

Zebra I/O Breakout Box™

Installation and Technical Reference



ZEBRA

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Regulatory Compliance

Limited Warranty

Chapter

1

Before you begin

This chapter introduces you to the key features of the Zebra I/O Breakout Box unit, key to symbols on the unit, general warnings, and handling precautions.

Introducing Zebra I/O Breakout Box

Zebra I/O Breakout Box provides a convenient way to connect the digital I/O and power connector of your Zebra Iris GTX or Zebra AltiZ to third-party devices. In addition, to facilitate development and maintenance operations, the Zebra I/O Breakout Box unit has switches and push-buttons to test and configure inputs and outputs (for example, to generate triggers, re-route outputs to inputs, and enable output pull-up/down resistors), and to power cycle the smart camera or 3D sensor. The unit also has LEDs to show the status of input and output lines.

Zebra I/O Breakout Box is protected by an enclosure that can be mounted on a wall or DIN rail. The enclosure includes a plastic see-through cover that protects the PCB and allows the user to see the activity of the LEDs. A plastic insertion plate can also be added to permanently block the inside of your Zebra I/O Breakout Box.

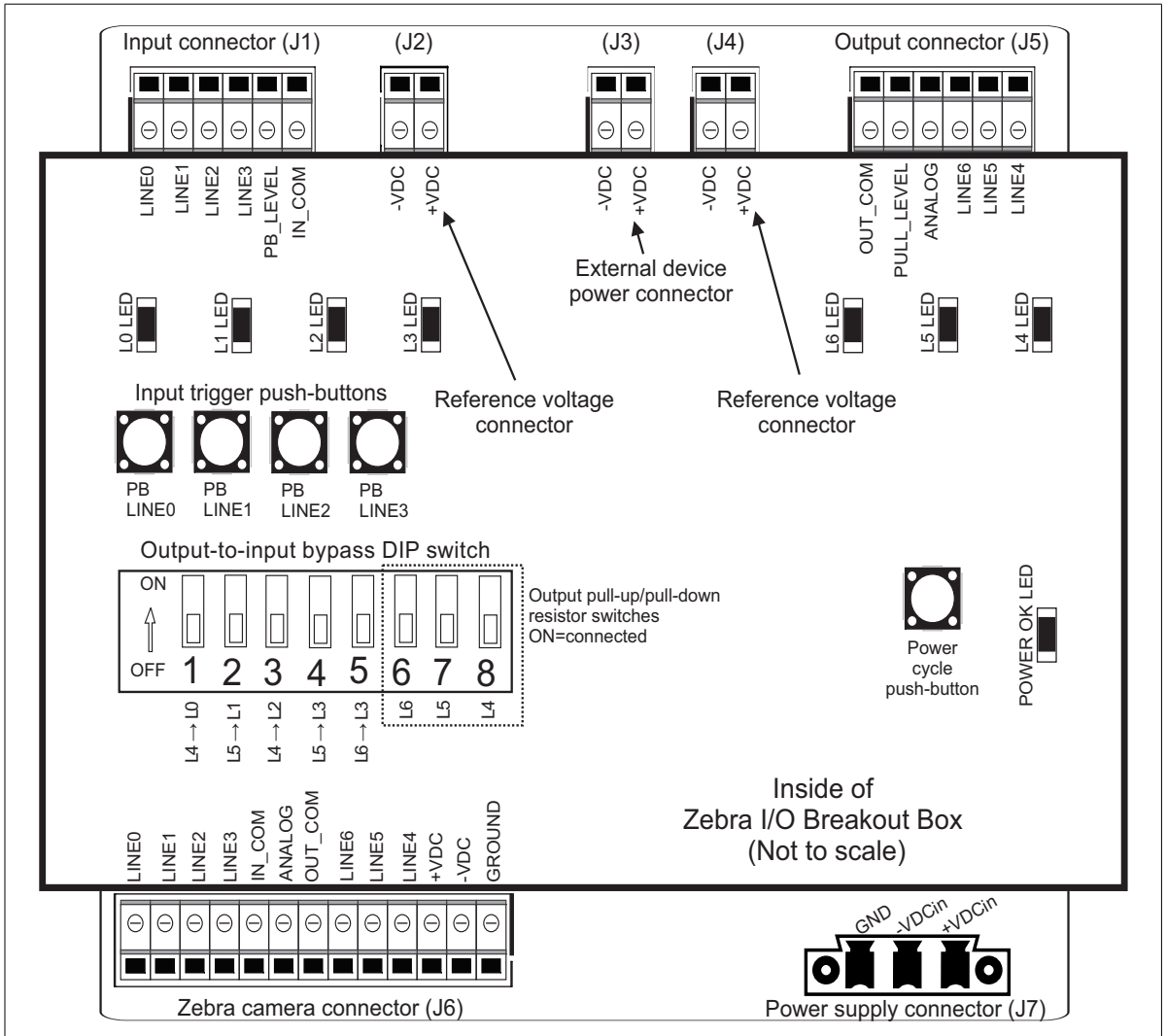
Warning

This plastic cover must only be opened by a qualified technician to access the switches and push-buttons.



Camera connector side

I/O connectors side



Compatibility

The Zebra I/O Breakout Box unit works with the Zebra Iris GTX smart camera or the Zebra AltiZ 3D sensor.

Zebra Iris GTX

Zebra Iris GTX is a family of smart cameras that feature an Intel-architecture processor and is pre-loaded with either a Matrox Design Assistant runtime environment or a MIL runtime environment. Zebra Iris GTX uses a global shutter CMOS that provides an externally triggered electronic shutter.

Zebra Iris GTX is fully integrated in an IP67 enclosure, eliminating the need to separately source a sealed housing, while still providing easy access to the lens.

Zebra AltiZ

Zebra AltiZ is a family of 3D sensors that use camera-laser triangulation (line profiling) to acquire high-precision 3D data. Zebra AltiZ includes two image sensors whose results can be combined, using a fusion algorithm, to increase the accuracy of 3D scans. Zebra AltiZ can be used with any software that is compatible with GigE Vision-compliant cameras and supports GenDC with 3D data sets.

Zebra AltiZ is fully integrated in an IP67 enclosure, eliminating the need to separately source a sealed 3D sensor housing, while still providing easy access to the connectors and image sensor windows.

Inspecting your Zebra I/O Breakout Box package

You should check the contents of your Zebra I/O Breakout Box package when you first open it. If something is missing or damaged, contact your Zebra representative.

Zebra I/O Breakout Box base package

If you purchased the Zebra I/O Breakout Box base package, it includes:

- Zebra I/O Breakout Box.
- Power terminal plug installed on the Zebra I/O Breakout Box unit (in addition to the one found in the starter kit).
- Plastic insertion plate.

Available separately

The following items are available separately.

- A starter kit that includes Zebra I/O Breakout Box with a Zebra digital I/O and power cable (M12-CBL-PWRIO/3), power cords (US, EU, and UK), external power supply (with a pre-installed power terminal plug), as well as other components. Zebra AltiZ and Zebra Iris GTX have separate starter kits. For more information on the components included in the starter kit, see the manual of the product you purchased.
- Zebra Iris GTX.
- Zebra AltiZ.
- Zebra digital I/O and power cable (M12-CBL-PWRIO/3) with an M12 12-pin (male) connector on one end and open ended wires on the other.
- Zebra Ethernet cable (M12-CBL-ETH/5).

Zebra I/O Breakout Box safety warnings and key to symbols

You should be aware of the meaning of the symbols on the unit and important usage and handling precautions.

Zebra I/O Breakout Box safety precautions and key to symbols

Before connecting to and using your Zebra I/O Breakout Box, you should be aware of the meaning of the symbols on the unit and the important safety precautions. The following is a list of precautionary symbols on your Zebra I/O Breakout Box and their meaning.

Symbol ^a	Description
	- Caution: Consult this manual^b before connecting to and using your Zebra I/O Breakout Box. For hardware connection instructions, refer to <i>Chapter 2: Powering and connecting to your Zebra I/O Breakout Box</i>; for environmental and electrical specifications and connector pinout descriptions, refer to <i>Chapter B: Technical reference</i>. This product must be used as specified; otherwise, the protection provided by its components might be compromised. - Refer to the Electrical specifications section, in <i>Appendix B: Technical reference</i> of this manual for voltage and current ratings. - There are no serviceable parts inside this product. In case of defect, contact your Zebra representative. - Zebra I/O Breakout Box terminals are not electrically shielded and can be susceptible to electrostatic discharges. Touch a grounded object before you touch inside the Zebra I/O Breakout Box unit or its terminals. - This product meets the requirements of a Category I installation as per industry standards^c. - This product is designed for use in a pollution degree 2 environment as per industry standards^c. - This product is designed for indoor use only. - This product is designed to operate at temperatures ranging from 0°C to 50°C. - Operating humidity: 85% RH, non-condensing. - This product is not intended for use at altitudes exceeding 2000 m. - For fire spreading safety, the Zebra I/O Breakout Box has to be installed inside a fireproof enclosure.
	DC current only. Your Zebra I/O Breakout Box can only be powered using a 24 V DC power source (+/-10% tolerance, 2.5 A).

a. Note that these symbols might not necessarily be the same color as depicted.

b. Manual available on the Zebra website at www.zebra.com/us/en/products/industrial-machine-vision-fixed-scanners.html

c. As per CAN/CSA-C22.2 No 61010-1-12, UL std. No 61010-1 (3rd edition), and EN Std. No. 61010-1 (3rd Edition)

Handling precautions

The Zebra I/O Breakout Box unit is sensitive to static electricity. To avoid damaging the unit, follow these precautions.

- Be sure to turn off the power to the unit and all peripherals, and disconnect all power cords, before adding or removing devices.
- Drain static electricity from your body by touching a metal fixture (or ground) before touching the unit.
- Wear a grounded wrist strap designed to prevent static discharge.
- Avoid letting your clothing come in contact with the unit.
- Only allow a qualified technician to open the plastic cover so they can access the switches and push-buttons.

Manual overview

This manual provides all the information required to power, connect, configure, and use your Zebra I/O Breakout Box. This information is pertinent to both Zebra Iris GTX and Zebra AltiZ.

For information on powering your Zebra I/O Breakout Box, connecting your Zebra smart camera or 3D sensor, and connecting it to third-party devices, refer to *Chapter 2: Powering and connecting to your Zebra I/O Breakout Box*.

For a summary of the key features of Zebra I/O Breakout Box, reading the LEDs, and pinout descriptions for external connectors of your Zebra I/O Breakout Box, refer to *Appendix B: Technical reference*.

Need help?

For the most recent version of this manual, check the product page of Zebra Iris GTX or Zebra AltiZ on the Zebra website.

If you experience problems during installation or while using this product, you can refer to the support page on the Zebra website: supportcommunity.zebra.com/s/contactsupport?brand=matrox. The support page provides information on how to contact technical support.

To request support, you should first complete and submit the online Technical Support Request Form, accessible from the above-mentioned web page. Once you have submitted the information, a Zebra support agent will contact you shortly thereafter by email or phone, depending on the problem.

Vision Academy

The Vision Academy online training resource is also available to help customers visualize the steps involved in using various products. For access to these videos, visit the Zebra website.

Chapter

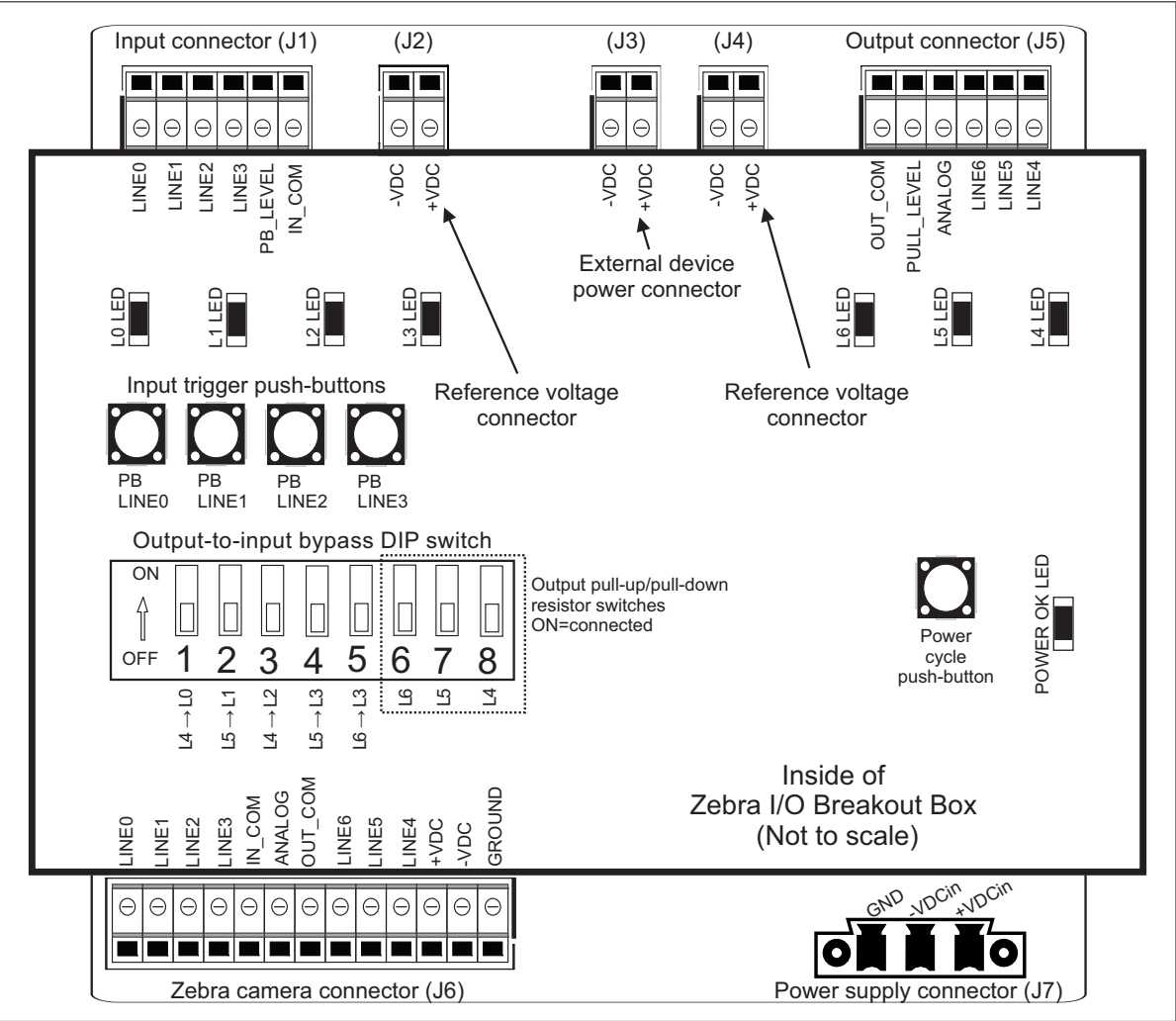
2

Powering and connecting to your Zebra I/O Breakout Box

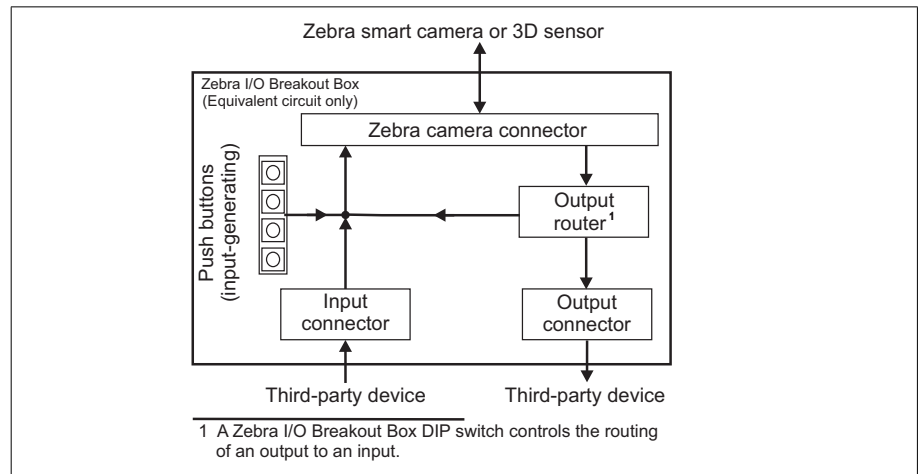
This chapter guides you through powering your Zebra I/O Breakout Box and connecting it to another device.

Connecting to your Zebra I/O Breakout Box

The Zebra I/O Breakout Box unit has the following interfaces. Most of the connectors are terminal block connectors designed for open-wire connection:



The following is a flow diagram of the auxiliary input and auxiliary output signals of Zebra I/O Breakout Box:



Your Zebra I/O Breakout Box unit has the following connectors:

- **Input connector.** Receives auxiliary input signals from third-party devices.
- **Output connector.** Sends auxiliary output signals to third-party devices. The connector can also output a specialized analog intensity (dimming) control signal intended to be used with a lighting device (such as an Advanced Illumination inline control system (ICS3), a Smart Vision Light Brick light, or a similar device).
- **Zebra I/O Breakout Box power supply connector.** Powers your Zebra I/O Breakout Box.
- **External device power connector.** Provides 24 V to a peripheral device.
- **Voltage reference connectors (2).** Provide a reference voltage for the input and output connectors.
- **Zebra camera connector.** Connects your Zebra I/O Breakout Box to your Zebra smart camera or 3D sensor, using the Zebra digital I/O and power cable. The wiring of this connector will vary depending on which Zebra product you are connecting.

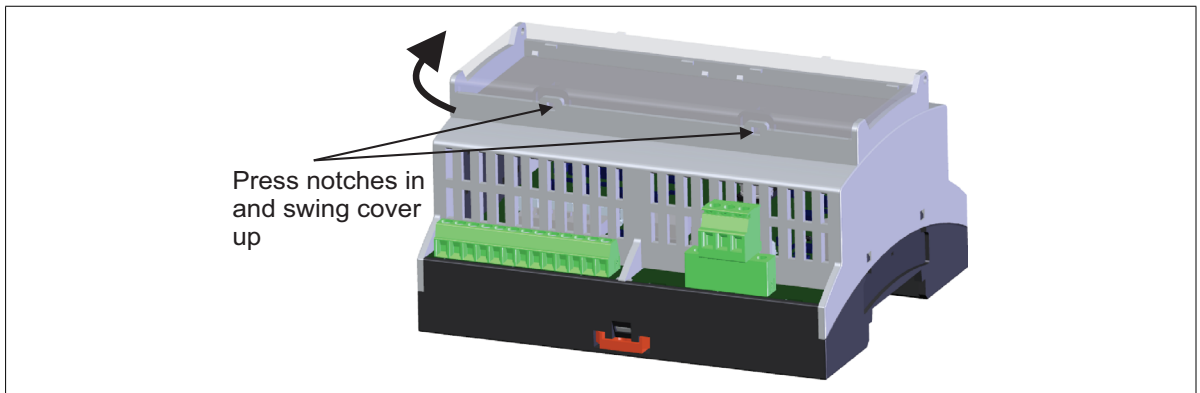
Opening the housing cover and adding a cover insertion plate

The see-through housing cover should be closed when Zebra I/O Breakout Box is installed in a production environment. A qualified technician can open the cover only when they need access to the switches or push-buttons during lab development (prior to deployment) and during testing. The qualified technician might also want to add a plastic insertion plate so that the inside of Zebra I/O Breakout Box is not accessible once installed. To open the housing cover and add the plastic insertion plate, perform the following.

Warning

Only a qualified technician shall open this cover, and they shall only open this cover in a controlled environment that is not on a production floor.

1. Touch something grounded to drain any static electricity.
2. Press the two notches in so that they are released from their latch.



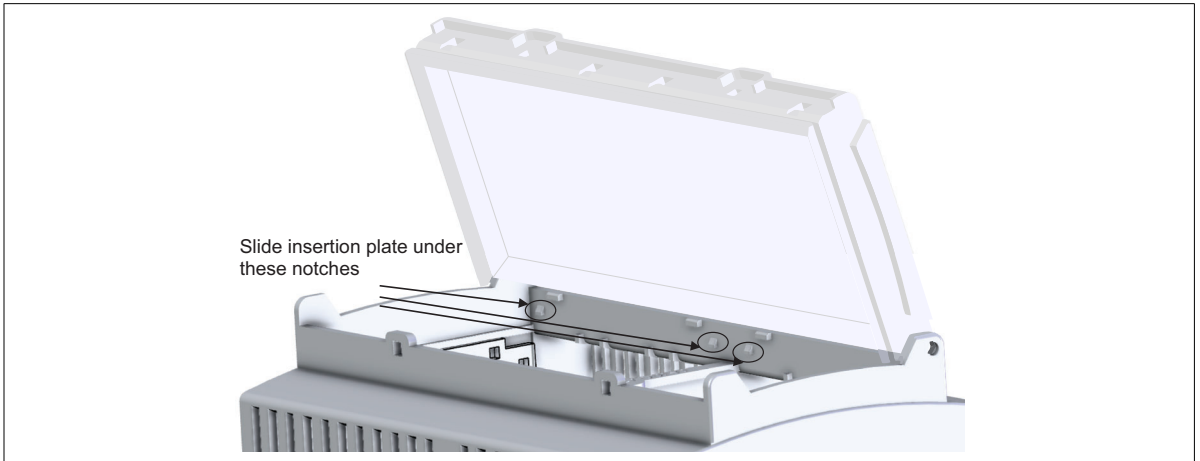
3. Swing the cover up. You will now have access to the inside of the Zebra I/O Breakout Box unit.

4. If you also want to add the plastic insertion plate, perform the following.

Warning

Note that once the insertion plate is installed, it cannot be removed. Ensure that all your testing is done before adding this plate.

- a. While the housing cover is still open, place the insertion plate under the notches found against the edge of the unit where the cover hinges meet the body of the housing.

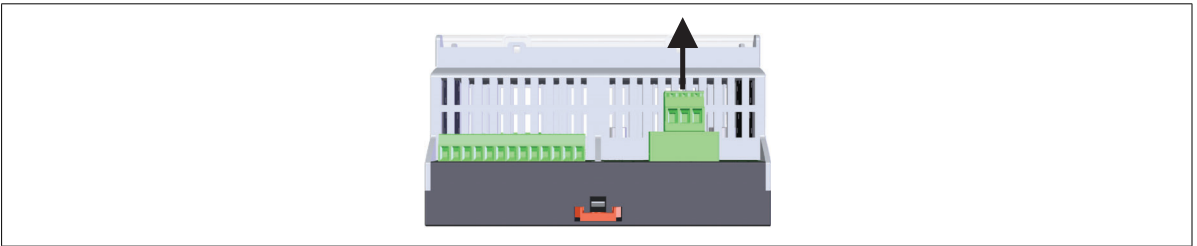


- b. Push the edge of the insertion plate that is opposite to the cover hinges down into the body of the Zebra I/O Breakout Box housing, until it clicks in place. Now the insertion plate is installed and cannot be removed.
5. Close the housing cover until the two notches snap back into place.

Removing the power terminal plug

The Zebra I/O Breakout Box unit comes pre-installed with a power terminal plug, which allows you to connect it to the power supply that is provided in the starter kit. You might find that you need to remove the power terminal plug if you are attaching a different power supply. To remove the power terminal plug, perform the following:

1. Hold the body of your Zebra I/O Breakout Box firmly.
2. Pull the power terminal plug straight up and out of the power supply connector (J7). Be careful not to pull the power terminal plug out at an angle so as not to damage the power supply connector.



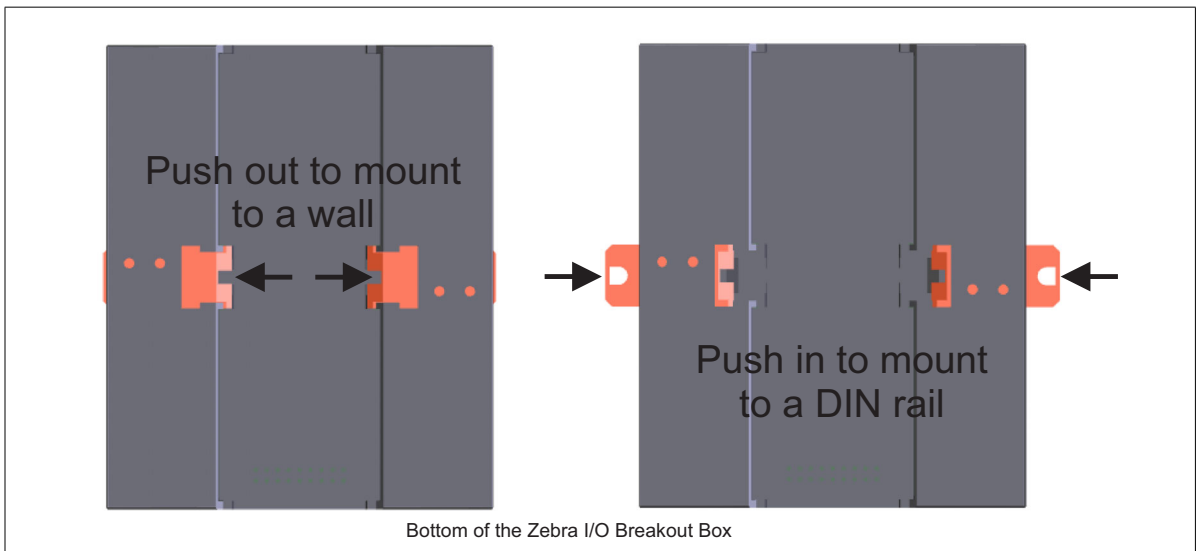
3. To re-install the power terminal plug, align the power terminal plug with the power supply connector (J7) and press it firmly down into the connector.

Zebra I/O Breakout Box mounting

Zebra I/O Breakout Box can be mounted in an industrial environment to a DIN rail or a screwed to a surface. When mounting Zebra I/O Breakout Box, ensure to install it inside an electrical cabinet. When installing Zebra I/O Breakout Box to a DIN rail, it is recommended that you install the unit so that the Zebra camera connector and power supply connector are at the bottom of the unit.

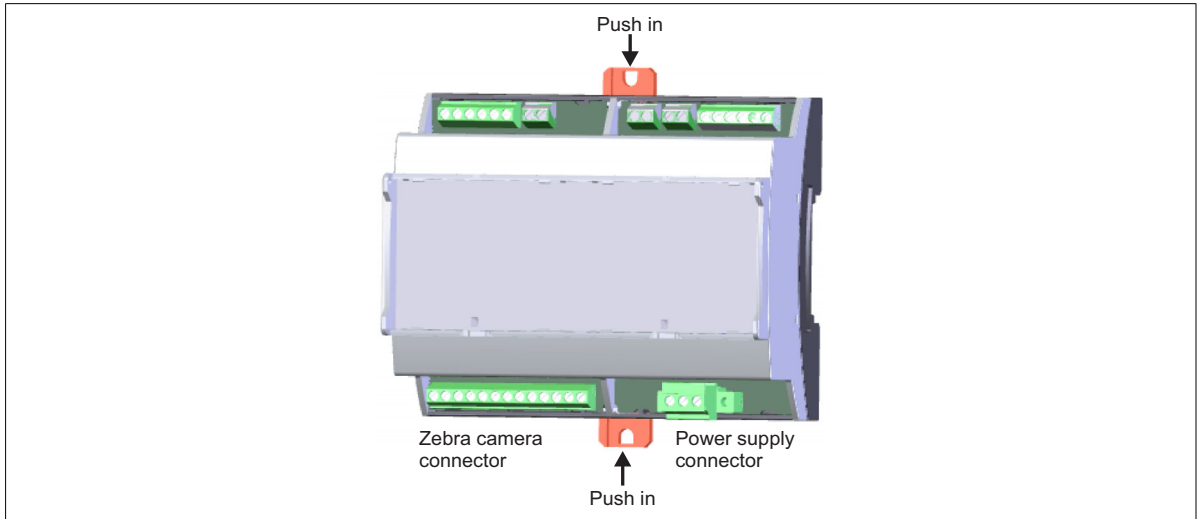
Opening and closing the mounting clips

Zebra I/O Breakout Box has two orange mounting clips built into the housing of the unit. These mounting clips are found at the bottom of the housing and can be used to either clip the unit to a DIN rail, or mount it on a wall with screws. If the mounting clips are closed (flush with the sides of the housing), they can be used to mount the Zebra I/O Breakout Box unit to a DIN rail. If the mounting clips are open, the holes in the clips can be used to attach the Zebra I/O Breakout Box unit to a wall.

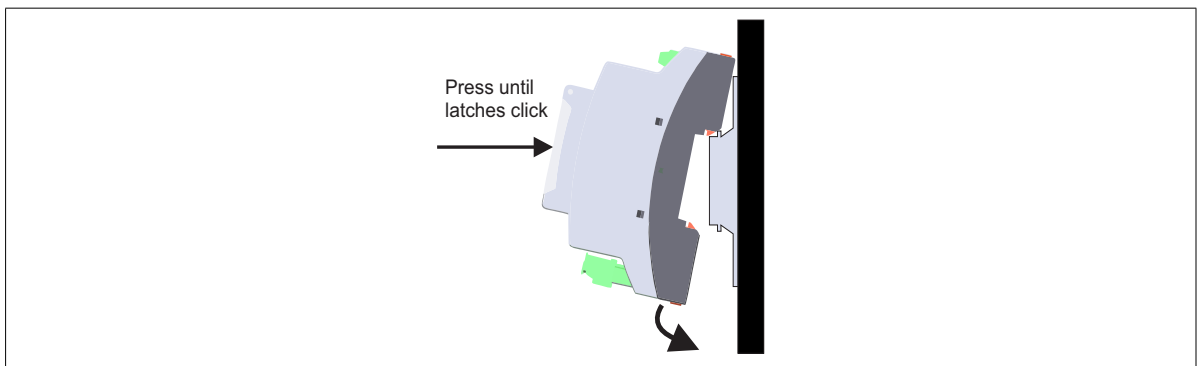


Mounting to a DIN rail To mount the Zebra I/O Breakout Box unit to a DIN rail, perform the following:

1. Ensure that Zebra I/O Breakout Box is not connected to anything before mounting.
2. Ensure the mounting clips are flush with the sides of the Zebra I/O Breakout Box unit. If they are not flush, push the orange mounting clips on the sides of the Zebra I/O Breakout Box unit so that they are flush against the sides.



3. With the Zebra camera connector and power supply connector on the bottom of the unit, position the Zebra I/O Breakout Box DIN rail slot so that it is over the DIN rail. Press the Zebra I/O Breakout Box unit towards the DIN rail until the latches on the DIN rail slot click onto the DIN rail.

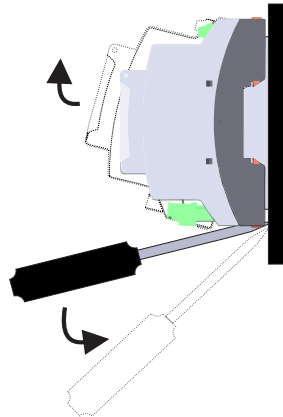


If necessary, slide the Zebra I/O Breakout Box unit along the DIN rail to a location that is best suitable for your case.

Removing

To remove the Zebra I/O Breakout Box unit from the DIN rail, perform the following:

1. Disconnect any wires and cables from the Zebra I/O Breakout Box unit.
2. Pry the bottom of the Zebra I/O Breakout Box unit from the DIN rail with a flathead screwdriver.



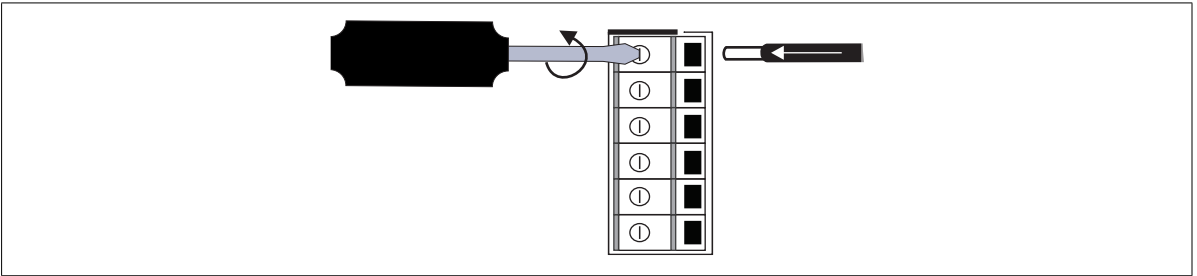
Connecting a wire to a screw wire-terminal

Most connectors on your Zebra I/O Breakout Box have screw wire-terminals instead of pins. To connect an open-wire to a screw wire-terminal, perform the following.

Warning

Before touching the Zebra I/O Breakout Box terminals, you should touch something that is grounded to discharge any static electricity.

1. Unscrew the slotted screw in a counter clockwise direction with a flathead screwdriver.



2. Insert the un-insulated wire tip into the hole below the slotted screw.

If your connection wires are insulated, you will have to strip at least 5 mm of the wire so that it makes an electrical contact with the wire-terminal in which it is installed. It is also recommended to tin any stripped wires to ensure the best connection.

3. Screw the slotted screw in a clockwise direction until the wire is snug in the hole. The wire is now attached to the terminal block connector on Zebra I/O Breakout Box.
- ❖ Note that you should only tighten the screw enough so that the wire is securely in place, but not so much that it will cut or damage the wire that has been installed.

Powering and connecting

To provide power to your Zebra I/O Breakout Box and connect it to your Zebra smart camera or 3D sensor, perform the following.

Warning

Note that before touching the Zebra I/O Breakout Box terminals, you should touch something that is grounded to discharge any static electricity.

1. Connect your Zebra smart camera or 3D sensor to the Zebra camera connector (J6). Appendix B of this manual describes the pinout of the Zebra camera connector, the color of the wires of the cable, and to which pins they correspond on Zebra Iris GTX and Zebra AltiZ. Wrap any unused wires with insulating tape. Otherwise, connect them to the appropriate terminals.

Important

- ❖ Note that the exact pinout of the Zebra camera connector cable will depend on whether you connect the cable to Zebra Iris GTX or Zebra AltiZ. Also, be aware that the auxiliary line numbers of your Zebra I/O Breakout Box do not correspond to the auxiliary signal numbers of Zebra Iris GTX. Keep this in mind when using MIL. For example, for Zebra Iris GTX, auxiliary signal 0 is an output signal and corresponds to MIL constant M_AUX_IO0, whereas auxiliary line 0 of your Zebra I/O Breakout Box is an input line.
 - ❖ If you are connecting your Zebra I/O Breakout Box to Zebra AltiZ, also attach the ground of the Zebra AltiZ chassis to the ground pin of the Zebra camera connector (J6). To complete the path to ground, pin 1 of the power supply connector (J7) will also need to be connected to ground.
2. Connect third-party devices to the input connector (J1) and/or the output connector (J5). For information on connecting to peripheral devices, see the *Routing auxiliary signals* section below.
 3. Power peripheral devices either using the power from your Zebra I/O Breakout Box or using an external power supply.

To power a peripheral device from the Zebra I/O Breakout Box unit, connect it to the external device power connector (J3), which can provide 24 V of DC power at 1.5 A. If you connect a peripheral device to J3 and one of its outputs to the input connector, you will also need to connect reference voltage connector J2 or J4 to the IN_COM terminal of the input connector. Similarly, if you connect a peripheral device to J3 and an input of the device to the output connector, you will also need to connect reference voltage connector J2 or J4 to the OUT_COM terminal of the output connector. Reference voltage connectors J2 and J4 include a resettable fuse that limits the current to 150 mA.

- ❖ However you power your peripheral device, be aware that the input connector must always share the same reference voltage for IN_COM and PB_LEVEL as that of the connected peripheral device. Similarly, the output connector must always share the same reference voltage for OUT_COM and PULL_LEVEL as that of the connected peripheral device.

Fuse protection

The main input supply line of the Zebra I/O Breakout Box's power supply is protected by an eFuse that will trigger when current is at or above 3.7 A.

4. Connect the power supply that is provided in the starter kit to the power supply connector (J7). This will power Zebra I/O Breakout Box externally.

Routing auxiliary signals

There are five ways to route signals to/from your Zebra Iris GTX or Zebra AltiZ.

- Route a signal from a third-party device to an auxiliary input signal of your Zebra Iris GTX or Zebra AltiZ.
- Route an auxiliary output signal from your Zebra Iris GTX or Zebra AltiZ to a third-party device.
- Route auxiliary output signals to auxiliary input signals. This is used to test signal integrity.
- Generate an auxiliary signal with a push-button on Zebra I/O Breakout Box and route it to an auxiliary input signal on your Zebra Iris GTX or Zebra AltiZ.
- Apply a load on an auxiliary output signal from Zebra Iris GTX or Zebra AltiZ, using a pull-up/pull-down resistor on Zebra I/O Breakout Box.

When routing signals, you will be able to route them in either sinking or sourcing configuration. To enable the input connector to source a third-party sinking signal, wire IN_COM to +VDC, and to enable your input connector to sink a third-party sourcing signal, wire IN_COM to -VDC. Likewise, to enable your output connector to source a third-party sinking signal, wire OUT_COM to +VDC, and to enable your output connector to sink a third-party sourcing signal, wire OUT_COM to -VDC. Once IN_COM and/or OUT_COM is connected, the signals on the connector will either all provide a sinking or sourcing path.

For push-buttons to function, the PB_LEVEL terminal must have the opposite polarity of the IN_COM terminal. For pull-up/pull-down resistors and output status LEDs to function, the PULL_LEVEL terminal must have the opposite polarity of the OUT_COM terminal.

Warning

The Zebra I/O Breakout Box auxiliary input and output signals are compatible with 24 V.

As a precaution, all auxiliary input and output lines have ESD/EFT/Surge protection (transient voltage protection) provided by a TVS diode. The IN_COM and OUT_COM lines are also equipped with resettable PTC fuses that provide protection from current above 150 mA.

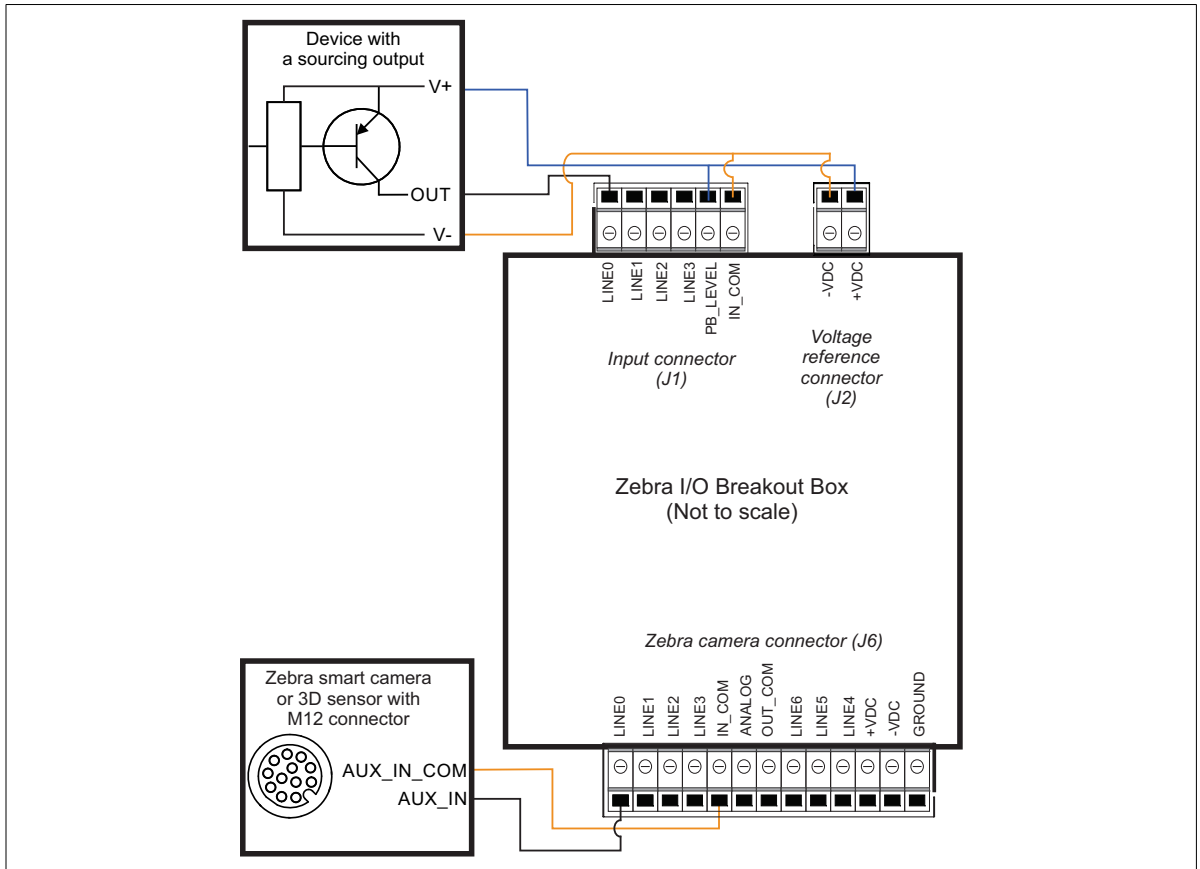
Routing signals from a device to auxiliary input signals of your Zebra Iris GTX or Zebra AltiZ

Zebra I/O Breakout Box can forward the state of signals from a variety of external devices (such as the output modules found on most programmable logic controllers (PLCs) or proximity detectors) to your Zebra Iris GTX or Zebra AltiZ. Zebra I/O Breakout Box expects the signals from any third-party device to have a nominal voltage of 24 V.

If you are connecting to a device in a way not mentioned in these subsections, refer to the **Connecting to the auxiliary I/O interface** section of either your Zebra Iris GTX or Zebra AltiZ manual.

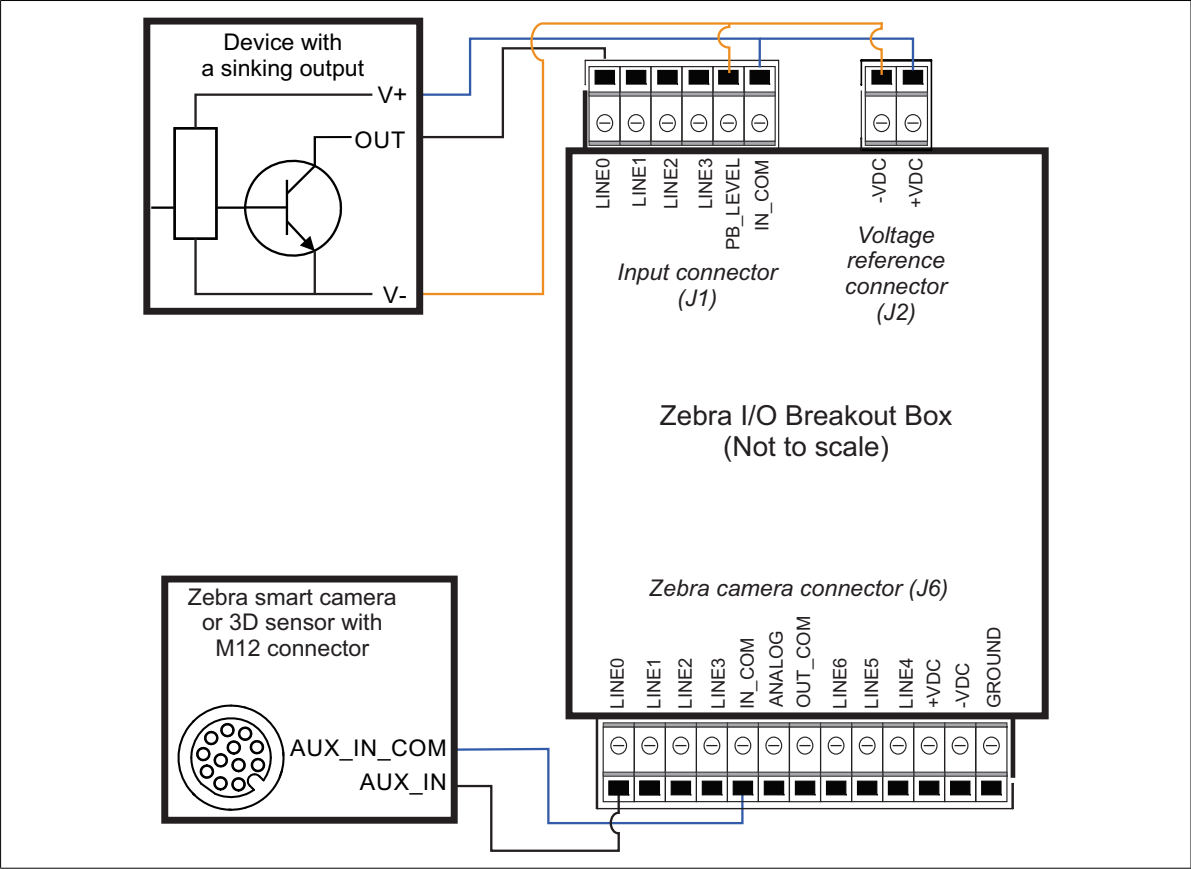
Connecting a sourcing output of a device to an auxiliary input line

To route an output signal from a third-party sourcing device to an auxiliary input signal of your Zebra Iris GTX or Zebra Altiz, connect the devices as shown below. In this example, the signal is being received on auxiliary input line 0 of Zebra I/O Breakout Box.



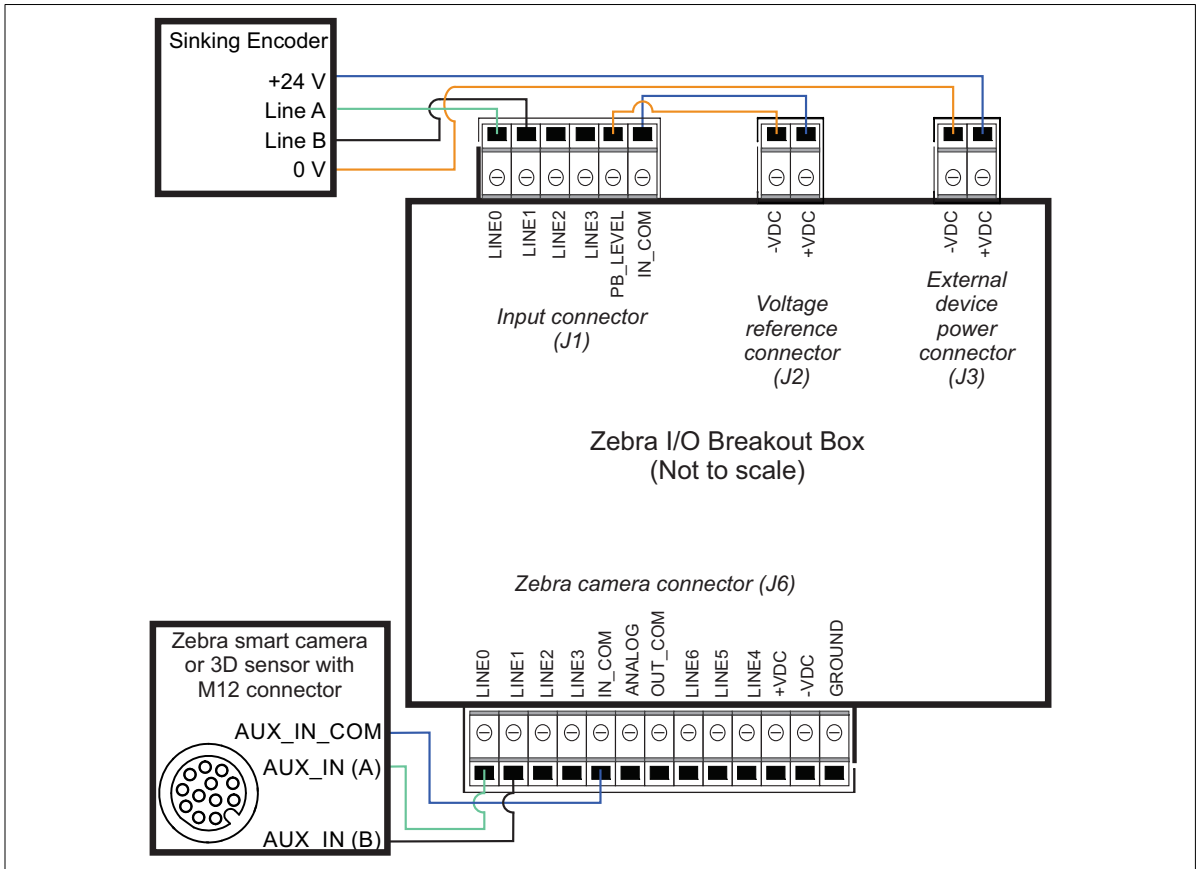
Connecting a sinking output of a device to an auxiliary input line

To route an output signal from a third-party sinking device to an auxiliary input signal of your Zebra Iris GTX or Zebra Altiz, connect the devices as shown below. In this example, the signal is being received on auxiliary input line 0 of Zebra I/O Breakout Box.



Connecting a sinking quadrature encoder to the input lines

To route output signals A and B from a sinking quadrature encoder to auxiliary input signals of your Zebra Iris GTX or Zebra Altiz, connect the devices as shown below. In this example, signals A and B are being received on auxiliary input line 0 and line 1 of Zebra I/O Breakout Box.



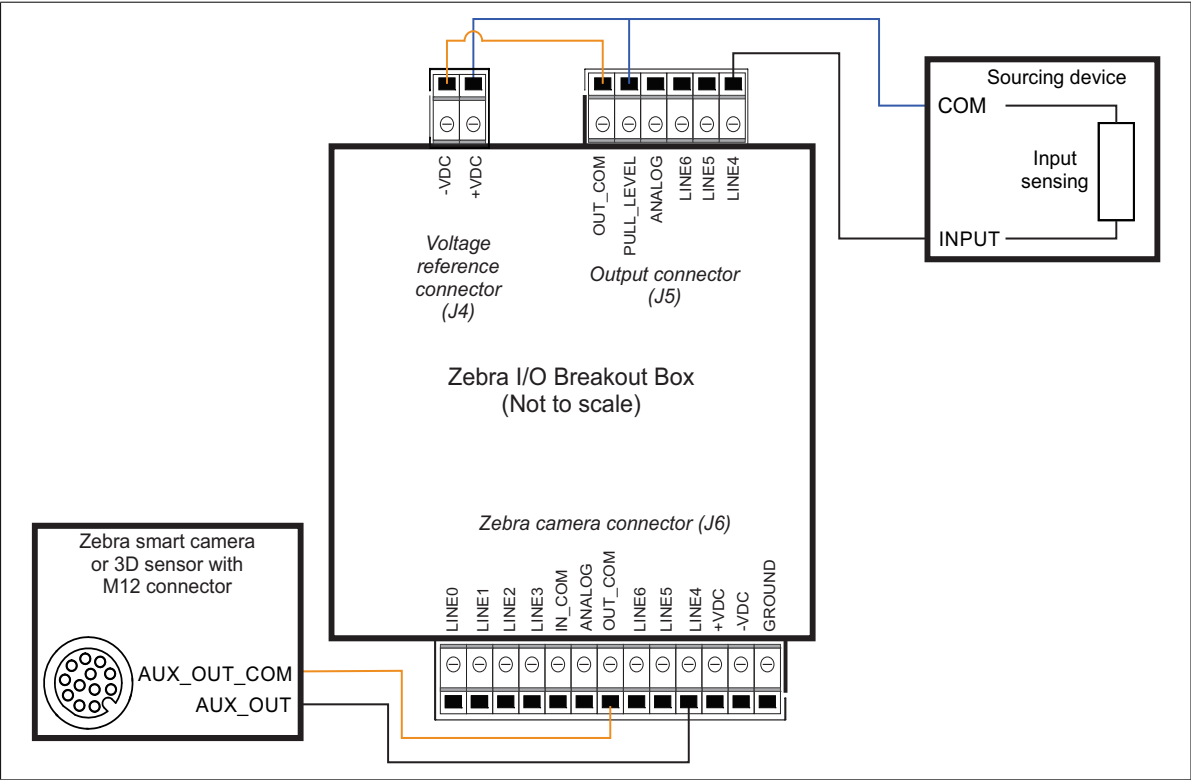
Routing auxiliary output signals from your Zebra Iris GTX or Zebra AltiZ to third-party devices

Zebra I/O Breakout Box can forward the state of auxiliary output signals from your Zebra Iris GTX or Zebra AltiZ to a variety of external devices (such as the input modules found on most programmable logic controllers (PLCs) or third-party sensing devices). Zebra I/O Breakout Box outputs signals with a nominal voltage of up to 24 V.

If you are connecting to a device in a way not mentioned in these subsections, refer to the **Connecting to the auxiliary I/O interface** section of either your Zebra Iris GTX or Zebra AltiZ manual.

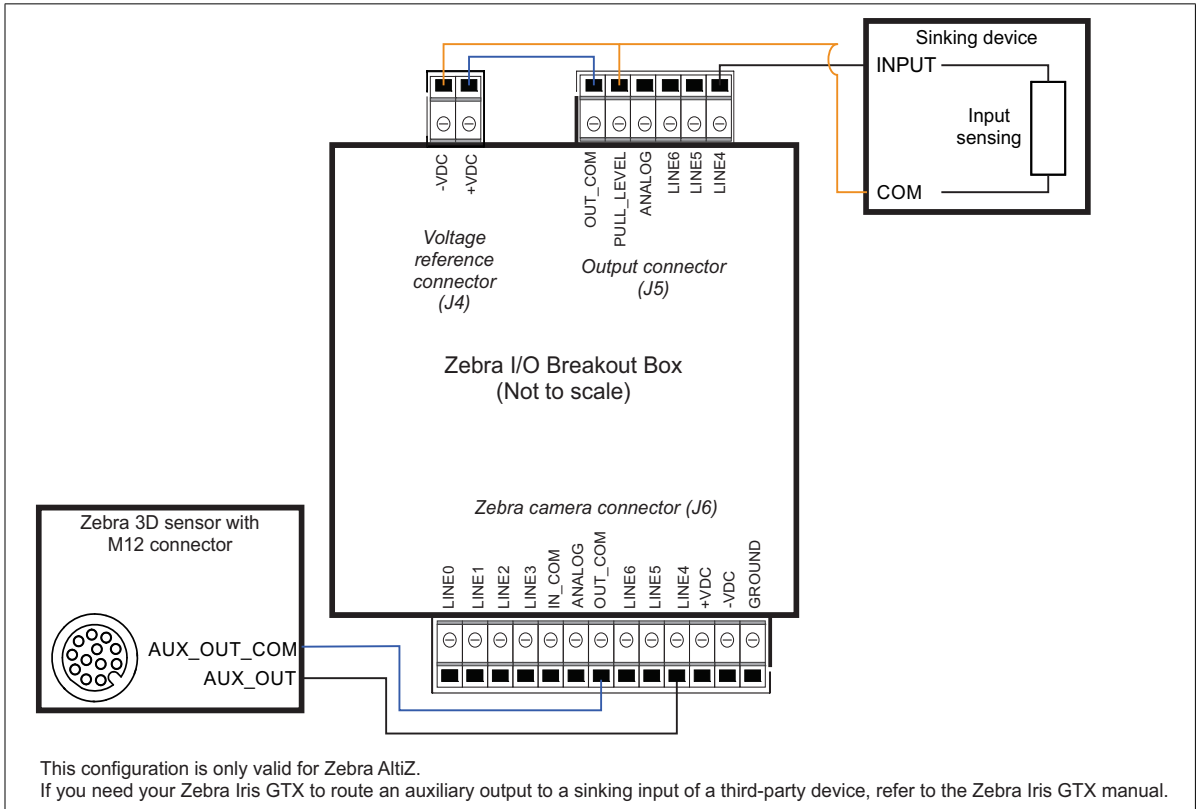
Connecting an auxiliary output line to a sourcing input of a device

To route an auxiliary output signal from your Zebra Iris GTX or Zebra AltiZ to a sourcing input of a third-party device, connect the devices as shown below. In this example, the signal is being transmitted on auxiliary output line 4 of Zebra I/O Breakout Box.



Connecting an auxiliary output line to a sinking input of a device

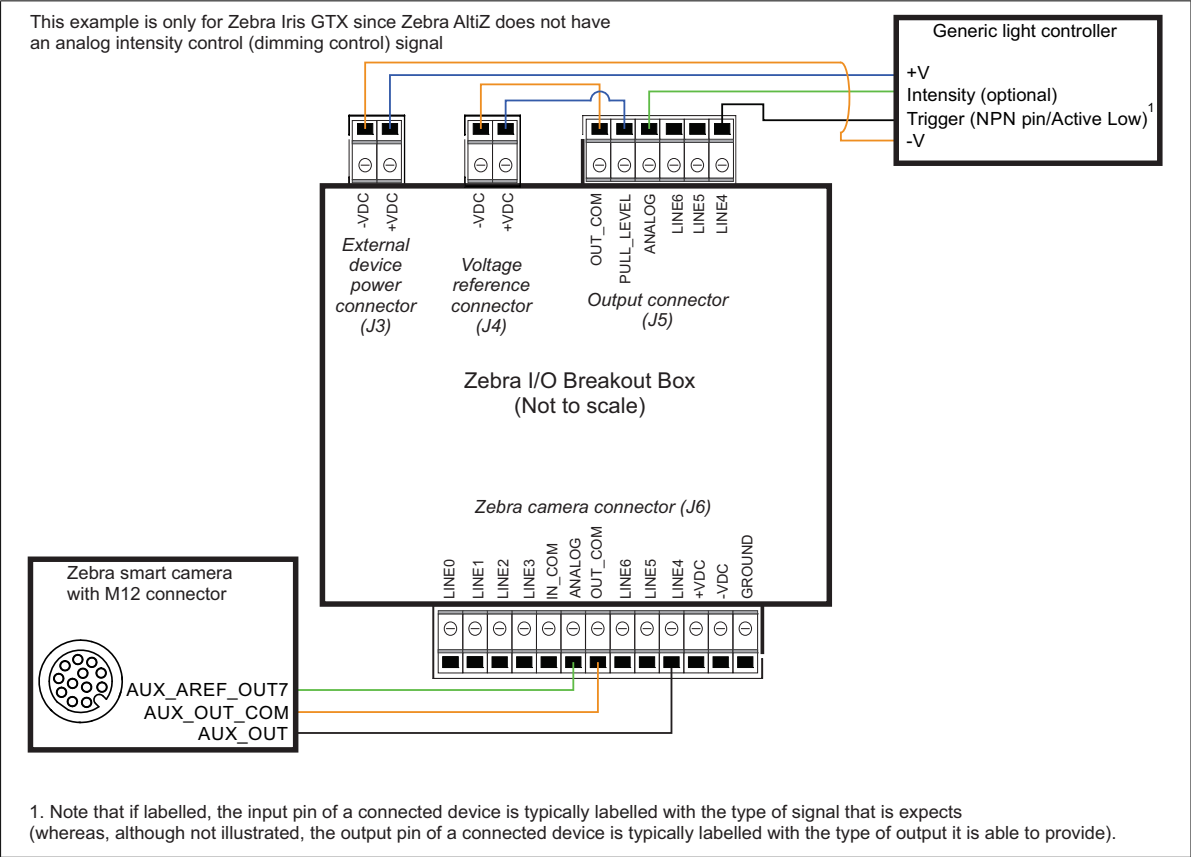
To route an auxiliary output signal from your Zebra AltiZ to the sinking input of a third-party device, connect the devices as shown below. In this example, the signal is being transmitted on auxiliary output line 4 of Zebra I/O Breakout Box.



Connecting the output connector to a sourcing lighting controller

To route an auxiliary output signal from your Zebra Iris GTX to a sourcing light controller, connect the devices as shown below. In this example, the auxiliary output signal is being transmitted on auxiliary output line 4 and the analog intensity control signal is being transmitted on the ANALOG line of Zebra I/O Breakout Box (AUX_AREF_OUT7 on Zebra Iris GTX).

- ❖ This example only applies to Zebra Iris GTX since it is the only compatible product that includes an analog reference signal that can control the intensity (dimming control) of a generic light controller.



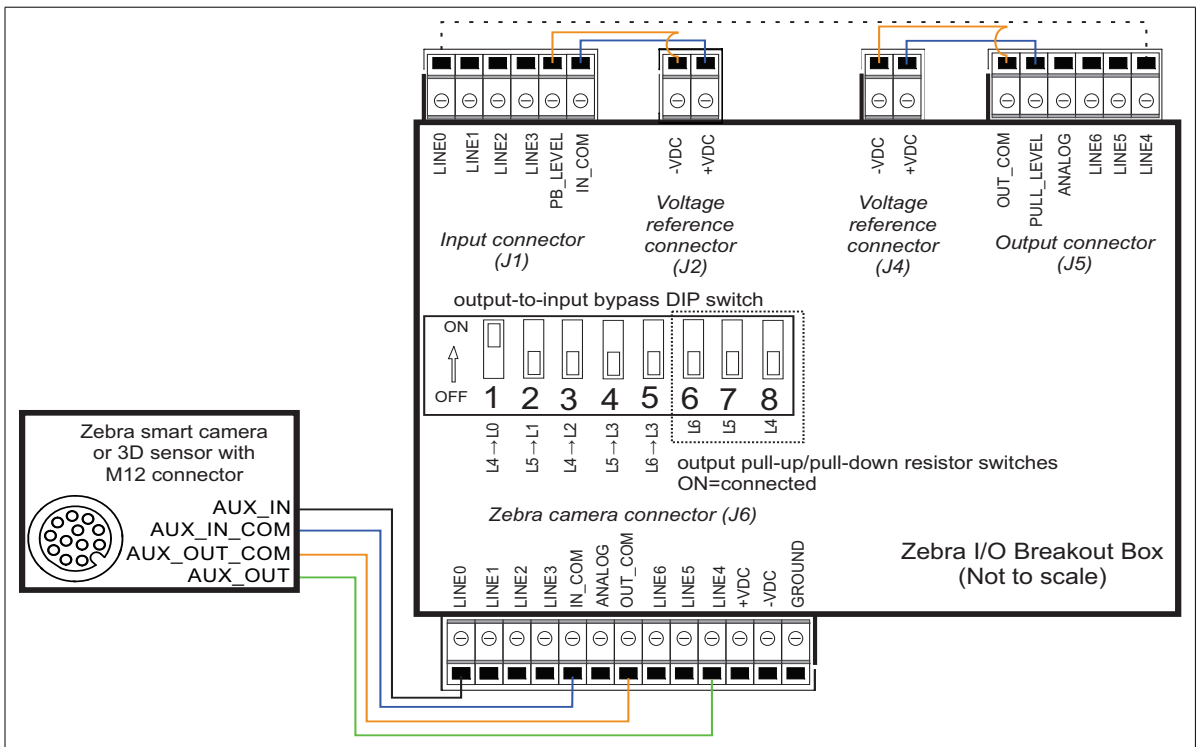
Routing auxiliary output signals to auxiliary input signals

You can route auxiliary output signals from Zebra Iris GTX or Zebra AltiZ to auxiliary input signals of the same device (for example, for testing purposes). To do so, use one of the five bypass switches on the DIP switch found inside the Zebra I/O Breakout Box enclosure. For more information, see the *DIP switch reference* section, in *Appendix B: Technical reference*.

Routing a sinking auxiliary output signal to a sourcing auxiliary input signal of your Zebra smart camera or 3D sensor

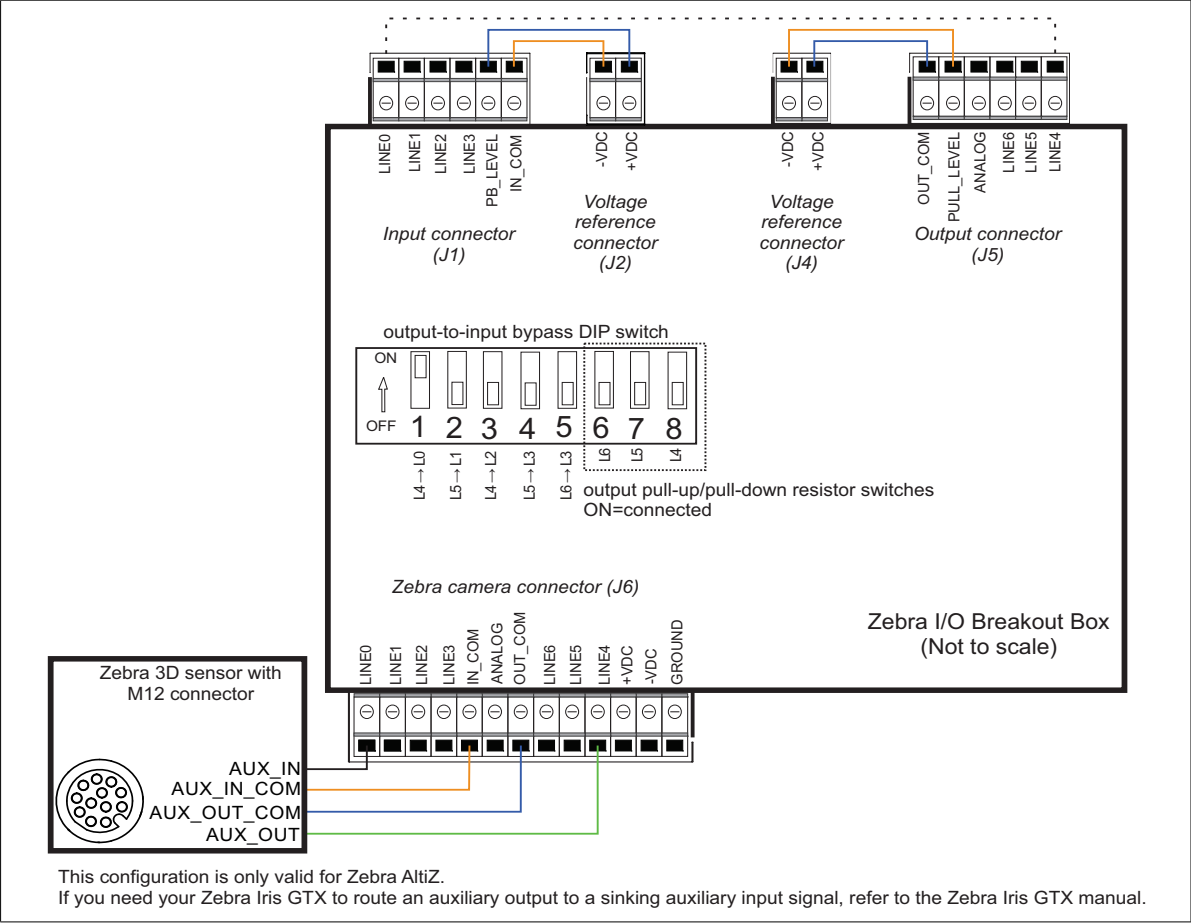
To route a sinking auxiliary output signal to a sourcing auxiliary input signal of your Zebra Iris GTX or Zebra AltiZ, connect the devices as shown below. In this example, the dashed line indicates that Line 0 and Line 4 are routed; however, instead of physically connecting auxiliary input line 0 to auxiliary output line 4, you only need to set DIP switch 1 to ON.

- ❖ Note that OUT_COM and IN_COM must be physically connected to their reference voltage connectors.



Routing a sourcing auxiliary output signal to a sinking auxiliary input signal of your Zebra 3D sensor

To route a sourcing auxiliary output signal to a sinking auxiliary input signal of your Zebra AltiZ, connect the devices as shown below. In this example, the dashed line indicates that Line 0 and Line 4 are routed; however, instead of physically connecting auxiliary input line 0 to auxiliary output line 4, you only need to set DIP switch 1 to ON.



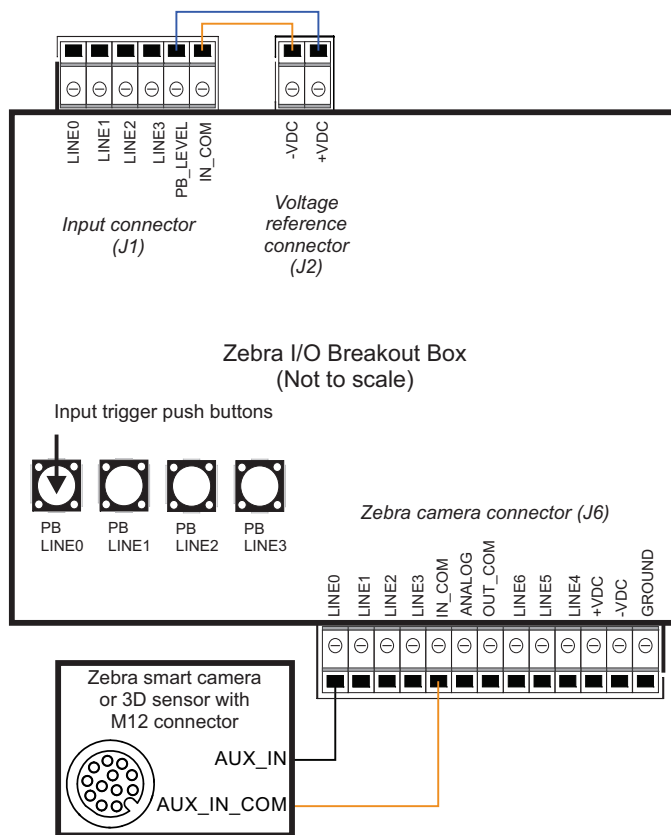
Generating an auxiliary input signal using a push-button

You can generate an auxiliary input signal (for example, a trigger signal) using the push-buttons on Zebra I/O Breakout Box. The push-buttons are found inside the Zebra I/O Breakout Box enclosure. This is primarily used for testing the auxiliary input signals on your Zebra smart camera or 3D sensor.

For the push-buttons to function, the PB_LEVEL terminal must have the opposite polarity of the IN_COM terminal.

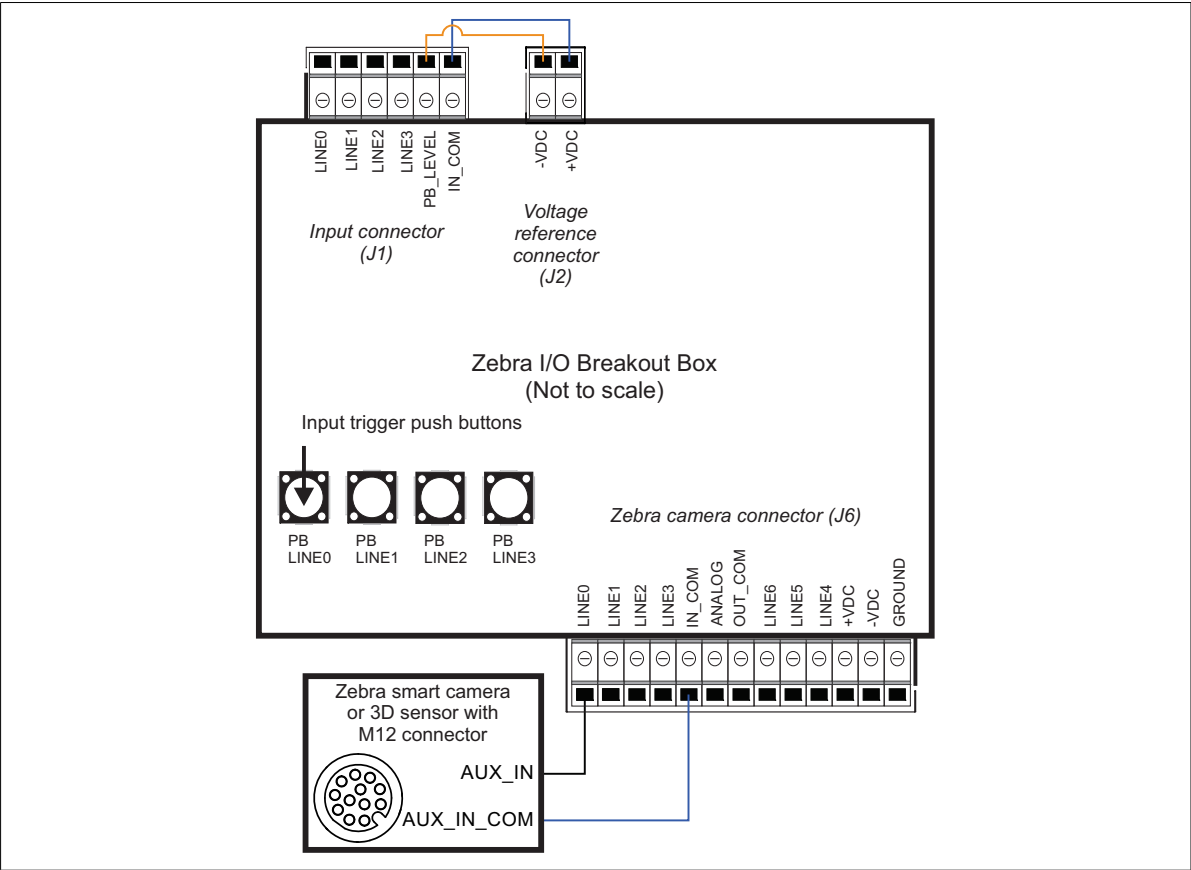
Connecting Zebra I/O Breakout Box to provide a sourcing signal from an on-board push-button

To provide a sourcing signal from an on-board push-button, connect the devices as shown below. In this example, connect the Zebra smart camera or 3D sensor to auxiliary input line 0 of the Zebra I/O Breakout Box camera connector so that the push-button for line 0 (PB LINE 0) triggers a signal.



Connecting Zebra I/O Breakout Box to provide a sinking signal from an on-board push-button

To provide a sinking signal from an on-board push-button, connect the devices as shown below. In this example, connect the Zebra smart camera or 3D sensor to auxiliary input line 0 of the Zebra I/O Breakout Box camera connector so that the push-button for line 0 (PB LINE 0) triggers a signal.



Applying a load on an auxiliary output signal using a pull-up or pull-down resistor

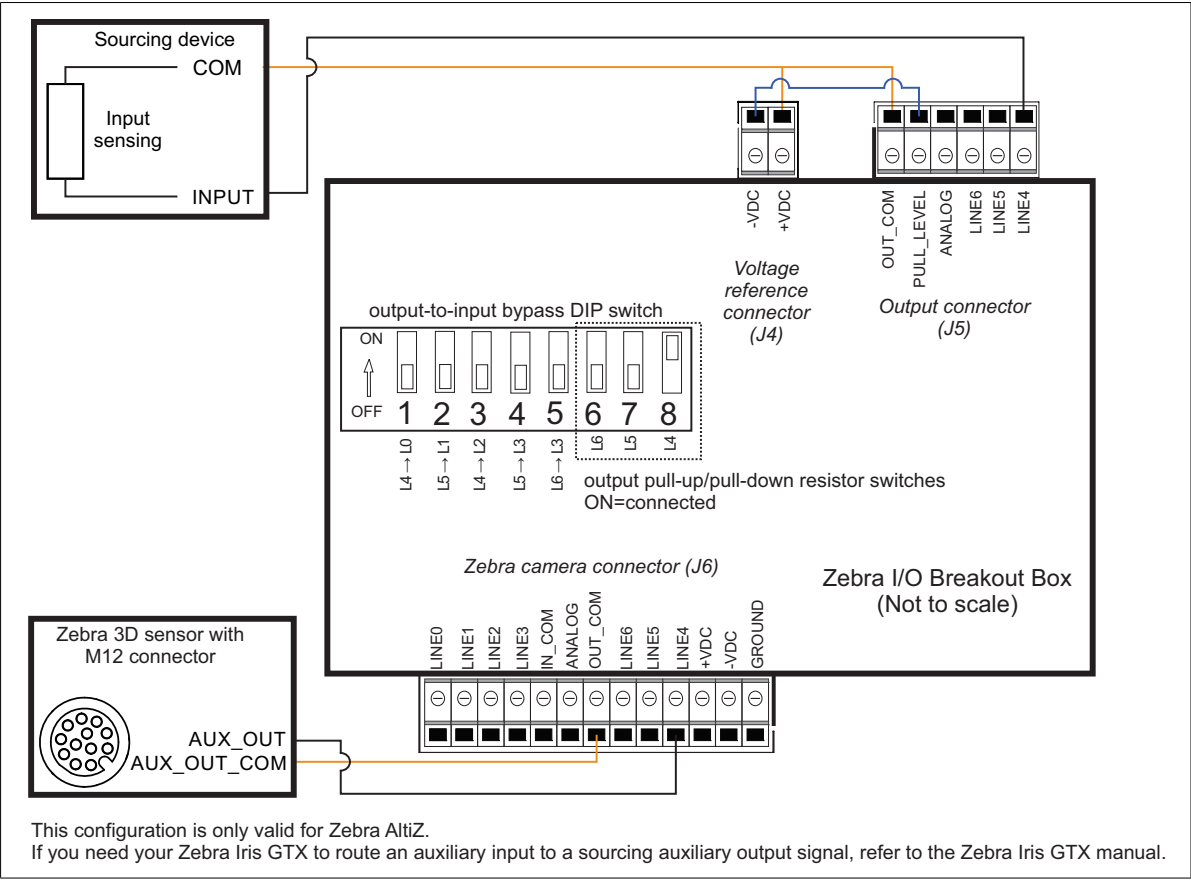
You can apply a load on the auxiliary output signal using an internal pull-up/pull-down resistors on Zebra I/O Breakout Box. This is primarily used for testing the auxiliary output signals on your Zebra smart camera or 3D sensor, or in a case where both the connected third-party device and the Zebra product are both sinking or both sourcing, respectively.

To provide a pull-up/pull-down resistor on the output lines, turn on the output pull-up/pull-down resistor switch associated with the auxiliary output signal of your Zebra I/O Breakout Box. For information on the output pull-up/pull-down resistor switches found on the output-to-input bypass DIP switch, see the *DIP switch reference* section, in *Appendix B: Technical reference*.

For the pull-up/pull-down resistors to function, the PULL_LEVEL terminal must have the opposite polarity of the OUT_COM terminal.

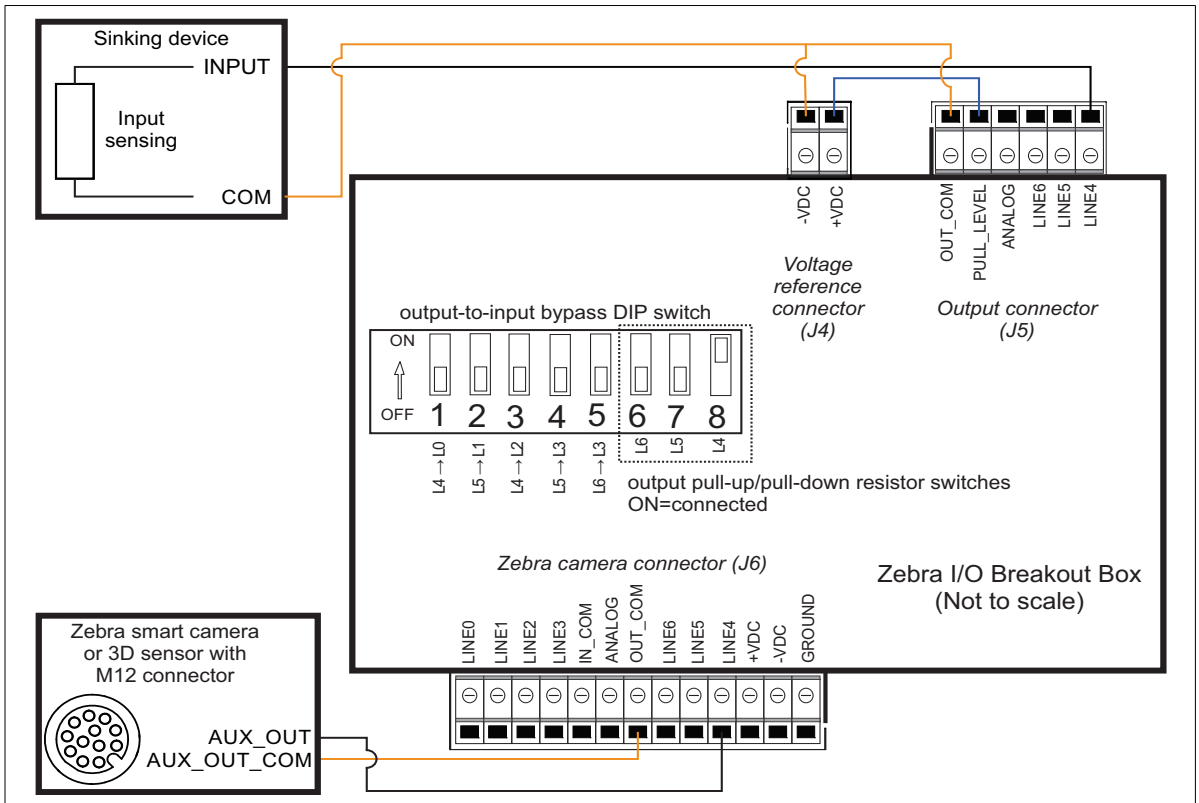
Connecting Zebra I/O Breakout Box to provide a sourcing auxiliary output signal connected to an on-board pull-down resistor

To provide a sourcing auxiliary output signal connected to an on-board pull-down resistor, connect the device as shown below. In this example, the Zebra 3D sensor is connected to auxiliary output line 4 of Zebra I/O Breakout Box, so you will need to set pull-down resistor switch 8 to ON.



Connecting Zebra I/O Breakout Box to provide a sinking auxiliary output signal connected to an on-board pull-up resistor

To provide a sinking auxiliary output signal connected to an on-board pull-up resistor, connect the device as shown below. In this example, the Zebra smart camera or 3D sensor is connected to auxiliary output line 4 of Zebra I/O Breakout Box, so you will need to set pull-up resistor switch 8 to ON.



Appendix A:

Glossary

This appendix defines some of the specialized terms used in this manual.

Glossary

- **Auxiliary I/O signal**

See Auxiliary I/O line.

- **Auxiliary I/O line**

An auxiliary input or output line represents a physical line (pin) on which a general purpose, digital (on/off) I/O signal (auxiliary I/O signal) can be received or transmitted, respectively. An auxiliary input line can be used to receive, for example, a user-defined input signal, a trigger signal, or bit A or B of a quadrature encoder. An auxiliary output line can be used, for example, to transmit a timer active signal, a counter active signal, the output signal of the encoder interface, or a static software-controlled bit of a user output register.

- **eFuse**

An eFuse is an electronic fuse that is built into the circuit and cannot be removed.

- **IP20**

An IP20 enclosure is a specific type of enclosure that protects against objects of sizes > 12.5 mm, but does not protect against water.

- **Sinking.**

A sinking circuit is a DC circuit that provides the common reference (low) for the circuit. In the case of Zebra AltiZ, auxiliary input lines are wired as sinking input lines when their common line (AUX_ISOIND_IN_COM) is connected to 0 V; in that case, you should connect the Zebra AltiZ auxiliary input lines to devices that are sourcing the current.

- **Sourcing.**

A sourcing circuit is a DC circuit that provides the voltage needed for the circuit. In the case of Zebra AltiZ, auxiliary input lines are wired as sourcing input lines when their common line (AUX_ISOIND_IN_COM) is connected to 24 V; in that case, you should connect the Zebra AltiZ auxiliary input lines to devices that are sinking the current.

- **Wire-terminal.**

A wire-terminal is designed to receive a stripped wire; the stripped wire can carry a signal. Typically, multiple wire-terminals are grouped together into an open-wire connector.

Appendix B:

Technical reference

This appendix summarizes the hardware elements of Zebra I/O Breakout Box. In addition, this appendix provides pinout descriptions for the external connectors on your Zebra I/O Breakout Box.

Zebra I/O Breakout Box summary

Your Zebra I/O Breakout Box has the following features:

- **Compatible with the Zebra Iris GTX smart camera and Zebra AltiZ 3D sensor.**
- **Ability to power your Zebra camera and peripheral devices.** The power supply provides power to the connected Zebra smart camera or 3D sensor through a 3-pole power connector (J7). The power supply also provides power to two reference voltage connectors (J2 and J4), and one external device power connector (J3).
- **Simple screw wire-terminals for third-party connections.** Your Zebra I/O Breakout Box uses a simple screw wire-terminal for easy connections with third-party devices.
- **A power and digital I/O cable.** Your Zebra I/O Breakout Box uses the Zebra power and digital I/O cable to connect to your Zebra camera, making the initial connection hassle-free.

Zebra I/O Breakout Box specifications

The following specifications detail your Zebra I/O Breakout Box.

Electrical specifications

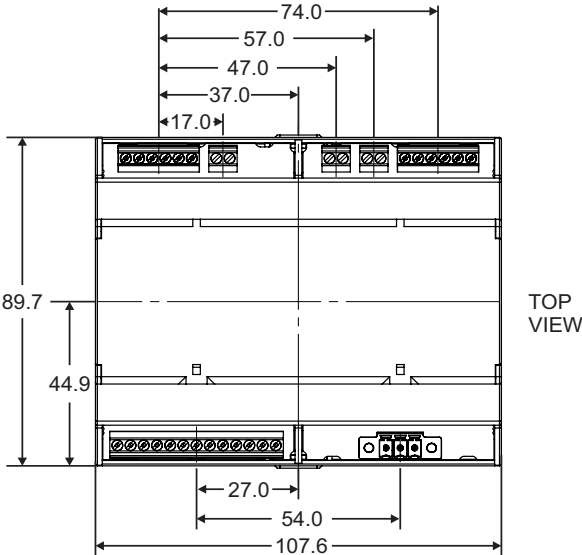
Zebra I/O Breakout Box signals		Voltage	Current	
Operating voltages and currents for Zebra I/O Breakout Box				
	Power supply connector J7 (+/- VDC in)	24 V DC in (+/-10%)	2.5 A	
	Zebra camera connector J6 (+/- VDC output to Zebra smart camera or 3D sensor)	24 V DC out	0.6 A	
	External device power connector J3 (VDC out)	24 V DC out	1.5 A	
	Reference voltage connector J2 (VDC ref1)	24 V DC out	150 mA	
	Input connector block J1 Push-button level (PB_LEVEL)	24 V DC	30 mA	
	Input connector block J1 common (IN_COM)	24 V DC	30 mA	
	Reference voltage connector J4 (VDC ref2)	24 V DC out	150 mA	
	Output connector block J5 pull-up/pull-down level (PULL_LEVEL)	24 V DC	30 mA	
	Output connector block J5 common (OUT_COM)	24 V DC	150 mA	
I/O specifications				
	Input lines	Lines 0-3	24 V (28.9 V Max)	7 mA max (per line)
		Status LED ON voltage	> 10.95 V	2.75 mA max (in addition to lines 0-3 operating current)
		Status LED OFF voltage	<8.7 V	2.75 mA max (in addition to lines 0-3 operating current)
	Output lines	Lines 4-6	24 V (28.9 V max)	50 mA max (per line)
		Analog line	0-10 V	N/A
		Status LED ON voltage	> 10.95 V	2.75 mA max (in addition to lines 4-6 operating current)
		Status LED OFF voltage	< 8.7 V	2.75 mA max (in addition to lines 4-6 operating current)
		Maximum leakage	26 V	0.2 μA
			28.9 V	1 mA

Environmental specifications

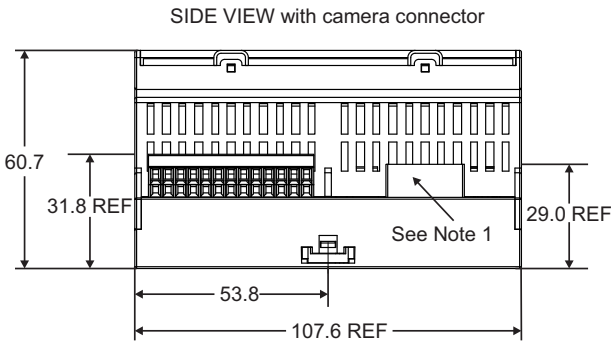
- For indoor use only.
- This product is not intended for use at altitudes exceeding 2000 m.
- Operating temperature: 0 to 50 °C (32 °F to 122 °F).
- Storage temperature: 0 to 70 °C (32 °F to 158 °F), 95%RH, non-condensing.
- Operating humidity: 85% RH, non-condensing.
- Ventilation requirements: Natural convection.

Dimension specifications

Zebra I/O Breakout Box	
Length	107.6 mm (4.24")
Width	89.7 mm (3.53")

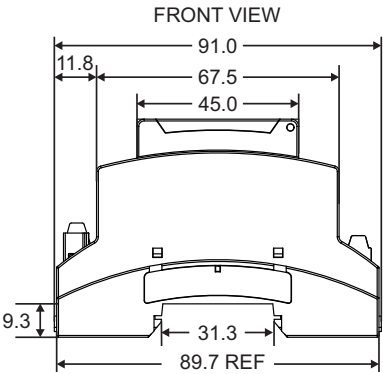


Dimensions are in mm



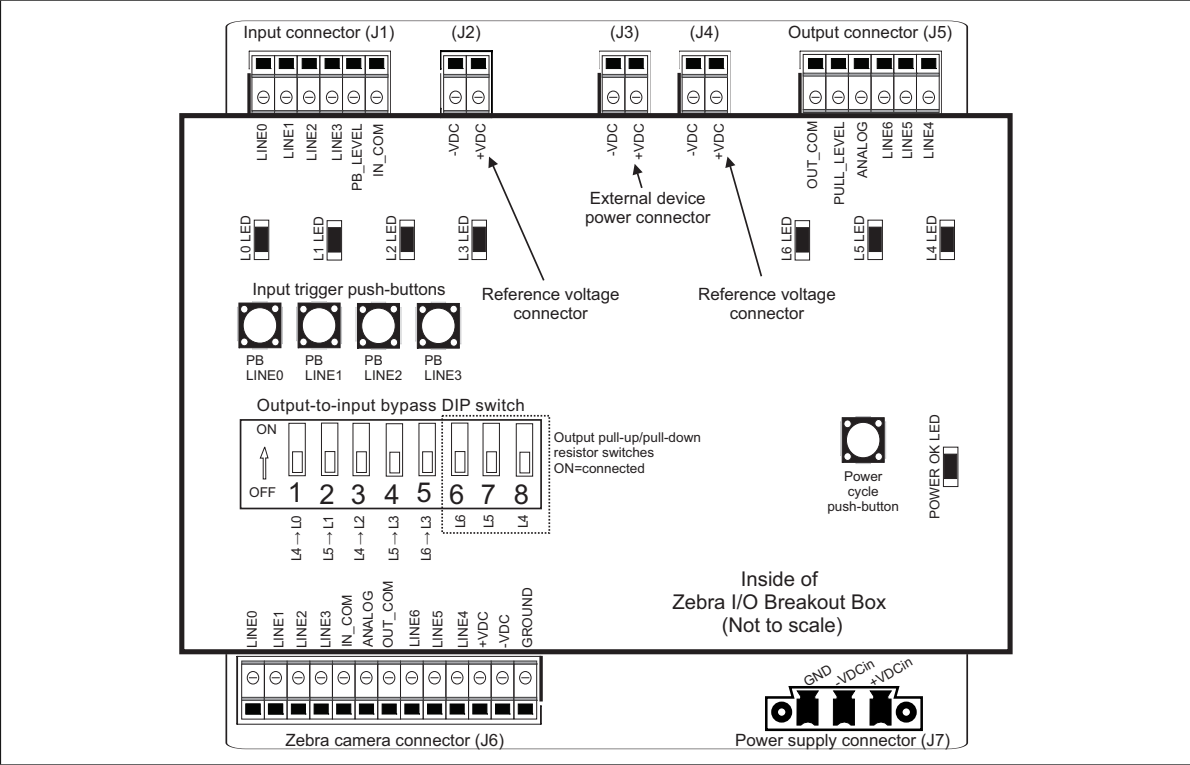
Note 1: Power connector. Please read and understand all instructions before powering up the unit

Dimensions are in mm



Open-wire connectors reference

Zebra I/O Breakout Box has seven separate terminal-block connectors designed for open-wire connections. Each connector is composed of multiple wire-terminals. Each of these wire-terminals require stripped cable wires with tinned wires to be inserted, wire by wire, into the available wire-terminal.



Connector	Zebra breakout board connector name	Connector type
J1	Input connector	Connects to third-party devices so that they can send auxiliary input and trigger signals to your Zebra I/O Breakout Box.
J2-J4	External device power connector and reference voltage connectors	Provide power to a third-party device or reference voltage to the input and/or output connector
J5	Output connector	Connects to third-party devices so that they can receive auxiliary output signals from your Zebra I/O Breakout Box.
J6	Zebra camera connector	Connects your Zebra smart camera or 3D sensor to your Zebra I/O Breakout Box via the Zebra digital I/O and power cable.
J7	Zebra I/O Breakout Box power supply connector	Connects Zebra I/O Breakout Box to a power source.

Input connector

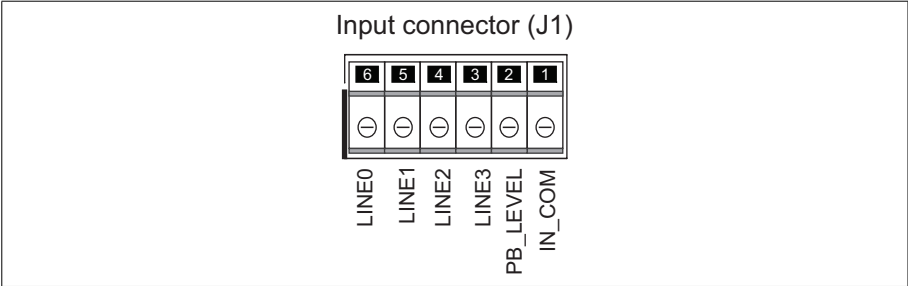
The input connector (J1) is a series of 6 wire-terminals. The connector is used to receive up to 4 auxiliary input signals. Each input line has transient voltage protection. If a peripheral device is powered by Zebra I/O Breakout Box through the external device power connector (J3), and you intend to connect the device to the input connector, you must power the input connector with reference voltage connector J2 or J4.

Depending on how the IN_COM terminal is connected, the input connector will be able to connect to sinking or sourcing devices. If IN_COM is connected to -VDC (of connector J2 or J4), then the auxiliary input signals are sinking and must be connected to a sourcing device. Conversely, if IN_COM is connected to +VDC (of connector J2 or J4), then the auxiliary input signals are sourcing and must be connected to sinking devices. The IN_COM line is protected by a resettable fuse.

- ❖ Note that, if you want the push-buttons to function, you must ensure that PB_LEVEL is connected to the opposite polarity to that of IN_COM.

Each auxiliary input signal should have only one input source. For example, when an input signal comes from a connected third-party device, it should always be the only source of input for that signal, and not have to compete with the signal from a re-routed auxiliary output signal or a push-button.

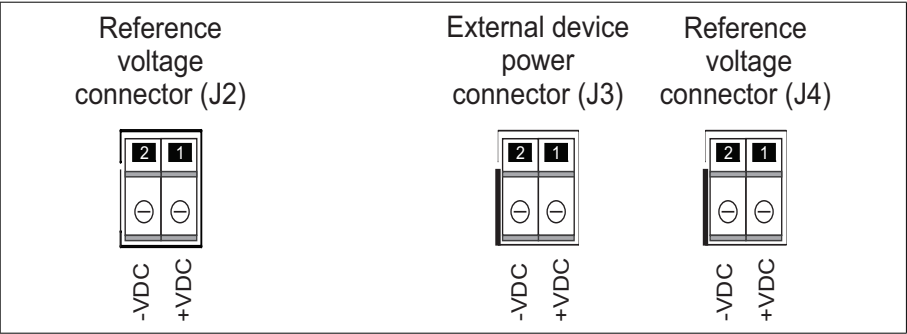
The pinout for the input connector (J1) is as follows:



Terminal position	Signal name	Description	Zebra Iris GTX signal	Zebra Altiz signal
1	IN_COM	Auxiliary signal (input) common. Note that, this wire-terminal is shared among the four auxiliary input lines. To enable the input connector to source a third-party sinking signal, connect IN_COM to +VDC, and to enable the input connector to sink a third-party sourcing signal connect IN_COM to -VDC. A resettable PTC fuse protects against currents at or above 150 mA.	AUX_OPTOIND_IN_COMMON	AUX_ISOIND_IN_COM
2	PB_LEVEL	Push-button activation level. Note that, this wire-terminal is shared among the four push-buttons. For the push-buttons on Zebra I/O Breakout Box to work, PB_LEVEL must be connected to the opposite polarity as that of IN_COM.	N/A	N/A
3	LINE3	Auxiliary line 3 (input).	AUX_OPTOIND_IN6 (MIL constant: M_AUX_IO6)	AUX_ISOIND_IN3 (MIL constant: M_AUX_IO3)
4	LINE2	Auxiliary line 2 (input).	AUX_OPTOIND_IN5 (MIL constant: M_AUX_IO5)	AUX_ISOIND_IN2 (MIL constant: M_AUX_IO2)
5	LINE1	Auxiliary line 1 (input).	AUX_OPTOIND_IN4 (MIL constant: M_AUX_IO4)	AUX_ISOIND_IN1 (MIL constant: M_AUX_IO1)
6	LINE0	Auxiliary line 0 (input).	AUX(TRIG)_OPTOIND_IN3 (MIL constant: M_AUX_IO3)	AUX_ISOIND_IN0 (MIL constant: M_AUX_IO0)

External device power connector and reference voltage connectors

There is one external device power connector and two reference voltage connectors, each with two screw-wire-terminals. The external device power connector (J3) provides external devices with 24 V at 1.5 A. The reference voltage connectors (J2 and J4) provide reference voltage levels for either the input connector or the output connector, and are limited to 150 mA. If a device is powered by J3, then the input or output connector that is used by that device must also be powered by J2 or J4.



The pinout for the external device power connector and reference voltage connectors are as follows:

Connector	Terminal position	Signal name	Description
J2	1	+VDCref1	Provides +VDC reference.
	2	-VDCref1	Provides -VDC reference.
J3	1	+VDCout	Provides +VDC for powering third-party devices.
	2	-VDCout	Provides -VDC for powering third-party devices.
J4	1	+VDCref2	Provides +VDC reference.
	2	-VDCref2	Provides -VDC reference.

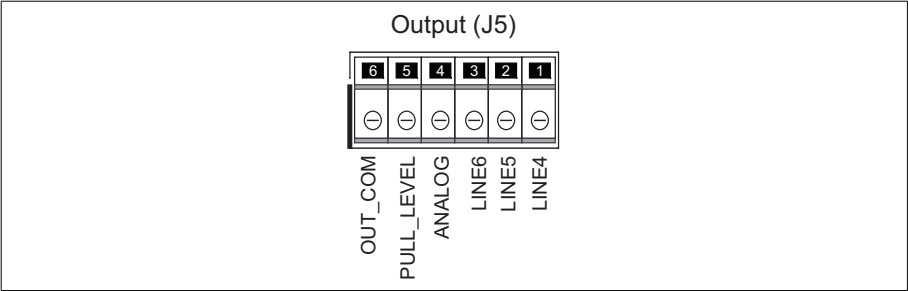
Output connector

The output connector (J5) is a series of 6 wire-terminals. The connector is used to send up to 3 auxiliary output signals and an analog intensity (dimming) control signal. Each output line has transient voltage protection. If a peripheral device is powered by Zebra I/O Breakout Box through the external device power connector (J3), and you intend to connect the device to the output connector, you must power the output connector with reference voltage connector J2 or J4.

Depending on how the OUT_COM terminal is connected, the output connector will be able to connect to sinking or sourcing devices. If OUT_COM is connected to -VDC (of connector J2 or J4), then the auxiliary output signals are sinking and must be connected to sourcing devices. Conversely, if OUT_COM is connected to +VDC (of connector J2 or J4), then the auxiliary output signals are sourcing and must be connected to sinking devices. The OUT_COM line is protected by a resettable fuse.

- ❖ Note that, if you want the output status LEDs or the on-board pull-up/pull-down resistors to function, you must ensure that PULL_LEVEL is connected to the opposite polarity to that of OUT_COM.

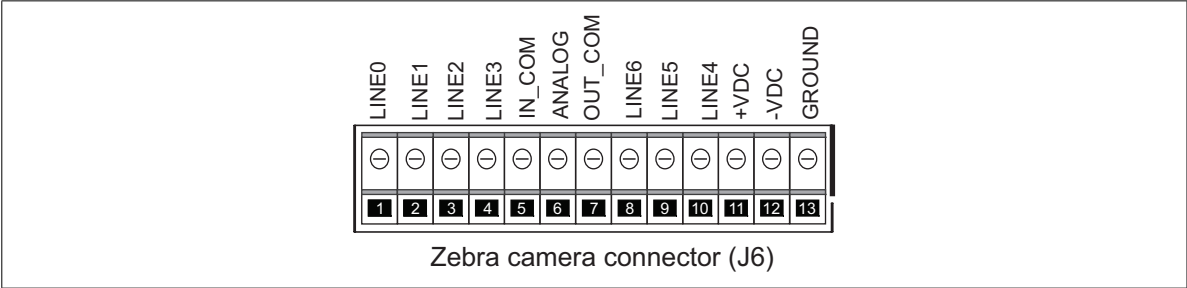
The pinout for the output connector (J5) is as follows:



Terminal position	Signal name	Description	Zebra Iris GTX signal	Zebra Altiz signal
1	LINE4	Auxiliary line 4 (output).	AUX_OPTOIND_OUT0 (MIL constant: M_AUX_I00)	AUX_ISOIND_OUT4 (MIL constant: M_AUX_I04)
2	LINE5	Auxiliary line 5 (output).	AUX_OPTOIND_OUT1 (MIL constant: M_AUX_I01)	AUX_ISOIND_OUT5 (MIL constant: M_AUX_I05)
3	LINE6	Auxiliary line 6 (output).	AUX_OPTOIND_OUT2 (MIL constant: M_AUX_I02)	Reserved
4	ANALOG	Analog intensity (dimming) control line (output)	AUX_AREF_OUT7	Reserved
5	PULL_LEVEL	Pull-up/pull-down activation level. Note that, this wire-terminal is shared among the four pull-up/pull-down resistors. For the pull-up/pull-down resistors on Zebra I/O Breakout Box to work, PULL_LEVEL must be connected to the opposite polarity as that of OUT_COM.	N/A	N/A
6	OUT_COM	Auxiliary line (output) common. Note that, this wire-terminal is shared among the three auxiliary output lines. To enable the output connector to source a third-party sinking signal, connect OUT_COM to +VDC, and to enable the output connector to sink a third-party sourcing signal, connect OUT_COM to -VDC. A resettable PTC fuse protects against currents at or above 150 mA.	AUX_OPTOIND_OUT_COMMON	AUX_ISOIND_OUT_COM

Zebra camera connector

The Zebra camera connector (J6) is a series of 13 wire-terminals. Connect it to the digital I/O and power connector of your Zebra Iris GTX or Zebra Altiz, using a Zebra open-wire digital I/O and power cable (M12-CBL-PWRIO/3). This connector provides power to your Zebra smart camera or 3D sensor, receives Zebra smart camera or 3D sensor auxiliary output signals, and transmits auxiliary input signals to your Zebra smart camera or 3D sensor.



When using Zebra Iris GTX, the pinout for the Zebra camera output connector (J6) is as follows:

Terminal position	Signal name	Wire color	Description	MIL constant	Zebra Iris GTX signal
1	LINE0	Pink	Auxiliary line 0 (input).	M_AUX_I03	AUX(TRIG)_OPTOIND_IN3
2	LINE1	Red	Auxiliary line 1 (input).	M_AUX_I04	AUX_OPTOIND_IN4
3	LINE2	Black	Auxiliary line 2 (input).	M_AUX_I05	AUX_OPTOIND_IN5
4	LINE3	Gray	Auxiliary line 3 (input).	M_AUX_I06	AUX_OPTOIND_IN6
5	IN_COM	Yellow	Auxiliary line (input) common.	N/A	AUX_OPTOIND_IN_COMMON
6	ANALOG	Blue	Analog intensity (dimming) control line.	N/A	AUX_AREF_OUT7
7	OUT_COM	Brown	Auxiliary line (output) common.	N/A	AUX_OPTOIND_OUT_COMMON
8	LINE6	White	Auxiliary line 6 (output).	M_AUX_I02	AUX_OPTOIND_OUT2
9	LINE5	Red-Blue	Auxiliary line 5 (output).	M_AUX_I01	AUX_OPTOIND_OUT1
10	LINE4	Violet	Auxiliary line 4 (output).	M_AUX_I00	AUX_OPTOIND_OUT0
11	+VDC	Green	Provides +VDC to the Zebra Iris GTX.	N/A	+VDC
12	-VDC	Gray-Pink	Provides -VDC to the Zebra Iris GTX.	N/A	-VDC
13	Ground	N/A	Provides internal connection to pin 1 of the power supply connector (J7).	N/A	N/A

When using Zebra Altiz, the pinout for the output connector (J6) is as follows:

Terminal position	Signal name	Wire color	Description	MIL constant	Zebra Altiz signal
1	LINE0	Violet	Auxiliary line 0 (input).	M_AUX_I00	AUX_ISOIND_IN0
2	LINE1	Black	Auxiliary line 1 (input).	M_AUX_I01	AUX_ISOIND_IN1
3	LINE2	Blue	Auxiliary line 2 (input).	M_AUX_I02	AUX_ISOIND_IN2
4	LINE3	Pink	Auxiliary line 3 (input).	M_AUX_I03	AUX_ISOIND_IN3
5	IN_COM	Yellow	Auxiliary line (input) common.	N/A	AUX_ISOIND_IN_COM
6	ANALOG	Gray	Reserved	N/A	N/A
7	OUT_COM	Brown	Auxiliary line (output) common.	N/A	AUX_ISOIND_OUT_COM
8	LINE6	Red-Blue	Auxiliary line 6 (output).	N/A	N/A
9	LINE5	White	Auxiliary line 5 (output).	M_AUX_I05	AUX_ISOIND_OUT5
10	LINE4	Red	Auxiliary line 4 (output).	M_AUX_I04	AUX_ISOIND_OUT4
11	+VDC	Green	Provides +VDC to Zebra Altiz.	N/A	+VDC
12	-VDC	Gray-Pink	Provides -VDC to Zebra Altiz.	N/A	-VDC
13	Ground	N/A	Provides internal connection to pin 1 of the power supply connector (J7).	N/A	Ground (Camera housing)

Zebra I/O Breakout Box power supply connector

The Zebra I/O Breakout Box power supply connector is a three position connector that provides power to Zebra I/O Breakout Box. The power supply connector is protected by an eFuse that will protect against currents at or above 3.7 A.



The pinout for the power supply connector (J7) is as follows:

Terminal position	Signal name	Description
1	GND	Provides a connection to ground for pin 13 of the Zebra camera connector (J6).
2	-VDCin	Negative line of the power provided to Zebra I/O Breakout Box. This pin must be connected to a 24 V power supply.
3	+ VDCin	Positive line of the power provided to Zebra I/O Breakout Box. This pin must be connected to a 24 V power supply.

Push-buttons

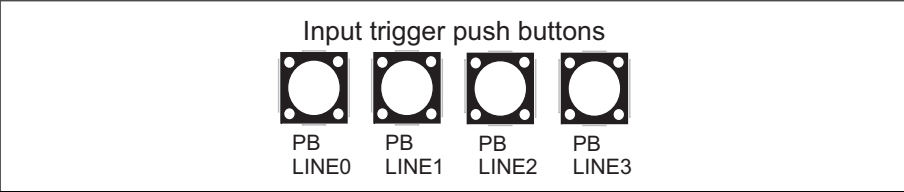
Zebra I/O Breakout Box has two types of push-buttons: input trigger push-buttons and a power cycle push-button.

Input trigger push-buttons

Each input trigger push-button generates an auxiliary input signal that is sent to your Zebra smart camera or 3D sensor through the Zebra I/O Breakout Box’s camera connector (J6). When you press a push-button to create an auxiliary input signal, signal bounce (also called chatter) might occur. To guarantee that the created auxiliary input signal is not interpreted as multiple input pulses, set the minimum period of time (debounce time) during which any shorter pulses are considered noise, and are suppressed. The debounce time can be set using Matrox Design Assistant or MIL.

❖ Note that, if you want the push-buttons to function, you must ensure that PB_LEVEL is connected to the opposite polarity to that of IN_COM.

Each auxiliary input signal should have only one input source. For example, when a push-button is used to provide an auxiliary input signal, it should always be the only source of input for that signal, and not have to compete with the signal from a re-routed output signal or a signal from a connected third-party device.

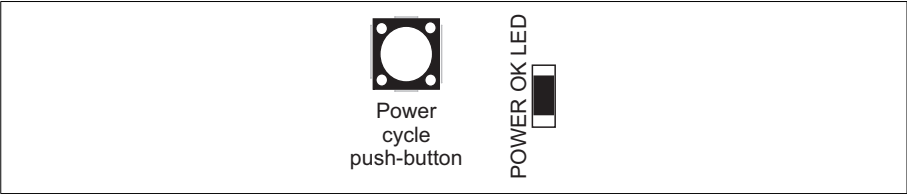


The Zebra I/O Breakout Box reference for the push-buttons is as follows:

Push-button	Description	Zebra Iris GTX signal received	Zebra Altiz signal received
PB LINE0	Input Line 0	AUX(TRIG)_OPTOIND_IN3	AUX_ISOIND_IN0
PB LINE1	Input Line 1	AUX_OPTOIND_IN4	AUX_ISOIND_IN1
PB LINE2	Input Line 2	AUX_OPTOIND_IN5	AUX_ISOIND_IN2
PB LINE3	Input Line 3	AUX_OPTOIND_IN6	AUX_ISOIND_IN3

Power cycle push-button

The power cycle push-button is used to power cycle Zebra I/O Breakout Box. After pressing the power cycle push-button, the power OK LED will turn green once the unit is back on.

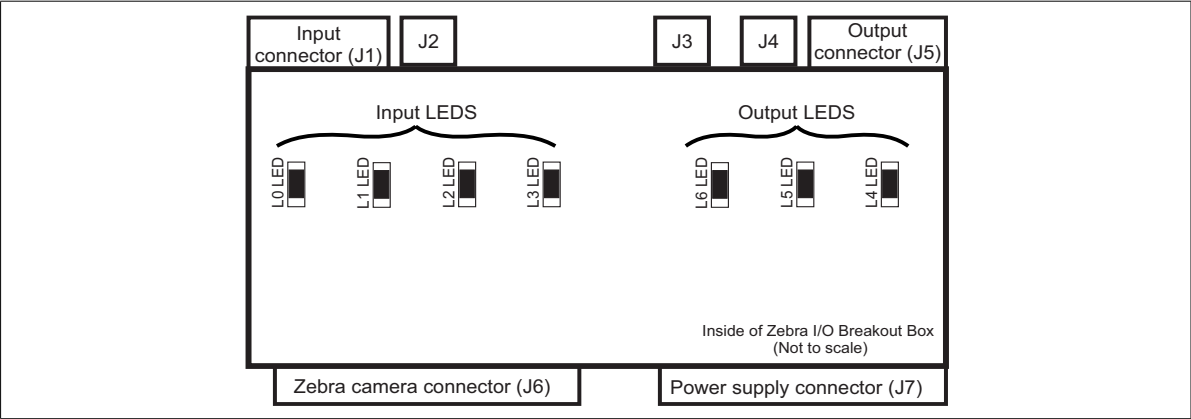


Status LEDs

Your Zebra I/O Breakout Box has 7 LEDs designed to report the activity on their corresponding auxiliary lines. Each LED has two states: on and off, where on produces a yellow light and denotes activity on the monitored line.

Input status LEDs are ON when the voltage between Line N and IN_COM is >11 V; otherwise, they are OFF. Likewise, output status LEDs are ON when the voltage between Line N and PULL_LEVEL is >11 V; otherwise, they are OFF.

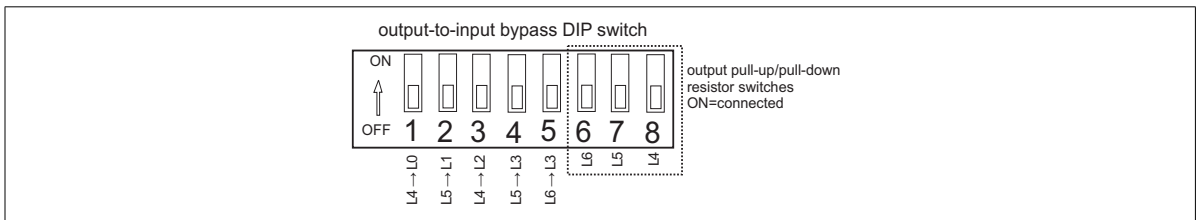
❖ Note that, if you want the output status LEDs to function, you must ensure that PULL_LEVEL is connected to the opposite polarity to that of OUT_COM.



DIP switch reference

Your Zebra I/O Breakout Box includes an 8 switch DIP switch to enable output-input bypass connection and pull-up/pull-down resistor functionality. Switches 1-5 are designed to re-route the output signals to the input signals of Zebra I/O Breakout Box. This is useful when you want to test the outputs and inputs of your connected Zebra smart camera or 3D sensor. Switches 6-8 are designed to enable on-board resistors that can act as pull-up or pull-down resistors. Each switch has two states: on and off.

- ❖ Note that, if you want the on-board pull-up/pull-down resistors to function, you must ensure that PULL_LEVEL is connected to the opposite polarity to that of OUT_COM.



Each switch is named and listed with its board label.

Zebra breakout board switch name	Board label	Description
Output-to-input bypass (switch 1)	L4 - L0	Specifies whether the auxiliary line 4 (output) will connect to the auxiliary line 0 (input).
Output-to-input bypass (switch 2)	L5 - L1	Specifies whether the auxiliary line 5 (output) will connect to the auxiliary line 1 (input).
Output-to-input bypass (switch 3)	L4 - L2	Specifies whether the auxiliary line 4 (output) will connect to the auxiliary line 2 (input).
Output-to-input bypass (switch 4)	L5 - L3	Specifies whether the auxiliary line 5 (output) will connect to the auxiliary line 3 (input).
Output-to-input bypass (switch 5)	L6 - L3	Specifies whether the auxiliary line 6 (output) will connect to the auxiliary line 3 (input).
Output pull-up/pull-down resistor (switch 6)	L6	Connects a 3 KOhm pull-up/pull-down resistor to output line 6.
Output pull-up/pull-down resistor (switch 7)	L5	Connects a 3 KOhm pull-up/pull-down resistor to output line 5.
Output pull-up/pull-down resistor (switch 8)	L4	Connects a 3 KOhm pull-up/pull-down resistor to output line 4.

Regulatory Compliance

FCC Compliance Statement

Warning

Changes or modifications to these units not expressly approved by the party responsible for the compliance could void the user's authority to operate this equipment.

The use of shielded cables for connections of these devices to other peripherals is required to meet the regulatory requirements.

Note

These devices comply with Part 15 of FCC Rules. Operation is subject to the following two conditions:

1. These devices may not cause harmful interference, and
2. These devices must accept any interference received, including interference that may cause undesired operation.

This equipment has been tested and found to comply with the limits for Class A digital devices, 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 these devices in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his/her own expense.

Innovation, Science and Economic Development Canada Compliance Statement

These digital apparatuses do not exceed the Class A limits for radio noise emission from digital apparatuses set out in the Radio Interference Regulations of Innovation, Science and Economic Development Canada (ISED).

Ces appareils numériques n'émettent pas de bruits radioélectriques dépassant les limites applicables aux appareils numériques de Classe A prescrites dans le Règlement sur le brouillage radioélectrique édicté par Innovation, Sciences et Développement Économique Canada (ISDE).

EU Notice (European Union)

WARNING: These are class A products. In a domestic environment these products may cause radio interference in which case the user may be required to take adequate measures.

AVERTISSEMENT: Ces appareils sont des produits informatiques de Classe A. Lorsque ces appareils sont utilisés dans un environnement résidentiel, ces produits peuvent entraîner des interférences radioélectriques. Dans ce cas, l'utilisateur peut être prié de prendre des mesures correctives appropriées.

This device complies with Directive 2014/30/EU for Class A digital devices. They have been tested and found to comply with EN55011/CISPR11 and EN61326-1/IEC61326-1.

Ces unités sont conformes à la Directive 2014/30/EU pour les unités numériques de Classe A. Les tests effectués ont prouvé qu'elles sont conformes aux normes EN55011/CISPR11 et EN61326-1/IEC61326-1.

Directive on Waste Electrical and Electronic Equipment (WEEE)

Europe

(English) European user's information – Directive on Waste Electrical and Electronic Equipment (WEEE)

Please refer to the Zebra Website (zebra.com/weee) for recycling information.

(Français) Informations aux utilisateurs Européens – Règlementation des déchets d'équipements électriques et électroniques (DEEE)

Se référer au site Web de Zebra (zebra.com/weee) pour l'information concernant le recyclage.

(Deutsch) Information für europäische Anwender – Europäische Regelungen zu Elektro- und Elektronikgeräten (WEEE)

Bitte wenden Sie sich an dem Zebra-Website (zebra.com/weee) für Recycling Informationen.

(Italiano) Informazioni per gli utenti europei – Direttiva sui rifiuti di apparecchiature elettriche ed elettroniche (RAEE)

Si prega di riferirsi al sito Web Zebra (zebra.com/weee) per le informazioni di riciclaggio.



Limited Warranty

Refer to the warranty statement that came with your product.

