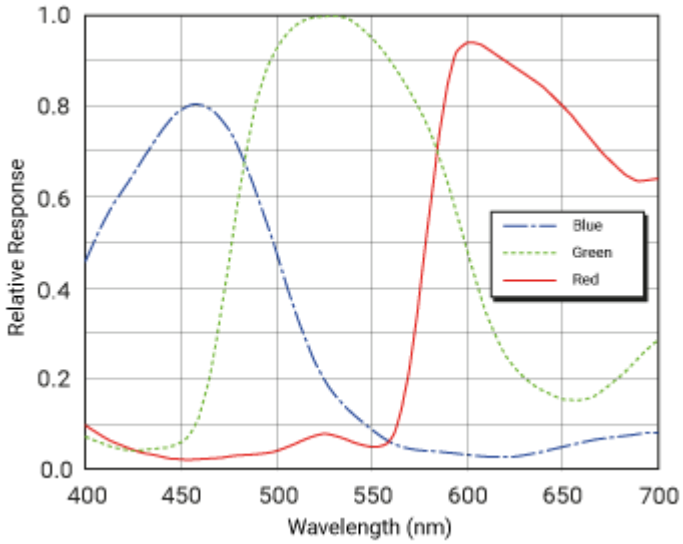
# Specifications

## General Specifications

| Specification | acA3088-16gc |
|---|---|
| Resolution (H x V Pixels) | 3088 x 2064 |
| Sensor Type | Sony IMX178LQJ-C<br>Progressive scan CMOS<br>Rolling shutter |
| Optical Size | 1/1.8" |
| Effective Sensor Diagonal | 8.92 mm |
| Pixel Size (H x V) | 2.4 µm x 2.4 µm |
| Frame Rate (at Default Settings) | 16.9 fps |
| Product Line | ace U |
| Mono / Color | Color |
| Image Data Interface | Fast Ethernet (100 Mbit/s)<br>Gigabit Ethernet (1000 Mbit/s) |
| Pixel Formats | See Pixel Format. |
| Synchronization | Via hardware trigger<br>Via software trigger<br>Via free run |
| Exposure Time Control | Programmable via the camera API |
| Camera Power Requirements | Power over Ethernet (PoE) 802.3af compliant supplied via Ethernet connector<br>12–24 VDC supplied via I/O connector |
| | ≈2.9 W (typical) when using Power over Ethernet<br>≈2.5 W (typical) @ 12–24 VDC when supplied via I/O connector |

| | |
|---|---|
| I/O Lines | 1 opto-coupled input line<br>1 opto-coupled output line<br>1 general purpose I/O (GPIO) line |
| Lens Mount | C-mount |
| Size (L x W x H) | 42.0 mm x 29 mm x 29 mm (without lens mount or connectors)<br>60.3 mm x 29 mm x 29 mm (with lens mount and connectors) |
| Weight | < 90 g |
| Conformity | CE (includes RoHS), UL Listed, FCC, GenICam, GigE Vision, IP30, IEEE 802.3af (PoE), REACH<br>The EU Declaration of Conformity is available on the Basler website. |
| Software | Basler pylon Camera Software Suite (version 4.0 or higher)<br>Available for Windows, Linux x86, Linux ARM, and OS X |
| Accessories | Cables for your camera model<br>Lenses for your camera model<br>Additional accessories for your camera model |

## Spectral Response




The spectral response curves exclude lens characteristics, light source characteristics, and IR cut filter characteristics.

## IR Cut Filter

Color cameras are equipped with an IR cut filter. The filter is mounted in a filter holder inside the lens mount.

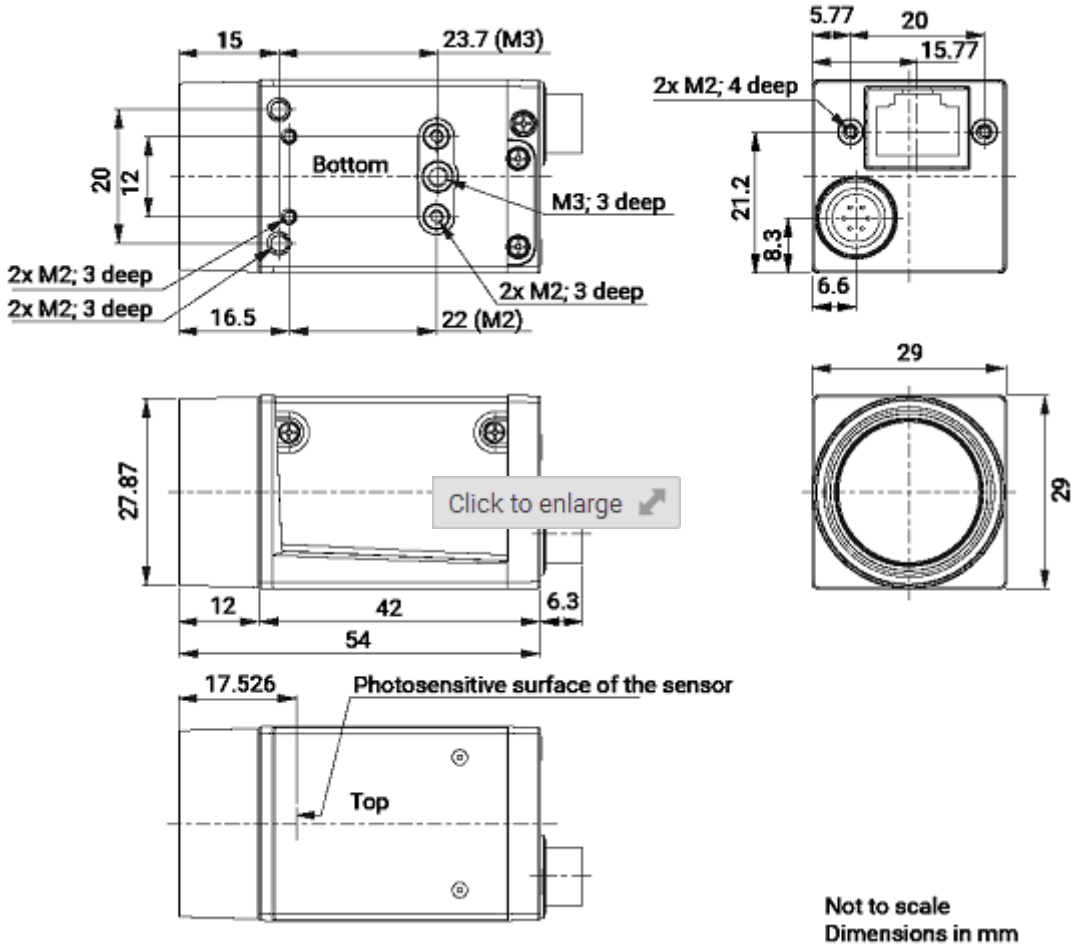
The IR cut filter has the following spectral characteristics:

| Wavelength [nm] | Transmittance |
|---|---|
| 450–610 | $T_{min}$ > 90 % |
| 450–620 | $T_{avg}$ > 93 % |
| 645 ± 10 | T = 50 % |
| 700–1070 | $T_{max}$ < 4 % |
| 690–1070 | $T_{avg}$ < 1 % |

The filter holder can't be removed.

# Mechanical Specifications

## Camera Dimensions and Mounting Points




## Maximum Allowed Lens Intrusion

→ See Maximum Allowed Lens Intrusion.

## Stress Test Results

→ See Stress Test Results.

# Requirements

## Environmental Requirements

### Temperature and Humidity

| | |
|---|---|
| Housing temperature during operation | 0–50 °C (32–122 °F) |
| Humidity during operation | 20–80 %, relative, non-condensing |
| Storage temperature | -20–80 °C (-4–176 °F) |
| Storage humidity | 20–80 %, relative, non-condensing |
| Housing temperature according to UL 60950-1 | max. 70 °C (158 °F) |
| Ambient temperature according to UL 60950-1 | max. 30 °C (86 °F) |
| UL 60950-1 test conditions: no lens attached to camera; no heat dissipation measures; ambient temperature kept at 30 °C (86 °F). | |

### Heat Dissipation

→ See Providing Heat Dissipation.

## Electrical Requirements

**⚠ DANGER**

**Electric Shock Hazard**

**⚠ WARNING**

**Fire Hazard**

***NOTICE***

**Incorrect voltage can damage the camera.**

### Camera Power

***NOTICE***

**Dual camera power supply can damage the camera.**

- **Power supply via Power over Ethernet (PoE):** Power must comply with the IEEE 802.3af specification.
- **Power supply via I/O connector:** The operating voltage is 12–24 VDC. As a minimum, 10.8 VDC must be supplied. To avoid damaging the camera, a maximum

of 30 VDC must not be exceeded.

## Opto-Coupled I/O Input Line

| Voltage | Description |
|---|---|
| 30 VDC | Absolute maximum. This voltage must never be exceeded. Doing so may damage the camera and voids the warranty. |
| 0–24 VDC | Safe operating range. |
| 0–1.4 VDC | Indicates a logical 0 (with inverter disabled). |
| >1.4–2.2 VDC | Region where the logic level transition occurs; the logical state is not defined in this region. |
| >2.2 VDC | Indicates a logical 1 (with inverter disabled). |

- **Minimum current:** 5 mA
- **Current draw:** 5–15 mA
- If the camera is connected to a PLC device, Basler recommends using a cable that adjusts the voltage level of the PLC to that of the camera.

## Opto-Coupled I/O Output Line

| Voltage | Description |
|---|---|
| 30 VDC | Absolute maximum. This voltage must never be exceeded. Doing so may damage the camera and voids the warranty. |
| 3.3–24 VDC | Safe operating range. |
| <3.3 VDC | Unreliable I/O output. |

- **Leakage current:** <60 µA. Actual leakage depends on operating temperature and production spread of electronic components.
- **Maximum load current:** 50 mA
- **Minimum load current:** Not specified. Consider the following:
- Leakage current will have stronger effect when load currents are low.
- Propagation delay of the output increases as load currents decrease.
- Higher-impedance circuits tend to be more susceptible to EMI.
- Higher currents cause higher voltage drops in long cables.

## General Purpose I/O Lines

*NOTICE*

**Applying incorrect electrical signals to the camera's GPIO line can severely damage the camera.**

### Operation as Input

| Voltage | Description |
|---|---|
| 30 VDC | Absolute maximum. This voltage must never be exceeded. Doing so may damage the camera and voids the warranty. |
| 0–5 VDC | Safe operating range. The minimum external pull-up voltage is 3.3 VDC. |
| 0–0.8 VDC | Indicates a logical 0 (with inverter disabled). |
| >0.8–2 VDC | Region where the logic level transition occurs; the logical status is not defined in this region. |
| >2 VDC | Indicates a logical 1 (with inverter disabled). |

- **Current draw (high-level):** <100 µA
- **Sink current:** Your application must be able to accept 2 mA sink current from the GPIO input line without exceeding 0.8 VDC.

### Operation as Output

| Voltage | Description |
|---|---|
| 30 VDC | Absolute maximum. This voltage must never be exceeded. Doing so may damage the camera and voids the warranty. |
| 3.3–24 VDC | Safe operating range. |
| <3.3 VDC | Unreliable GPIO output. |

- **Internal pull-up resistor:** ≈2 kΩ, with open collector. Many applications will have to provide an additional pull-up resistor.
- **Residual voltage ("on" state):** ≈0.4 V at 50 mA and 25 °C (77 °F) housing temperature. Actual residual voltage depends on operating temperature, load current, and production spread of electronic components.
- **Leakage current:** <60 µA. Actual leakage depends on operating temperature and production spread of electronic components.
- **Maximum load current:** 50 mA
- **Minimum load current:** Not specified. However, consider the following:
- Leakage current will have a stronger effect when load currents are low.
- Propagation delay of the output increases as load currents decrease.
- Higher-impedance circuits tend to be more susceptible to EMI.
- Higher currents cause higher voltage drops in long cables.

## Circuit Diagrams

→ See Circuit Diagrams for Basler ace Cameras.

## Cable Requirements

### Ethernet Cable

- Use a high-quality Ethernet cable. Use of shielded CAT 5E or better cables with S/STP shielding is recommended.
- Use either a straight-through (patch) or a cross-over Ethernet cable.
- As a general rule, applications with longer cables or applications in harsh EMI conditions require higher category cables.
- Close proximity to strong magnetic fields should be avoided.
- Basler recommends using Ethernet cables from the Basler Vision Components range.

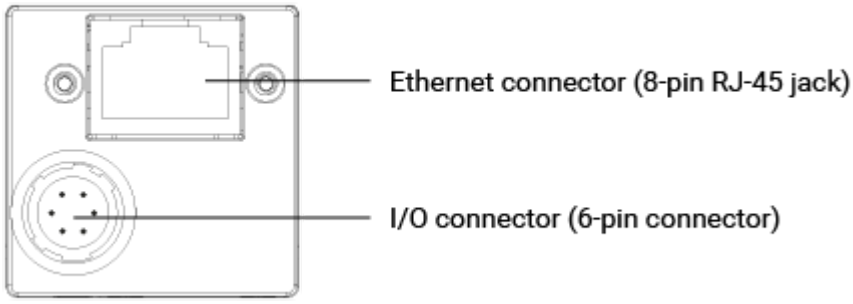
### I/O Cable

- The I/O cable must be shielded.
- The I/O cable must have a cross-section at least 0.14 mm² (close to AWG26).
- Use twisted pair wire cables.
- Maximum recommended cable length: 10 m
- Camera-side connector: Hirose micro plug (part number HR10A-7P-6S) or equivalent
- Close proximity to strong magnetic fields should be avoided.
- If you are supplying power to the camera via Power over Ethernet, the I/O cable will not be used to supply power. However, you can still use the cable to connect to the I/O lines.
- Basler recommends using I/O cables from the Basler Vision Components range:
  - GPIO cable, 10 m (yellow cable): For use with the GPIO lines of your camera. Also provides camera power. To avoid interferences due to crosstalk, the opto-coupled I/O lines are not connected.
  - Opto-I/O cable, 10 m (blue cable): For use with the opto-coupled I/O lines of your camera. To avoid interferences due to crosstalk, the GPIO lines are not connected. Does not provide camera power. Therefore, when using this cable, you must provide power via Power over Ethernet (PoE).
  - Opto-GPIO Y-cable, 2 x 10 m (yellow-blue cable): Allows you to use the GPIO lines and the opto-coupled I/O lines simultaneously without interferences due to crosstalk. There are two separate wires to split both I/O types. Also provides camera power.
  - Power-I/O cable, 10 m (gray cable): For use with the opto-coupled I/O lines of your camera. Unlike the opto-I/O cable (blue cable, see above), this cable allows you to provide camera power. However, because all lines are connected, crosstalk between the GPIO lines and the opto-coupled I/O lines may occur.
  - Power-I/O PLC+ cable, 10 m (gray cable): For use with the opto-coupled I/O lines of Basler cameras connected to a programmable logic controller (PLC).

It adapts the signal level for zero voltage from PLC level (<8.4 VDC) to TTL level (<1.4 VDC).

# Physical Interface

## Camera Connectors

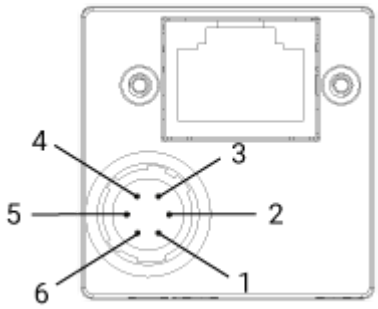



*NOTICE*

**Dual power supply can damage the camera.**

| Connector | Description |
|---|---|
| Ethernet connector | • 100/1000 Mbit/s Ethernet connection to the camera<br>• If power is not supplied via I/O connector: Power over Ethernet (PoE)<br>• 8-pin RJ-45 jack<br>Recommended mating connector: 8-pin RJ-45 plug (snap-in or with locking screws)<br>• When using locking screws, note the horizontal orientation of the screws. |
| I/O Connector | • If power is not supplied via Power over Ethernet (PoE): Power supply<br>• Hirose micro receptacle (part number HR10A-7R-6PB)<br>Recommended mating connector: Hirose micro plug (part number HR10A-7P-6S) |

## Connector Pin Numbering and Assignments




| Pin | Line | Function |
|---|---|---|
| 1 | - | 12–24 VDC Camera Power |
| 2 | Line 1 | Opto-coupled I/O input line |
| 3 | Line 3 | General purpose I/O (GPIO) line |
| 4 | Line 2 | Opto-coupled I/O output line |
| 5 | - | Ground for opto-coupled I/O lines |
| 6 | - | Ground for camera power and GPIO lines |

## Precautions

→ See Safety Instructions for Basler ace Cameras.

## Installation

→ See Camera Installation.

## Features

→ See the camera features section.

Suggestions for improving the documentation? Send us your feedback on this topic.

For technical questions, please contact your local distributor or use the support form on the Basler website.