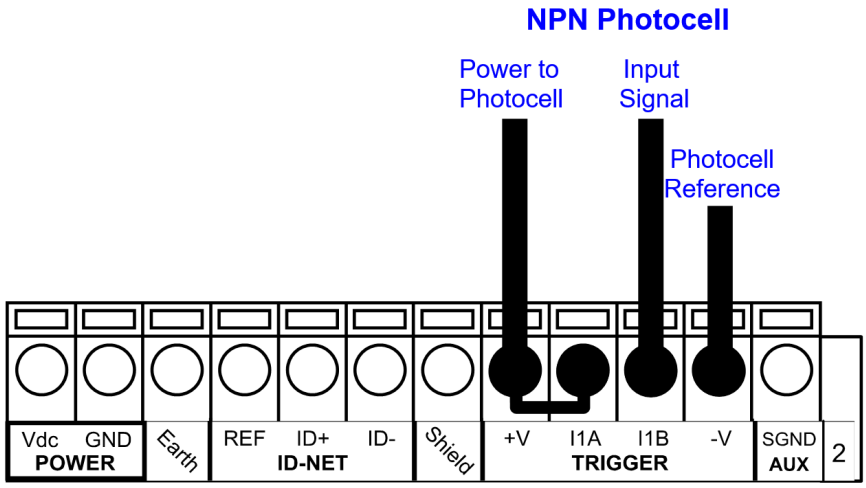


Figure 4 - NPN External Trigger Using P2x-Series™ Power

EXTERNAL TRIGGER INPUT CONNECTIONS USING EXTERNAL POWER

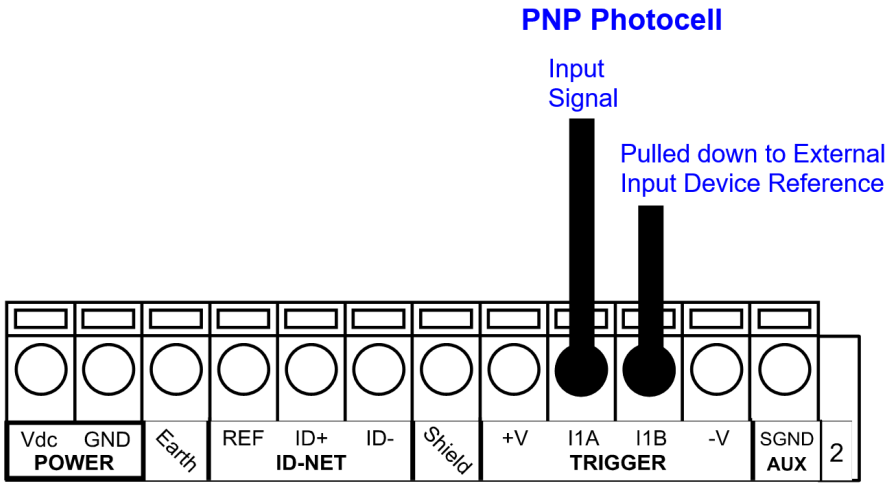


Figure 5 - PNP External Trigger Using External Power

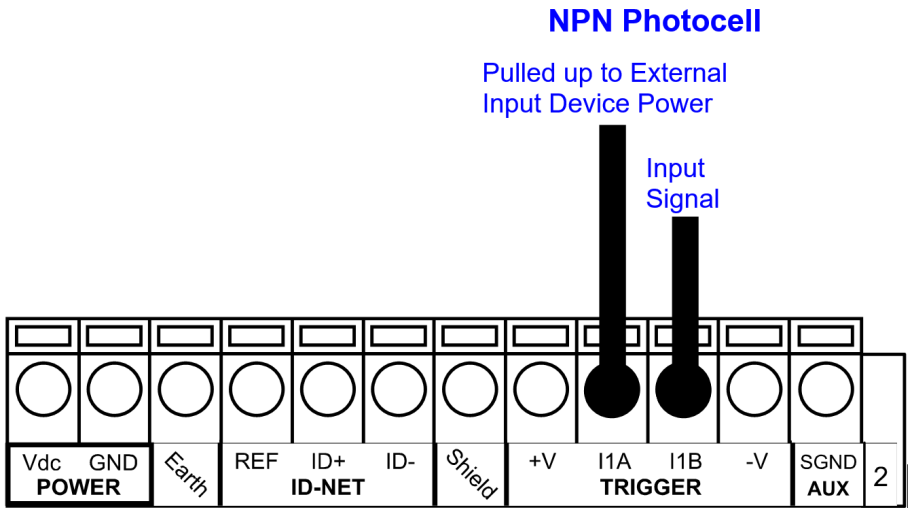


Figure 6 - NPN External Trigger Using External Power

CBX500/800	FUNCTION
+V	Power Source - Inputs
I2A	Input 2 + or - (polarity insensitive)
I2B	Input 2 + or - (polarity insensitive)
-V	Power Reference - Inputs

INPUT 2 CONNECTIONS USING P2x-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 all power supplies when working inside the CBX.

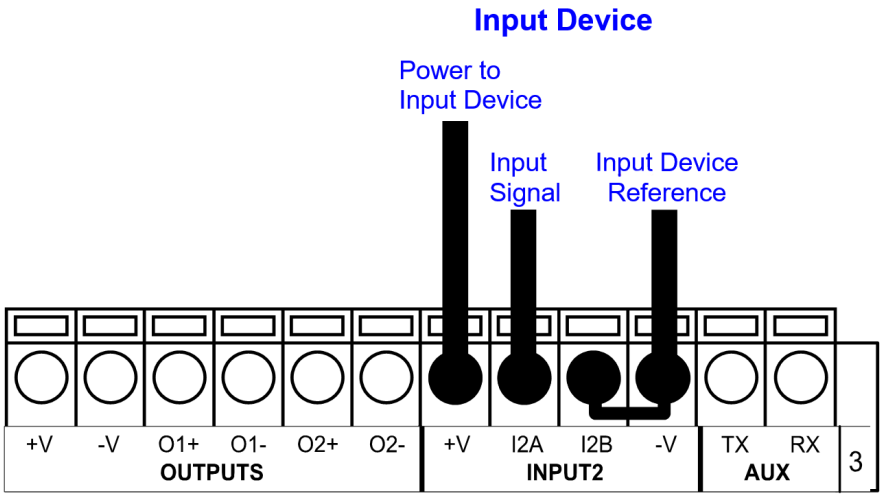


Figure 7 - PNP Input 2 Using P2x-Series™ Power

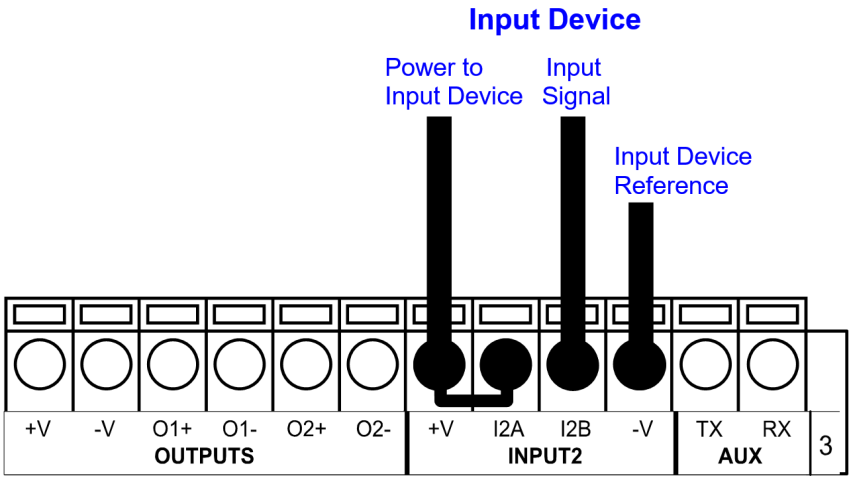


Figure 8 - NPN Input 2 Using P2x-Series™ Power

INPUT 2 CONNECTIONS USING EXTERNAL POWER

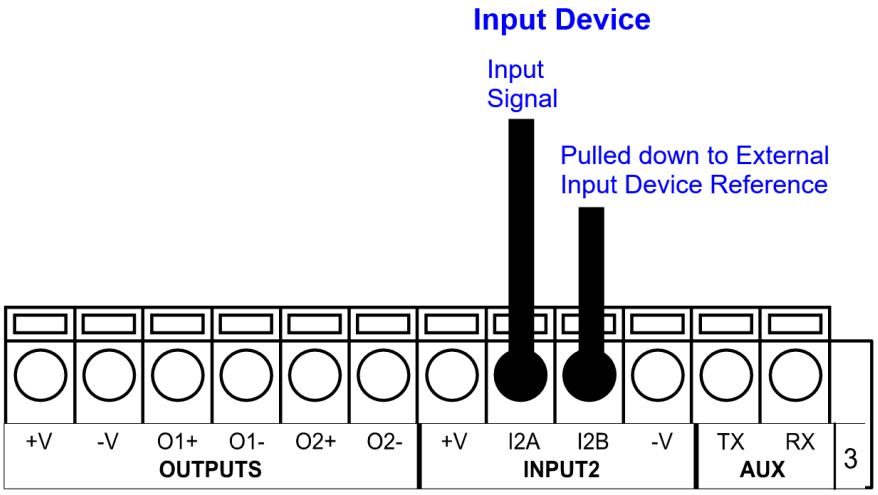


Figure 9 - PNP Input 2 Using External Power

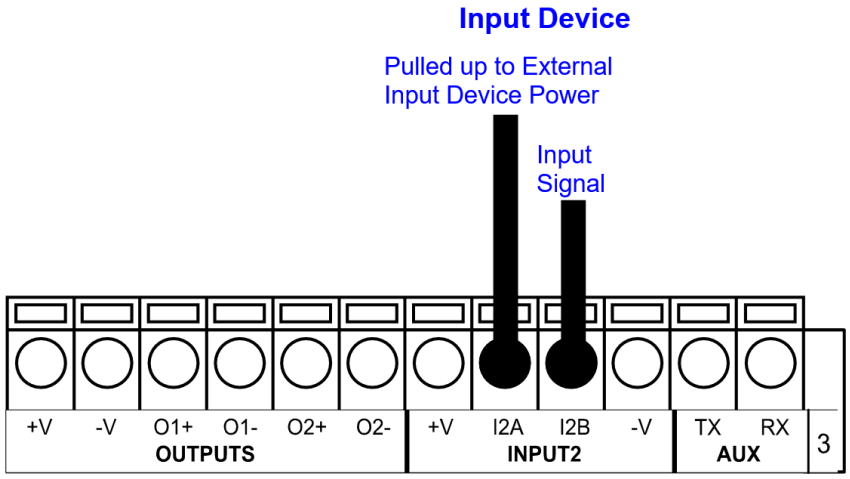


Figure 10 - NPN Input 2 Using External Power

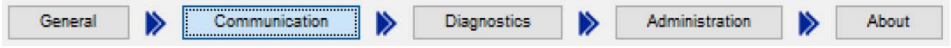
OUTPUTS

NOTE

When Outputs 1 and 2 are connected through the CBX connection box, you must set the Output Type configuration parameters to NPN.

The outputs are programmed using VPM.

1. Start VPM
2. Select the General icon.
3. Select the Communication button.



4. Select NPN for the output type.

Outputs 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
CBX500: O3A	Strobe /Output 3 (Single pin connection)
CBX500:O3B	Not used
CBX800: O3A	Strobe + /Output 3 + (Opto-isolated; See Note)
CBX800: O3B	Strobe - /Output 3 -
-V	Power Reference Outputs

NOTE

The strobe signal connection is shared with Output 3. Output 3 is active only if the External Strobe is disabled. (Configure in VPM – Settings – Camera – General)

The electrical features of the outputs are the following:

OUTPUT 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 signal are fully programmable. Refer to the Discrete Output tool section in the Impact Reference Guide for further details.

OUTPUT 1 AND 2 CONNECTIONS USING P2x-Series™ POWER

NOTE

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 all power supplies when working inside the CBX.

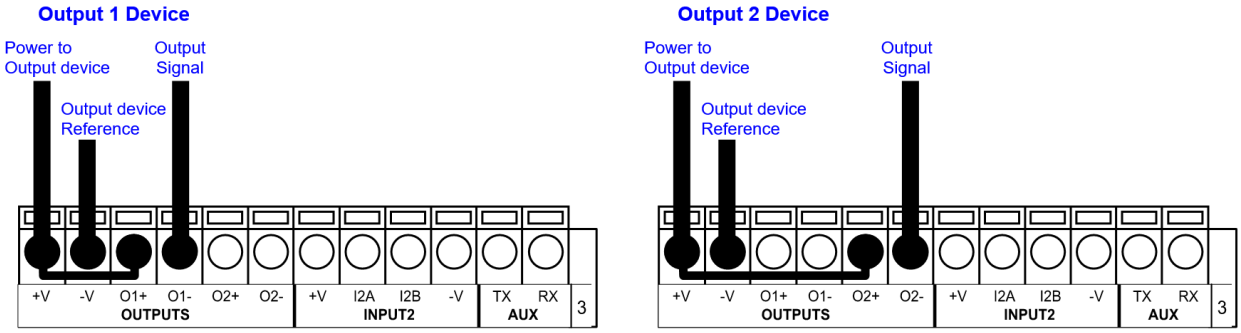


Figure 11 - PNP/Open Emitter Output Using P2x-Series™ Power

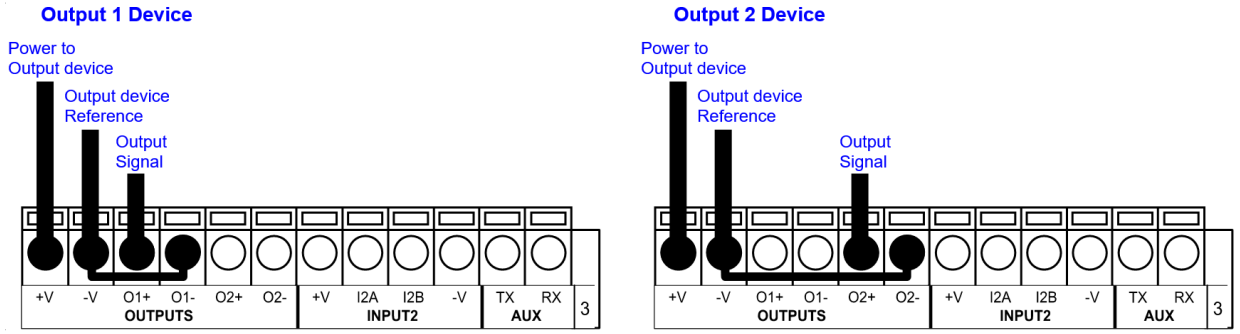


Figure 12 - NPN/Open Collector Output Using P2x-Series™ Power

OUTPUT 1 AND 2 CONNECTIONS USING EXTERNAL POWER

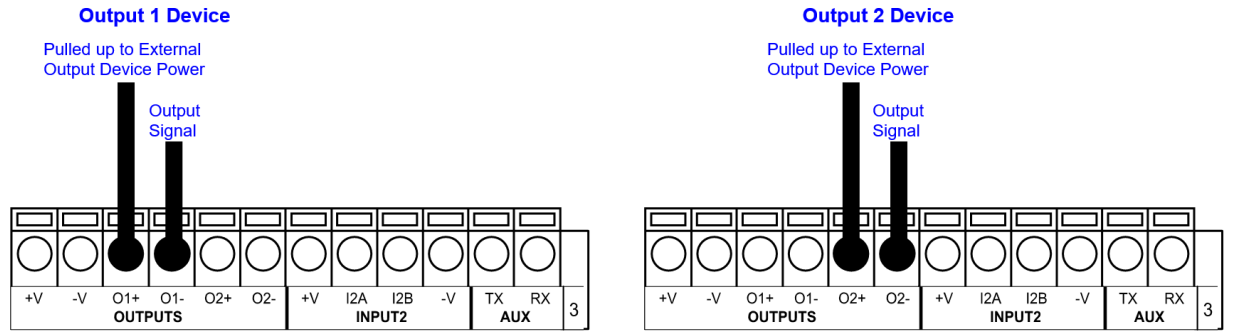


Figure 13 - PNP/Output Open Emitter Using External Power

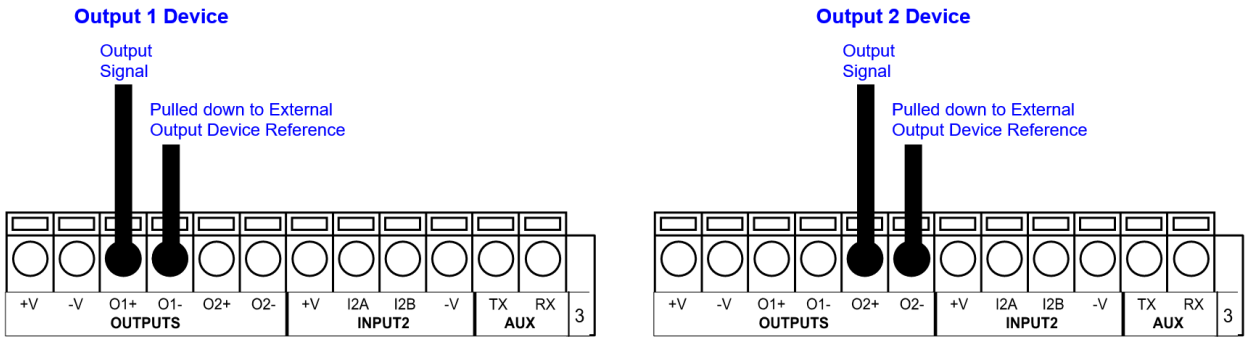


Figure 14 -NPN/Output Open Collector Using External Power

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 P2x-Series™ POWER (CBX500 Only)

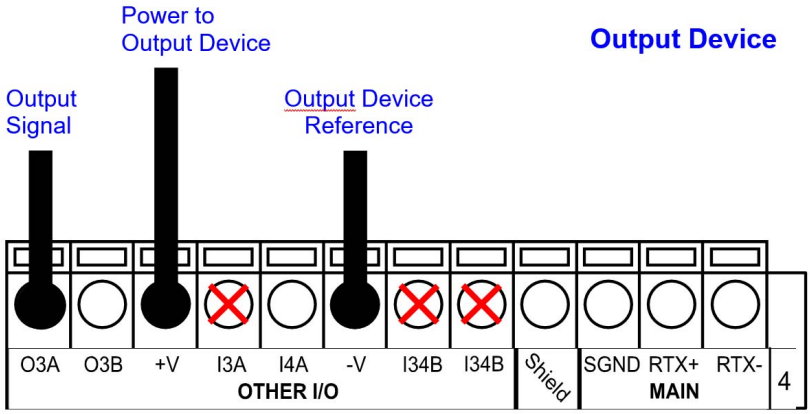


Figure 15 - Output 3 Using P2x-Series™ Power

OUTPUT 3 CONNECTIONS USING EXTERNAL POWER (CBX500 Only)

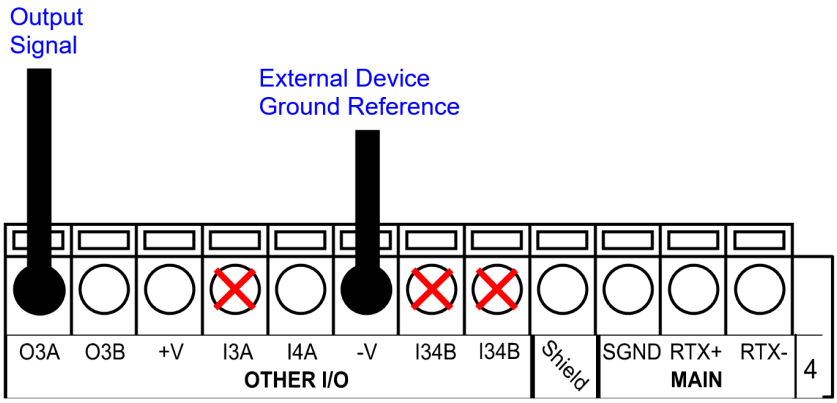


Figure 16 - Output 3 Using External Power

NOTE

Do not connect to I3A or I34B Signals, they are reserved.

OUTPUT 3 CONNECTIONS USING P2x-Series™ POWER (CBX800 Only)

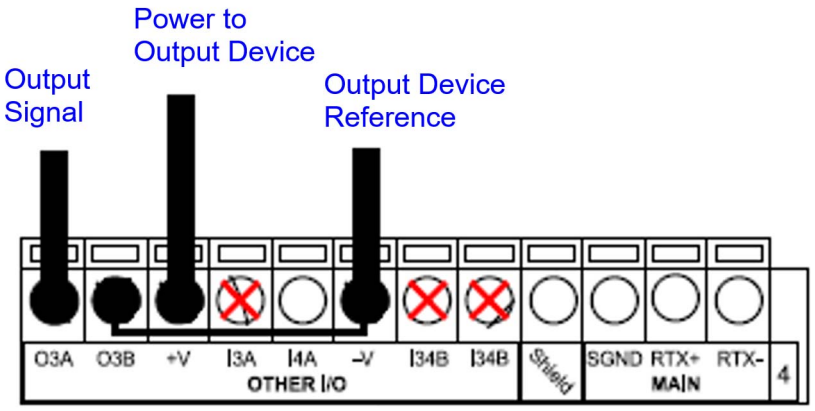


Figure 17 - Output 3 Using P2x-Series™ Power

OUTPUT 3 CONNECTIONS USING EXTERNAL POWER (CBX800 Only)

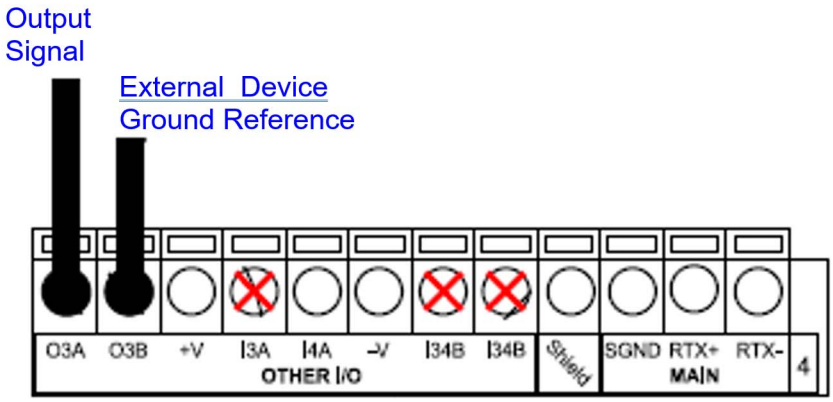


Figure 18 - Output 3 Using External Power

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.

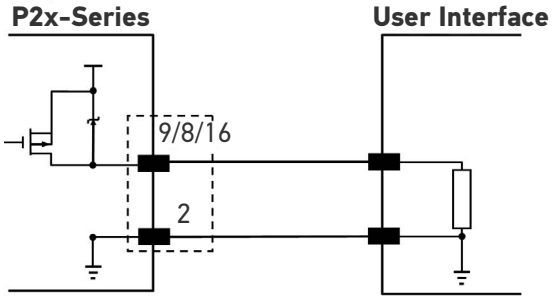


Figure 19 - PNP Output Connection

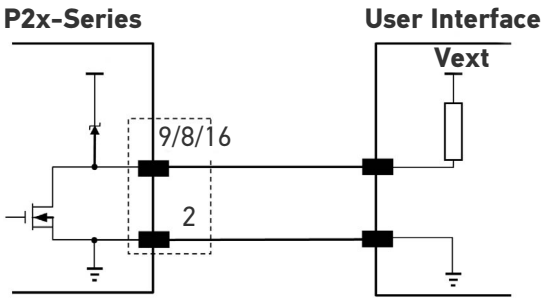


Figure 20 - NPN Output Connection

CAUTION

For NPN output connections, the external interface voltage (Vext) must not exceed the P2x-Series™ power supply source voltage (Vdc) otherwise correct output functioning cannot be guaranteed.

CHAPTER 5
SOFTWARE CONFIGURATION

Software configuration of your P2x-Series™ camera is accomplished using VPM. VPM runs on a host computer connected to the camera with a Gigabit Ethernet cable (CAB-ETH-X-Mxx) either directly or through a local area network (LAN). Refer to the Impact Reference Guide for details about creating vision programs for the P2x-Series™ camera.

IMPACT SYSTEM REQUIREMENTS

- Intel®, AMD®, or VIA® x86-class processor -minimum 1.2 GHz; 64-bit processors are supported with Windows 7, Windows 8.1, and Windows 10
- Microsoft® Windows 7, Windows 8.1, or Windows 10
- 4 GB or more of RAM, 8 GB recommended
- 2 GB or more of available hard disk space
- 1Gbps/1000Mbps Ethernet connection
- Monitor display resolution of 1024 x 768 or greater

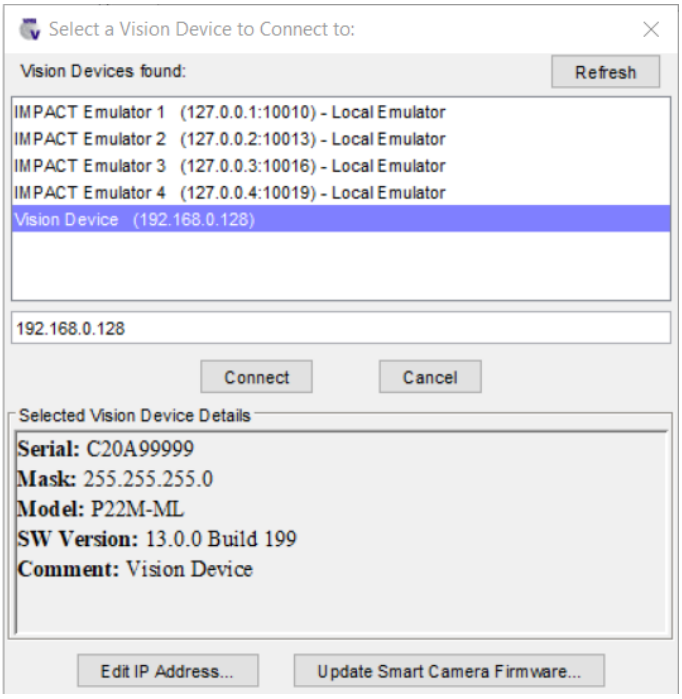
STARTUP

After completing the mechanical and electrical connections to P2x-Series™ camera, you can begin software configuration as follows:

1. Power on the P2x-Series™ camera. Wait for the camera startup. The system boot-strap requires about 30 seconds to be completed.

2. Run VPM.

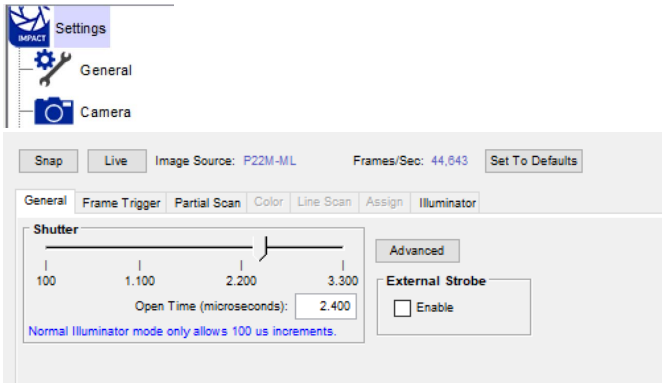
3. Click the Connect button in the VPM tool bar. A dialog is displayed so you can choose to connect to the P2x-Series™ camera. If the camera does not appear in the list, refer to the Impact Reference Guide - General Setup tab.



4. (Optional step) To update the Smart Camera Firmware click the button. The firmware update dialog will appear. Package is automatically selected and loaded.

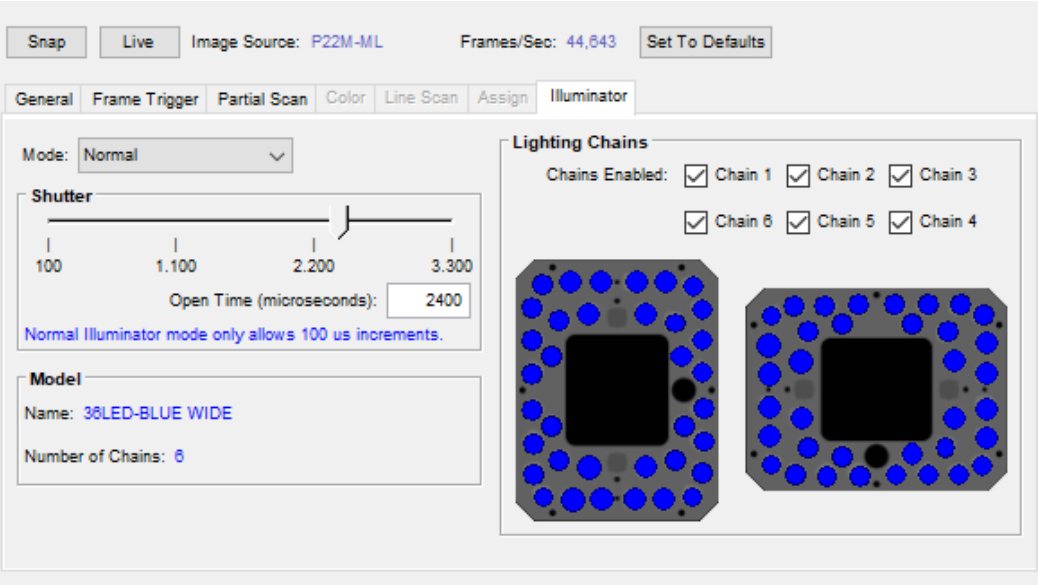
5. When the connection is complete, click the Settings tab.

6. Click the camera icon, click the Setup tab, then click the Setup button below the image window.



7. Use the General tab to set the Shutter open time.

8. Click the Illuminator tab to configure the P2x-Series™ camera's internal illuminator. The illuminator settings will affect the shutter Open Time range.



MODE

This sets the Internal Illuminator's operating mode (Disabled, Normal, Power). This also affects the permitted Shutter Open Time range.

Mode	Shutter Open Time Range (microseconds)
Disabled	27- 800,000
Normal	100-3,300
Power	27-500

SHUTTER

This is the amount of time the shutter is open. The higher the number, the longer the shutter is open and the brighter the image. The Mode type affects the Shutter range limits.

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**

Figure 1 - 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**

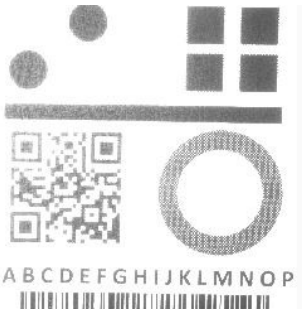


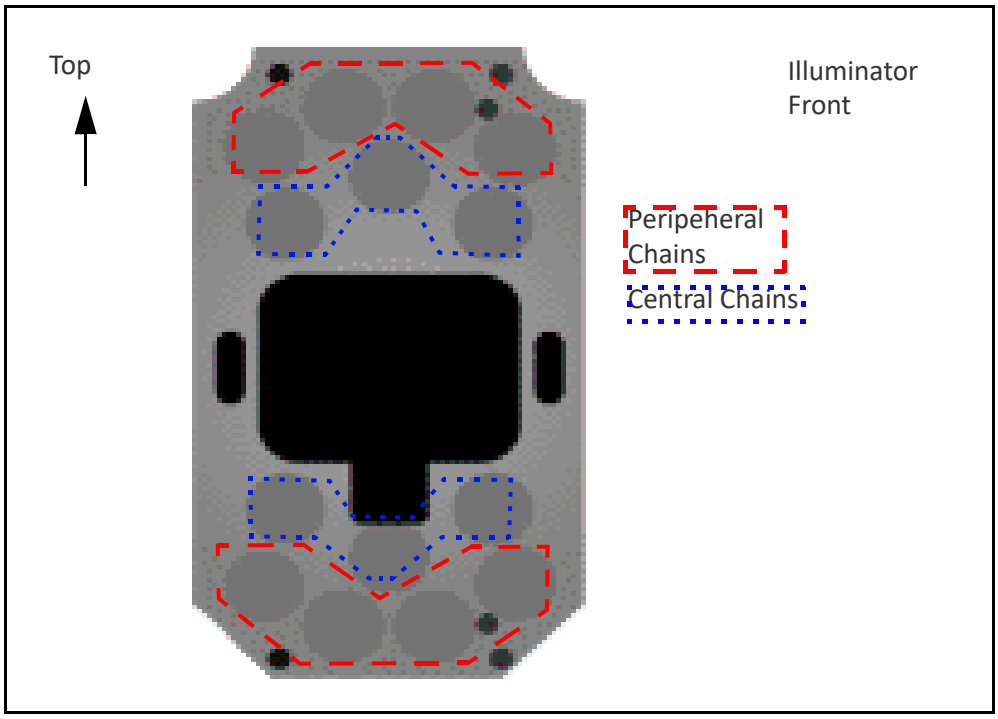
Figure 2 - Example Over Exposure: Too Light

MODEL

This box contains the model name of the Internal Illuminator mounted on the camera, and the number of Lighting Chains that the Illuminator contains.

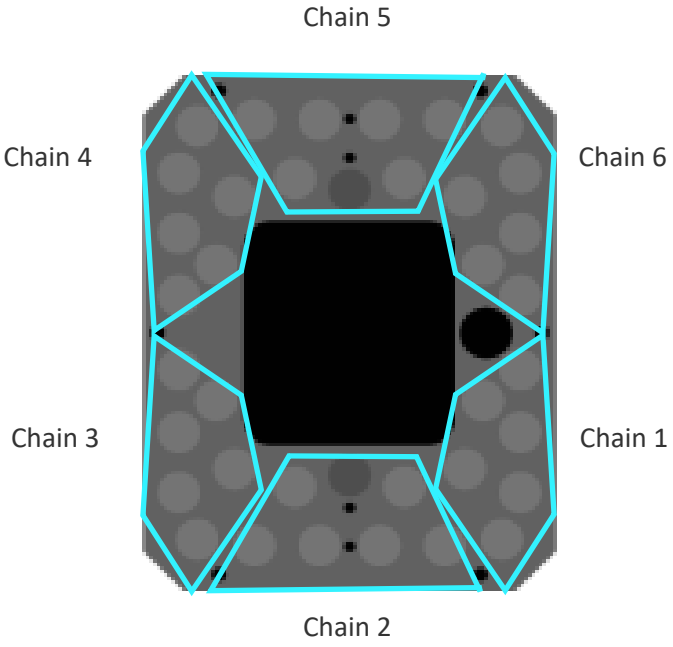
LIGHTING CHAINS

- Chains Enabled for the 14 LEDs Illuminator
  Peripheral: The eight LEDs around the edge of the Illuminator can be enabled.
  Central: The six LEDs in the central part of the Illuminator can be enabled.

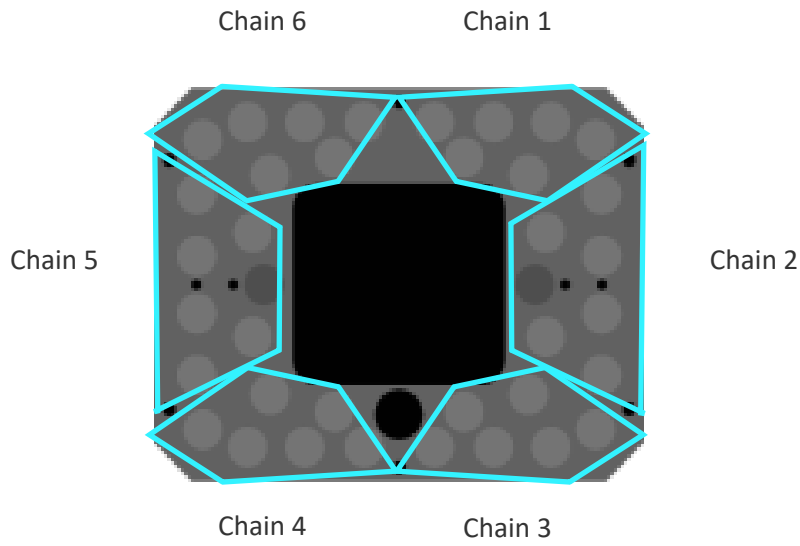


- Chains Enabled for the 36 LEDs illuminator
  Chain 1
  Chain 2
  Chain 3
  Chain 4
  Chain 5
  Chain 6
  The pictures below display the relative position on the illuminator.

Illuminator Vertical Position



Illuminator Horizontal Position



CALIBRATION

VPM provides calibration software to insure that the measurements indicated in VPM 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 Drawer section of the Impact Reference Guide for details.

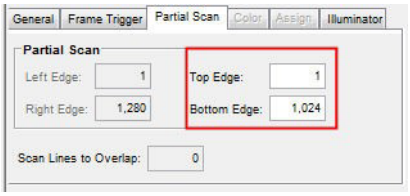
PARTIAL SCAN

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.



CHAPTER 6
ILLUMINATORS

An application may have several stable but different lighting conditions which require different lighting options. One Image Acquisition Setting could enable and use an internal illuminator and another setting could enable and use an external lighting system. The P2x-Series offers two Illuminators options (14 or 36 LEDs) and standard or polarized cover to remove LED reflection.

STANDARD ILLUMINATORS

14 LEDs chains

LEDs Illumination Angle

- 35° Narrow
- 60° Wide

Colors:

- White
- Blue
- Red

36 LEDs chains

LEDs Illumination Angle

- 35° Narrow
- 60° Wide

Colors:

- White
- Blue
- Red

COVER

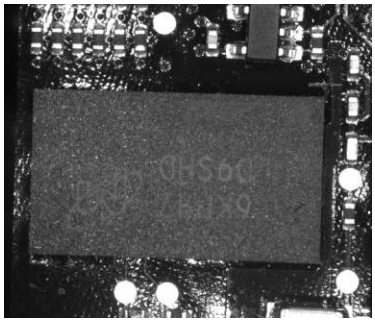
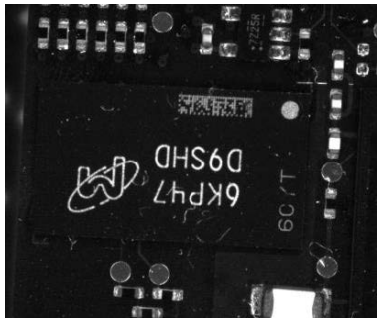
(STANDARD OR POLARIZED AS ACCESSORY)

The cover can be standard or polarized (accessory). The polarized cover is the best solution to reduce hot spots on the reflective surface applications.

- DPM on reflective metal surfaces
- DPM on non-metal reflecting surfaces
- DPM on electronic circuit boards
- Glossy labels
- Labels under plastic films

By removing LED reflection, P2x-Series™ with polarized illuminators features extreme mounting flexibility, as it can be mounted 90° to the target surface. This in turn avoids code distortion and allows more reliable code grading.

The following examples show the difference between codes read with and without polarizing filters:

DPM: Data Matrix on electronic components	
Non polarized	Polarized
	

Electronic Object	
Non polarized	Polarized

NOTE

If no polarized illuminator is used, the user may avoid LED reflections by turning on one or more sectors according to the code position in the reader's Field of View.

LIGHTNING

Illuminating the target properly and create contrast between the inspection object and the features to be detected is crucial for a good quality Machine Vision application.

The control of the lightning is critical for the test reproducibility and the robustness of the application (e.g .managing sample variation).

The illumination technique depends on the light source, its position and the interaction with the inspection object and the camera. Dealing with the parameters and selecting the best option is the result of the analysis of the possible combinations and their effects.

Lightning Techniques

Backlighting Field Illumination

This technique is commonly used for parts presence/absence, gauging and orientation/ location. The light is oriented behind a transparent object of interest to examine surface features.

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.

Coaxial Field Illumination

When the light hits the surface, most of it will reflect away from the lens and produce a dark image. Coaxial lights hit the surface perpendicular to the object plane providing a diffuse illumination and reducing shadowing.

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.

Structured Field Illumination

The light is projected with a known shading pattern on the target. The purpose of this technique is calculating the shape, size or position of the desired object by measuring the displacement or distortion.

CHAPTER 7
MAINTENANCE

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.

TROUBLESHOOTING

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 P2x-Series™ M12 17-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 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).

TROUBLESHOOTING GUIDE	
Problem	Suggestion
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, check the Debounce settings (Settings – General – Communication). • Is the camera online?
Communication: camera is not transmitting anything to the host.	• Is the Gigabit Ethernet cable wiring correct? • Is the Gigabit Ethernet cable wiring connected? • Are the host IP address settings 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 Gigabit 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 in the rear of the camera.

CHAPTER 8
TECHNICAL FEATURES

ELECTRICAL FEATURES		
Power		
Supply Voltage	24 Vdc ± 10%	
Consumption (including accessory internal illuminator)	14 LEDs Illuminator: 0.42 A, 10 W max. 36 LEDs Illuminator: 0.62 A, 15 W max.	
Communication Interfaces		
Gigabit Ethernet	1000 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-isolated and polarity insensitive	
Max. Voltage	30 Vdc	
Max. Input Current	10 mA	
Outputs[a] Output 1 and 2	• NPN or PNP short circuit protected (configure in VPM-Camera Setup) • Opto-isolated only when connected to CBX500/800	
Output 3	• NPN or PNP short circuit protected (configure in VPM-Camera Setup) • Opto-isolated only when connected to CBX800 • Strobe signal connection shared with Output 3. Output 3 is active only if the External Strobe is disabled. (Configure in VPM- Impact)	
V_{OUT} (I_{LOAD} = 0 mA) Max.	24Vdc	
V_{OUT}(I_{LOAD} = 100 mA) Max.	3 Vdc	
Load Max	100 mA	
OPTICAL FEATURES		
Image Sensor	CMOS sensor with Global Shutter	
Image	Color, Monochrome	
Pixel Size	2.0 Mpixel: 2.8 µm square	qHD: 5.6 µm square
Image Format	2.0 Mpixel: 1920x1080	qHD: 960 × 540
Imager Size	6.18 µm diagonal 1/2.8 inches	
Max. Frame Rate (sensor)	60 frames/sec	
Led Safety	according to EN 62471	

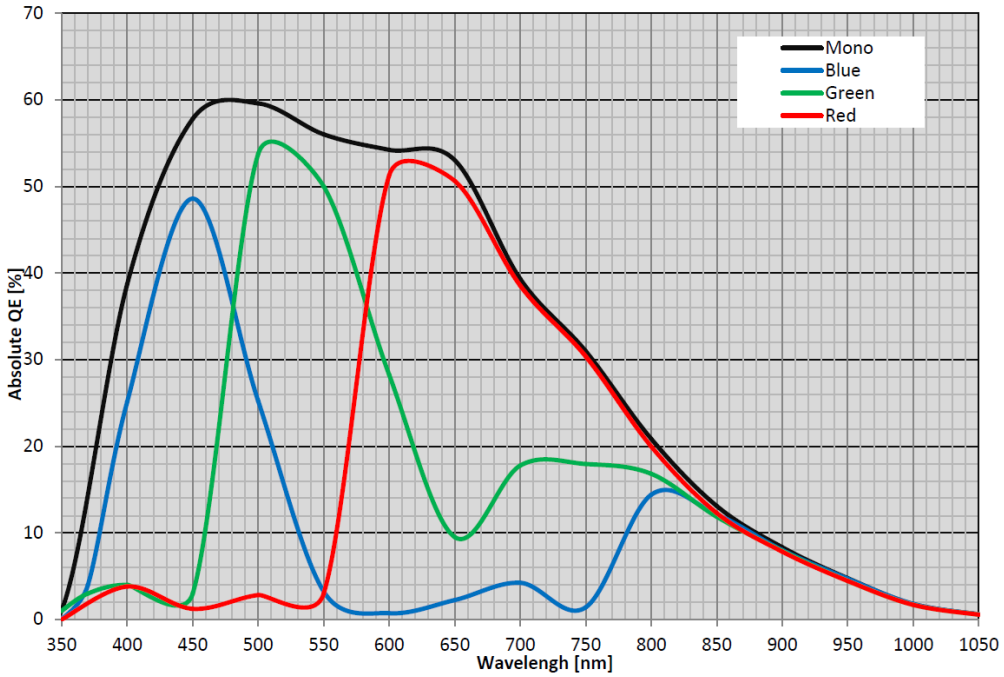
ELECTRICAL FEATURES		
Lighting System	Internal Illuminator (14 or 36 LEDs) and External Strobe (Output 3)	
ENVIRONMENTAL FEATURES		
Operating Temperature[b]	-10 to 50°C (14 to 122°F)	
Storage Temperature	-20° to 70°C (-4 to 158°F)	
Max. Humidity	90% non condensing	
Vibration Resistance EN 60068-2-6	14 mm @ 2 to 10 Hz; 1.5 mm @ 13 to 55 Hz; 2 g @ 70 to 500 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[c]	IP65/IP67	
PHYSICAL FEATURES	**14 LEDS ILLUMINATOR**	**36 LEDS ILLUMINATOR**
Dimensions (with lens cover)	H x W x L 109 x 54 x 56 mm (4.3 x 2.1 x 2.2 in.)	H x W x L 116 x 126x70 mm (4.6 x 4.9 x 2.8 in.)
Weight	about 380g. (13.4 oz.)	about 640g. (22.5 oz.)
Material	Aluminium	
USER INTERFACE		
LED Indicators	Power, Busy/Trigger, Out 1; Out 2; Out 3, Online	
Keypad Button	Reset; Camera Button Event (internal software event only); Loader	
HARDWARE FEATURES		
Storage	380MB	
RAM	1 GB	

a. 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.

b. Use metal mounting bracket for heat dissipation in high ambient temperatures.

c. When correctly connected to IP67 cables with seals.

Optical sensor response



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.

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.

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.

COLOR INSPECTION

Color processing is an effective method to extract meaningful information out of the picture. Impact offers a wide set of color tools, for more details see Impact Reference Guide.

CPM (CONTROL PANEL MANAGER)

Is an IDE that can create a graphical user interface with images, parameters, controls for the Machine Vision Inspection.

CPMRE (CONTROL PANEL MANAGER RUNTIME ENVIRONMENT)

Is the application to run the Graphical User Interface created with CPM. CPMRE can only run the GUI, editing is not enabled.

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.

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 P2x-Series™.

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.

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.

OCR

Means Optical Character Recognition. This technology allows to read and convert typed, printed or handwritten characters into machine-encoded texts to be managed. Impact Software offers a wide range of OCR tools, for more information see Impact Reference Guide.

PATTERN RECOGNITION

The automated recognition process of patterns and regularities in data. The information stored in a database is matched with the incoming data. Impact Software offers a wide range of pattern tools, for more information see Impact Reference Guide.

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.

TRANSMISSION CONTROL PROTOCOL/INTERNET PROTOCOL (TCP/IP)

A suite of standard network protocols. The TCP governs sequenced data; the IP governs packet forwarding. TCP/IP is the primary protocol that defines the Internet.

VISION PROGRAM MANAGER (VPM)

The Impact software module that provides tools to configure the P2x-Series™ camera and create vision programs for inspection and control.

Throughout this manual, the name “VPM” is used to refer to the software installed on the camera.

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