

OMRON

F440-F C-Mount Smart Camera

User Manual



NOTE

- All rights reserved.
- No part of this publication may be reproduced, stored in a retrieval system, or transmitted, in any form, or by any means, mechanical, electronic, photocopying, recording, or otherwise, without the prior written permission of OMRON.
- No patent liability is assumed with respect to the use of the information contained herein. Moreover, because OMRON is constantly striving to improve its high-quality products, the information contained in this manual is subject to change without notice. Every precaution has been taken in the preparation of this manual. Nevertheless, OMRON assumes no responsibility for errors or omissions.

Neither is any liability assumed for damages resulting from the use of the information contained in this publication.

Trademarks

- Sysmac and SYSMAC are trademarks or registered trademarks of OMRON Corporation in Japan and other countries for OMRON factory automation products.
- Microsoft, Windows, Windows Vista, Excel, and Visual Basic are either registered trademarks or trademarks of Microsoft Corporation in the United States and other countries.
- ODVA, CIP, CompoNet, DeviceNet, and EtherNet/IP are trademarks of ODVA.
- QR Code is a registered trademark of DENSO WAVE INCORPORATED.

Other company names and product names in this document are the trademarks or registered trademarks of their respective companies.

Copyrights

Microsoft product screen shots reprinted with permission from Microsoft Corporation.

Terms and Conditions Agreement

Warranty, Limitations of Liability

Warranties

● Exclusive Warranty

Omron's exclusive warranty is that the Products will be free from defects in materials and workmanship for a period of twelve months from the date of sale by Omron (or such other period expressed in writing by Omron). Omron disclaims all other warranties, express or implied.

● Limitations

OMRON MAKES NO WARRANTY OR REPRESENTATION, EXPRESS OR IMPLIED, ABOUT NON-INFRINGEMENT, MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE OF THE PRODUCTS. BUYER ACKNOWLEDGES THAT IT ALONE HAS DETERMINED THAT THE PRODUCTS WILL SUITABLY MEET THE REQUIREMENTS OF THEIR INTENDED USE.

Omron further disclaims all warranties and responsibility of any type for claims or expenses based on infringement by the Products or otherwise of any intellectual property right.

● Buyer Remedy

Omron's sole obligation hereunder shall be, at Omron's election, to (i) replace (in the form originally shipped with Buyer responsible for labor charges for removal or replacement thereof) the non-complying Product, (ii) repair the non-complying Product, or (iii) repay or credit Buyer an amount equal to the purchase price of the non-complying Product; provided that in no event shall Omron be responsible for warranty, repair, indemnity or any other claims or expenses regarding the Products unless Omron's analysis confirms that the Products were properly handled, stored, installed and maintained and not subject to contamination, abuse, misuse or inappropriate modification. Return of any Products by Buyer must be approved in writing by Omron before shipment. Omron Companies shall not be liable for the suitability or unsuitability or the results from the use of Products in combination with any electrical or electronic components, circuits, system assemblies or any other materials or substances or environments. Any advice, recommendations or information given orally or in writing, are not to be construed as an amendment or addition to the above warranty.

See <http://www.omron.com> or contact your Omron representative for further information.

Limitation on Liability; Etc.

OMRON COMPANIES SHALL NOT BE LIABLE FOR SPECIAL, INDIRECT, INCIDENTAL, OR CONSEQUENTIAL DAMAGES, LOSS OF PROFITS OR PRODUCTION OR COMMERCIAL LOSS IN ANY WAY CONNECTED WITH THE PRODUCTS, WHETHER SUCH CLAIM IS BASED IN CONTRACT, WARRANTY, NEGLIGENCE OR STRICT LIABILITY.

Further, in no event shall liability of Omron Companies exceed the individual price of the Product on which liability is asserted.

Application Considerations

Suitability of Use

Omron Companies shall not be responsible for conformity with any standards, codes or regulations which apply to the combination of the Product in the Buyer's application or use of the Product. At Buyer's request, Omron will provide applicable third party certification documents identifying ratings and limitations of use which apply to the Product. This information by itself is not sufficient for a complete determination of the suitability of the Product in combination with the end product, machine, system, or other application or use. Buyer shall be solely responsible for determining appropriateness of the particular Product with respect to Buyer's application, product or system. Buyer shall take application responsibility in all cases.

NEVER USE THE PRODUCT FOR AN APPLICATION INVOLVING SERIOUS RISK TO LIFE OR PROPERTY WITHOUT ENSURING THAT THE SYSTEM AS A WHOLE HAS BEEN DESIGNED TO ADDRESS THE RISKS, AND THAT THE OMRON PRODUCT(S) IS PROPERLY RATED AND INSTALLED FOR THE INTENDED USE WITHIN THE OVERALL EQUIPMENT OR SYSTEM.

Programmable Products

Omron Companies shall not be responsible for the user's programming of a programmable Product, or any consequence thereof.

Disclaimers

Performance Data

Data presented in Omron Company websites, catalogs and other materials is provided as a guide for the user in determining suitability and does not constitute a warranty. It may represent the result of Omron's test conditions, and the user must correlate it to actual application requirements. Actual performance is subject to the Omron's Warranty and Limitations of Liability.

Change in Specifications

Product specifications and accessories may be changed at any time based on improvements and other reasons. It is our practice to change part numbers when published ratings or features are changed, or when significant construction changes are made. However, some specifications of the Product may be changed without any notice. When in doubt, special part numbers may be assigned to fix or establish key specifications for your application. Please consult with your Omron's representative at any time to confirm actual specifications of purchased Product.

Errors and Omissions



Information presented by Omron Companies has been checked and is believed to be accurate; however, no responsibility is assumed for clerical, typographical or proofreading errors or omissions.

Safety Precautions

Meanings of Signal Words




● Symbols and Meanings of Safety Precautions Described in this Document

In order for the product to be used safely, the following indicators are used in this document to draw your attention to safety precaution statements. Precaution statements with graphical indicators are intended to maintain user safety.

 WARNING	<p>Indicates a potentially hazardous situation which, if not avoided, will result in minor or moderate injury, or may result in serious injury or death.</p> <p>Additionally, there may be significant property damage.</p>
 CAUTION	<p>Indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury or in property damage.</p>

Meanings of Alert Symbols

The following alert symbols are used in this document.

	<p>General Prohibition</p> <p>Indicates general prohibitions, including warnings, for which there is no specific symbol.</p>
	<p>General Caution</p> <p>Indicates general cautions, including warnings, for which there is no specific symbol.</p>
	<p>Electrical Hazard</p> <p>Indicates the possible danger of electric shock under specific conditions.</p>

Alert Statements in This Document

The following alert statements apply to the product in this document. Each alert statement also appears at the locations needed in this document to attract your attention.



This product must be used according to this document. Failure to observe this may result in impairment of functions and performance of the product.



This product is not designed or rated for ensuring safety of persons. Do not use it for such purposes.



Never connect the AC power supply with this product. When the AC power supply is connected, it causes electric shock and fire.



When using equipment that is connected to an AC power source such as an AC adapter or PoE injector, use it within the rated voltage range. Usage with a voltage higher than what it is rated for may cause serious personal injury due to electric shock, or serious physical damage due to fire or equipment failure. Do not touch any part of the device while in operation, or immediately after turning OFF the power.



Please design the system as a whole so that it remains safe even in the event of a failure of the product or an error due to an external product. Abnormal operation may result in a serious accident.



Precautions for Safe Use

Conditions for the Safe Use of This Product

- Please do not use this product directly or indirectly to detect the human body for the purpose of ensuring safety. In the same application, please use the safety sensor that is published in our sensor catalog.
- This product is designed and manufactured as a general-purpose product for use in general industrial applications. Use of the product is NOT intended in the following critical applications, and doing so will void the warranty, unless otherwise specifically agreed upon by the manufacturer.
 - a) Applications with stringent safety requirements, including but not limited to nuclear power control equipment, combustion equipment, aerospace equipment, railway equipment, elevator/lift equipment, amusement park equipment, medical equipment, safety devices and other applications that could physically harm the operator.
 - b) Applications that require high reliability, including but not limited to supply systems for gas, water and electricity, etc., 24 hour continuous operating systems, financial settlement systems and other applications that handle rights and property.
 - c) Applications under severe operating conditions or in a severe environment, including but not limited to outdoor equipment, equipment exposed to chemical contamination, equipment exposed to electromagnetic interference and equipment exposed to vibration and shocks.
 - d) Applications under operating conditions and environments not described in product specifications.
 - *1. In addition to the applications listed from (a) to (d) above, this product (see definition) is not intended for use in vehicles designed for human transport (including two-wheeled vehicles). Do NOT use this product for vehicles designed for human transport. Please contact the our sales staff for information on our automotive line of products.
 - *2. The above is part of the Terms and Conditions Agreement. Please carefully read the contents of the guarantee and disclaimers described in our latest version of the catalog, datasheets, and user manuals.

Installation Environment

- Do not use the product in areas where flammable or explosive gases are present.
- Be careful when installing the product. Product and mounting brackets may have sharp edges that can cause injury.
- Always use the lens cover when storing the product.
- To ensure safety of operation and maintenance, do not install the product close to high-voltage devices or other power devices.
- Make sure that all accessories, such as lights and lenses, are mounted securely.
- Make sure to tighten all installation screws securely.

Power Supply and Wiring

- Make sure to use the product with the power supply voltage specified by the user manual.
- Do not connect camera to AC power. Applying AC power will cause the unit to fail.
- Use a wire size suitable to the current consumption and length of wire.
- Use a DC power supply with safety measures against high-voltage spikes (safety extra low-voltage circuits on the secondary side). If the system must meet UL standards, use a UL Class 2 power supply.
- Confirm that the following conditions are met before applying power to the camera:
 - Correct voltage and polarity;
 - Proper load and output wiring;
 - All wiring is correct for the application.
- When using equipment that is connected to an AC power source such as an AC adapter or PoE injector, use it within the rated voltage range. Usage with a voltage higher than what it is rated for may cause serious personal injury due to electric shock, or serious physical damage due to fire or equipment failure. Do not touch any part of the device while in operation, or immediately after turning OFF the power.
- Be careful when connecting cables. Pinching or other injury may occur.

Ground

- Ensure that the power supply circuit of the unit is insulated from the internal circuit. Refer to the user manual.
- Check wiring again before turning on the unit.

Security Measures

● Anti-Virus Protection

Install the latest commercial-quality antivirus software on the computer connected to the control system and maintain to keep the software up to date.

● Security Measures to Prevent Unauthorized Access

Take the following measures to prevent unauthorized access to our products:

- Install physical controls so that only authorized personnel can access control systems and equipment.
- Reduce connections to control systems and equipment via networks to prevent access from untrusted devices.
- Install firewalls to shut down unused communications ports and limit communications hosts and isolate control systems and equipment from the IT network.
- Use a virtual private network (VPN) for remote access to control systems and equipment.
- Adopt multifactor authentication to devices with remote access to control systems and equipment.
- Set strong passwords and change them frequently.
- Scan for viruses to ensure safety of USB drives or other external storage devices before connecting them to control systems and equipment.

● Data Input and Output Protection

Validate backups and ranges to cope with unintentional modification of input/output data to control systems and equipment.

- Check the scope of data.
- Check validity of backups and prepare data for restore in case of falsification or abnormalities.
- Safety design, such as emergency shutdown and fail-soft operation in case of data tampering or abnormalities.

● Data Recovery

Back up and update data periodically to prepare for data loss.

When using an intranet environment through a global address, connecting to an unauthorized terminal such as a SCADA, HMI or to an unauthorized server may result in network security issues such as spoofing and tampering.

You must take sufficient measures such as restricting access to the terminal, using a terminal equipped with a secure function, and locking the installation area by yourself.

When constructing an intranet, communication failure may occur due to cable disconnection or the influence of unauthorized network equipment. Take adequate measures, such as restricting physical access to network devices, by such means as locking the installation area.

When using a device equipped with the SD Memory Card function, there is a security risk that a third party may acquire, alter, or replace the files and data in the removable media by removing or unmounting the removable media. Please take sufficient measures, such as restricting physical access to the controller or taking appropriate management measures for removable media, by means of locking the installation area, entrance management, etc.

● Software

To prevent computer viruses, install antivirus software on the computer where you use this software. Make sure to keep the antivirus software updated.

Keep your computer's OS updated to avoid security risks caused by a vulnerability in the OS.

Always use the latest version of this software to add new features, increase operability, and enhance security.

Manage usernames and passwords for this software carefully to protect them from unauthorized uses.

Set up a firewall (e.g., disabling unused communication ports, limiting communication hosts, etc.) on a network for a control system and devices to separate them from other IT networks.

Make sure to connect to the control system inside the firewall.

Use a virtual private network (VPN) for remote access to a control system and devices from this software.

Other

- Use only the cables designed specifically for the product. Use of other products may result in malfunction of, or damage to, the product.
- Always turn OFF the power of the camera and peripheral devices before connecting or disconnecting a cable. Connecting the cable with power supply on may result in damage to the camera or peripheral devices.
- Do not apply torsion stress to the cable. It may damage the cable.
- Secure the minimum bending radius of the cable. Otherwise the cable may be damaged.
- Do not attempt to dismantle, repair, or modify the product.
- Should you notice any abnormalities, immediately stop use, turn OFF the power supply, and contact your OMRON representative.
- While the power is ON or immediately after the power is turned OFF, the case is still hot. Do not touch the case.
- When disposing of the product, treat it as industrial waste.
- Do not drop the product or apply excessive vibration or shock to the product. Doing so may cause malfunction or burning of internal components.
- When controlling stages and robots using the read results (axis movement output based on calibration and alignment measurement), always take fail-safe measures within the stage and robot systems, such as checking whether the data obtained from the read results is within the range of movement of the stages and robots.

Precautions for Correct Use

Installation and Storage Sites

Install and store the product in a location that meets the following conditions:

- Surrounding temperature of 0 to +40°C (–25 to +65°C in storage)
- No rapid changes in temperature (place where dew does not form)
- Relative humidity of between 25% to 85%
- No presence of corrosive or flammable gases
- Place free of dust, salts and iron particles
- Place free of vibration and shock
- Place out of direct sunlight
- Place where it will not come into contact with water, oils or chemicals
- Place not affected by strong electro-magnetic waves
- Place not near to high-voltage, or high-power equipment

Ambient Temperature

- For good heat dissipation, maintain adequate distance.
- Do not install the product immediately above significant heat sources, such as heaters, transformers, or large-capacity resistors.
- Do not let the ambient temperature exceed an operating temperature range.
- Provide a forced-air cooling fan or air conditioning if the ambient temperature is near the upper range of operating temperature range. This will keep the ambient temperature from exceeding the upper operating temperature range.

Noise Resistance

- Do not install the product in a cabinet containing high-voltage equipment.
- Do not install the camera within 200 mm of power cables.
- To use the camera in an environment with a high level of noise, use the filter cable V430-WXXF-XM.
- Do not apply excessive force to connectors. They may break and cause the product to malfunction.

Component Installation and Handling

- Turning OFF the Power

When a message is displayed indicating that a task is in progress, do not turn OFF the power. Doing so causes the data in the memory to be corrupted, resulting in the product not operating properly upon the next start-up.

When turns OFF, conform the followings proceedings have completed. and then operate again.

- When saves using the camera:

Confirm the save processing is completed and next operation is possible.

- When saves using communication command:

Intended command is completed.

- Setting of Power Source

The power source need to be supplied from DC power source apparatus which is taken a save ultra-low-voltage circuit: to protect high voltage.

Maintenance

- Turn OFF the power and ensure the safety before maintenance.
- Optical components should be cleaned with a lens-cleaning cloth.
- Lightly wipe off dirt with a soft cloth.
- Do not use thinners or benzene.
- To ensure safe access for operation and maintenance, separate the camera as much as possible from high-voltage equipment and power machinery.
- When maintaining the product, be careful not to contact high pressure or other electrical equipment.

Regulations and Standards

Using Product Outside Japan

This regulation applies to the smart camera and peripheral devices.

If you export (or provide a non-resident with) this product or a part of this product that falls under the category of goods (or technologies) specified by the Foreign Exchange and Foreign Trade Control Law as those which require permission or approval for export, you must obtain permission or approval or service transaction permission) pursuant to the law.

Conformance to EC/EU Directives

This regulation applies to the smart camera and peripheral devices.

- This product is in compliance with all applicable directives, 2014/30/EU, 2014/35/EU, and 2011/65/EU.
- This product complies with EC/EU Directives. EMC-related performance of the OMRON devices that comply with EC/EU Directives will vary depending on the configuration, wiring, and other conditions of the equipment or control panel on which the OMRON devices are installed.
- The customer must, therefore, perform the final check to confirm that devices and the overall machine conform to EMC standards.

Conformance to UL Standards

This regulation applies to the smart camera and peripheral devices.

This product complies with UL Standards.

- UL60950-1 2nd-edition, 2014 (Class III)

Korean Radio Regulation (KC)

사용자안내문

이 기기는 업무용 환경에서 사용할 목적으로 적합성평가를 받은 기기로서 가정용 환경에서 사용하는 경우 전파간섭의 우려가 있습니다.

Guide for Users

This equipment has been evaluated for conformity in a commercial environment. When used in a residential environment, it may cause radio interference.

Radio Frequency Interference Requirements: FCC



This equipment has been tested for compliance with FCC (Federal Communications Commission) requirements and has been found to conform to applicable FCC standards. To comply with FCC RF exposure compliance requirements, this device must not be co-located with or operate in conjunction with any other antenna or transmitter. Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

Class A Statement

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

Class B Statement

NOTE: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

Radio Frequency Interference Requirements: Canada

This device complies with Industry Canada ICES-003. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation. Cet appareil est conforme à la norme ICES-003 d'Industrie Canada. Son fonctionnement est soumis aux deux conditions suivantes: (1) l'appareil ne doit pas produire de brouillage, et (2) l'utilisateur de l'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.

This Class B digital apparatus complies with Canadian ICES-003. Cet appareil numérique de la classe B est conforme à la norme NMB-003 du Canada.

Table of Contents

Terms and Conditions Agreement	3
Safety Precautions	5
Precautions for Safe Use	7
Precautions for Correct Use.....	10
Regulations and Standards	12
Revision History	14

Section 1 Introduction

1-1 Product Summary.....	1-2
1-2 Features and Benefits	1-3
1-3 Applications	1-4
1-4 Package Contents	1-5
1-6 Smart Camera Models	1-6
1-7 Part Number Structure	1-7

Section 2 Installation and Connections

2-1 System Configuration	2-2
2-2 Check Hardware	2-7
2-3 Position the Smart Camera and Set Up Optics.....	2-9
2-4 External Illumination Control and Wiring	2-12
2-5 I/O Wiring.....	2-17

Appendices

A General Specifications.....	A-1
B Firmware Update	B-1



Introduction

This section provides a general overview of the F440-F C-Mount Smart Camera.

1-1	Product Summary	1-2
1-2	Features and Benefits	1-3
1-3	Applications	1-4
1-4	Package Contents	1-5
1-5	Smart Camera Models	1-6
1-6	Part Number Structure	1-7

1-1 Product Summary

F440-F Smart Cameras are designed for reliable vision performance in identification and inspection applications. The compact size and wide variety of optics and illumination options available provide the best performance for virtually any machine vision application.

The F440-F allows automation engineers to implement inspection, symbol decoding, OCR, and more, in a single compact solution. The small form factor allows flexible positioning in tight spaces.

AutoVISION software, designed for use with the F440-F, provides an intuitive interface, step-by-step configuration, and a library of presets that allow easy setup and deployment. For more complex vision applications, the system can be upgraded from AutoVISION to Visionscape.

1-2 Features and Benefits

- Simple Configuration with AutoVISION
- 5 Megapixel Sensor
- Smallest Camera in Class
- IP40 Enclosure
- Power over Ethernet
- Ethernet TCP/IP
- EtherNet/IP
- PROFINET
- Single Locking RJ45 Connector and Cable
- Ring Light and Bracket Kit Options Available

1-3 Applications

- Inspection
- Guidance
- Gauging
- Part presence/absence
- Medical device inspection
- Fiducial location
- Part location/orientation detection
- Packaging
- Robotics
- Auto ID (Data Matrix and other 2D symbologies, 1D, OCR)
- 1D and 2D Code Verification
- OCV (Optical Character Verification)

1-4 Package Contents

Before you install AutoVISION software and connect your F440-F, please take a moment to confirm that the following items are available or accessible:

- An F440-F Smart Camera.
- An active internet connection to download the latest AutoVISION software installer from your region's Omron website.
- The cables or other accessories you have added to your order.

Note 1: F440-F cameras are sold without lenses, lights, cables, or mounting. All of these items can be found in later sections of this manual.

Note 2: The F440-F uses all the same cables and interconnect accessories as the V440-F. The F440-F uses standard Ethernet cables. High-Flex TPE cables and Robot Ethernet cables are shown later in this manual.

1-5 Smart Camera Models

F440-F Smart Camera

Simple configuration with AutoVISION.
 5 megapixel sensor.
 Smallest in class.
 IP40 enclosure.
 Ethernet TCP/IP, EtherNet/IP, PROFINET.
 Ring Light and Bracket Kit options available.



1-5-1 Software Options

AutoVISION Software provides a simple setup and runtime interface for solving basic to mid-range vision and auto ID challenges. Scalable with Visionscape Software.

Visionscape Software provides a professional setup and runtime interface with access to a full suite of auto ID, verification, and machine vision tools.


Software License	Vision Toolset
F440-FXXX50M-NNS: AutoVISION Sensor	Locate Tool, Presence/Absence Tool, Count Tool, Measure Tool, Logic Tool
F440-FXXX50M-NNA: AutoVISION + Verification	All of the Above + Decode Tool, OCR Tool, Match Strings Tool, String Format Tool, OCV Tool, Symbol Quality Verification Tool
F440-FXXX50M-NNV: AutoVISION + Verification + Visionscape	All of the Above + Visionscape Extensive Machine Vision Tool Set

1-6 Part Number Structure

F440-F Part Number Structure

Use this legend when defining product part numbers. When ordering, use valid part numbers from the tables in the Ordering Information section only.

Camera Models

Appearance	Description	Part Number
	F440-F, No Optics, 5 MP, Mono, No Light, AutoVISION Sensor	F440-FXXXY50M-NNS
	F440-F, No Optics, 5 MP, Mono, No Light, AutoVISION + Verification	F440-FXXXY50M-NNA
	F440-F, No Optics, 5 MP, Mono, No Light, AutoVISION + Verification + Visionscape	F440-FXXXY50M-NNV

2

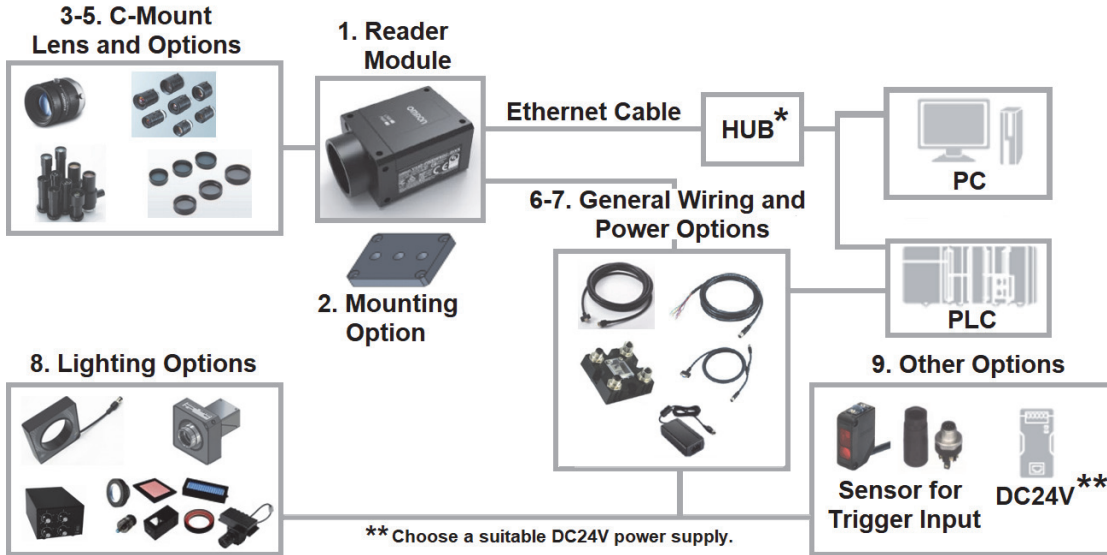
Installation and Connections

This section is designed to get your F440-F Smart Camera up and running quickly.

2-1	System Configuration	2-2
2-2	Check Hardware	2-7
2-3	Position the Smart Camera and Set Up Optics	2-9
2-4	External Illumination Control and Wiring	2-12
2-5	I/O Wiring	2-17

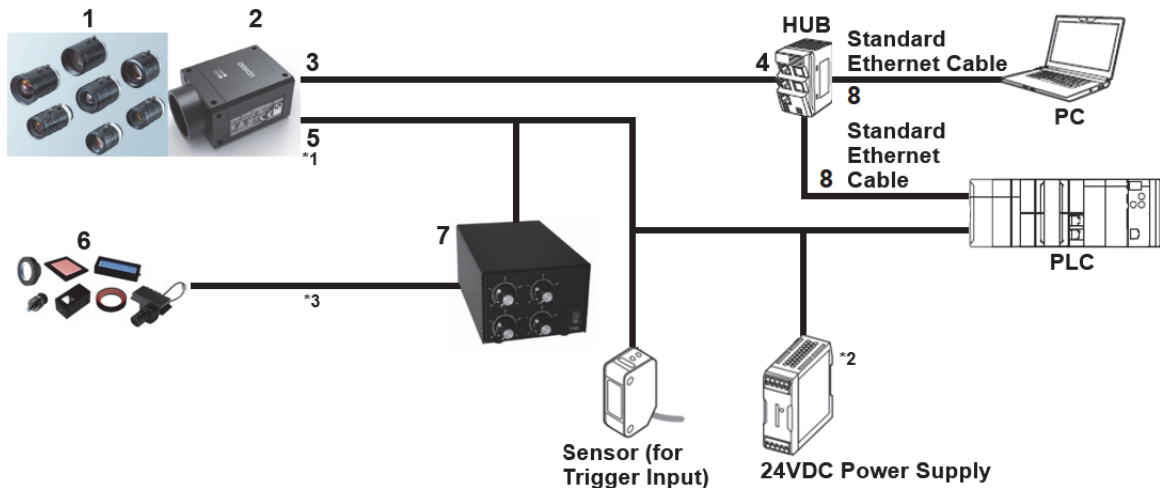
2-1 System Configuration

The following hardware configuration diagrams demonstrate some of the many ways the F440-F can be deployed in an application. These configurations show Omron lenses and lighting. The F440-F can be used with any vendor's lenses and lighting. Lighting can be either directly powered, or can use Strobe Out pulse on DIO 3.



2-1-1 System Configuration Examples

Example 1: FLV Series or Other External Lighting



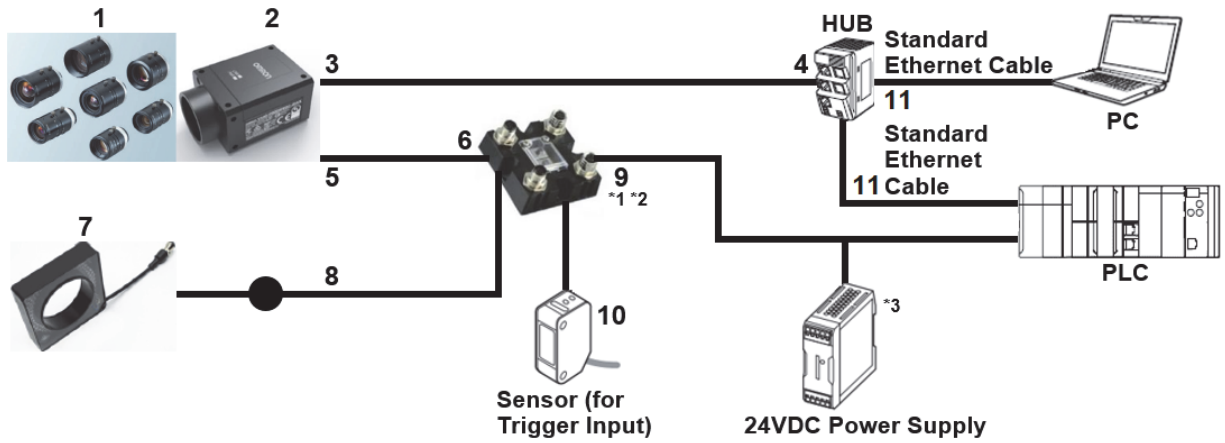
Drawing Reference	Category	Part Number
1	C-Mount Lens	3Z4S-□□, 98-9000□□□-01
2	F440-F C-Mount 5 MP Camera	F440-FXXX50M-NN□
3	Industrial High-Flex GigE Ethernet Cable with Jack Screws and RJ45 Connector	98-00013□-0□
4	Industrial Switching HUB	Example: W4S1-□□□Series
5	M12-to-Flying Leads Cable	V430-W8□□□-□M
6	FLV Lighting	FLV-□
7	Lighting Controller	FLV-ATC□, 3Z4S-LT IDGB□
8	Industrial Ethernet Network Cable	XS6W-5PUR8SS□□□□CM-G

*1. The V430-WQ cable (excluding V430-WQR / V430-WQK) can be used as an extension of the V430-W8 cable.

*2. A 24VDC power supply is not needed for the F440-F if a PoE switching HUB is used.

*3. Any vendor's lighting and power supply can be used with the F440-F. The I/O cable provides strobe signal to light power supply.

Example 2: NERLITE Smart Series Light with QX-1



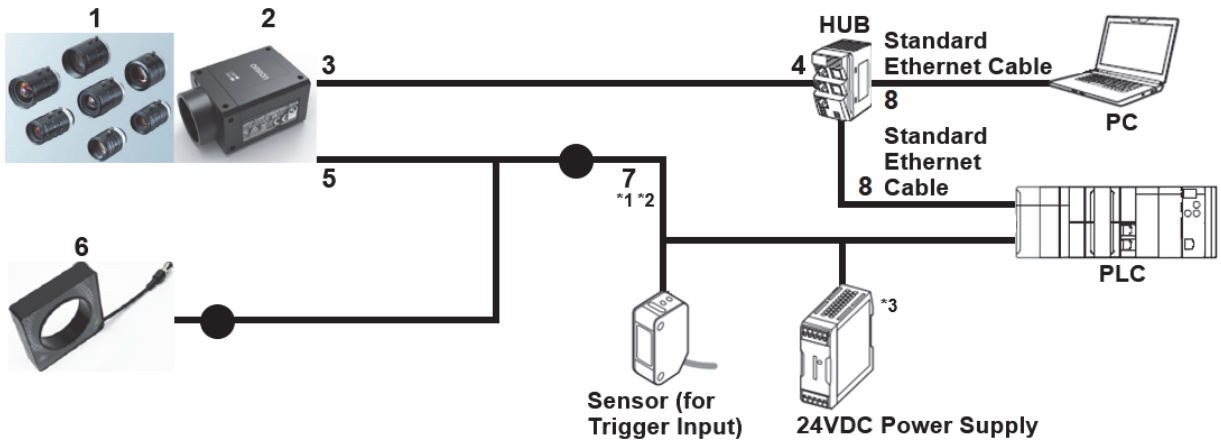
Drawing Reference	Category	Part Number
1	C-Mount Lens	3Z4S-□□, 98-9000□□□-01
2	F440-F C-Mount 5 MP Camera	F440-F□□□□50M-NN□
3	Industrial High-Flex GigE Ethernet Cable with Jack Screws and RJ45 Connector	98-00013□-0□
4	Industrial Switching HUB	Example: W4S1-□□□ Series
5	Camera-to-QX-1 Interconnect Cable	V430-WQ-1M
6	QX-1 Interface Device	98-000103-02
7	NERLITE Smart Series R-70 or R-100 Ring Light	NER-01166□□□□G
8	Integrated Light Cable	61-0002□□-01
9	M12-to-Flying Leads Cable	V430-W8□□□-□M
10	QX-1 Photo Sensor	99-9000016-01
	QX-1 Field-Wireable M12 4-Pin Plug for Any Trigger Source or Photo Sensor	98-9000239-01
11	Industrial Ethernet Network Cable	XS6W-5PUR8SS□□□□CM-G

*1. The V430-WQ cable (excluding V430-WQR / V430-WQK) can be used as an extension of the V430-W8 cable.

*2. It is possible to connect a 97-000012-01 power supply instead of V430-W8. However, since there is no I/O line, you cannot connect to the sensor or PLC.

*3. A 24VDC power supply is not needed for the F440-F if a PoE switching HUB is used.

Example 3: NERLITE Smart Series Light without QX-1



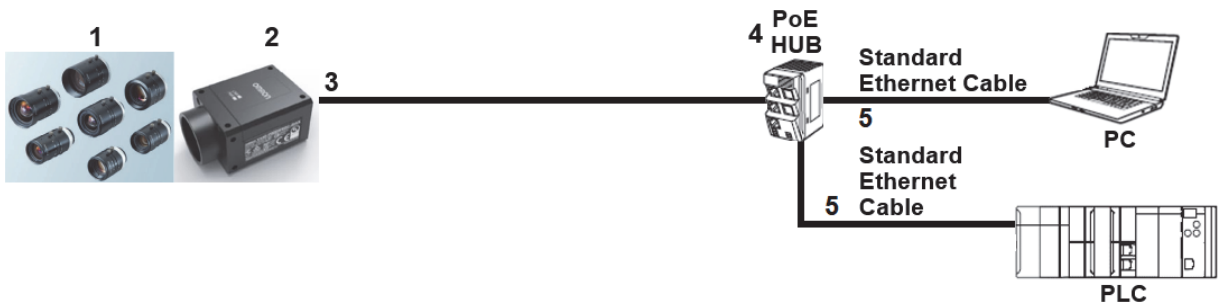
Drawing Reference	Category	Part Number
1	C-Mount Lens	3Z4S-□□, 98-9000□□□-01
2	F440-F C-Mount 5 MP Camera	F440-FXXX50M-NN□
3	Industrial High-Flex GigE Ethernet Cable with Jack Screws and RJ45 Connector	98-00013□-0□
4	Industrial Switching HUB	Example: W4S1-□□□ Series
5	Integrated Light Y Cable	61-900013□-01
6	NERLITE Smart Series R-70 or R-100 Ring Light	NER-01166□□□□G
7	M12-to-Flying Leads Cable	V430-W8□□□□-□M
8	Industrial Ethernet Network Cable	XS6W-5PUR8SS□□□□CM-G

*1. The V430-WQ cable (excluding V430-WQR / V430-WQK) can be used as an extension of the V430-W8 cable.

*2. It is possible to connect a 97-000012-01 power supply instead of V430-W8. However, since there is no I/O line, you cannot connect to the sensor or PLC.

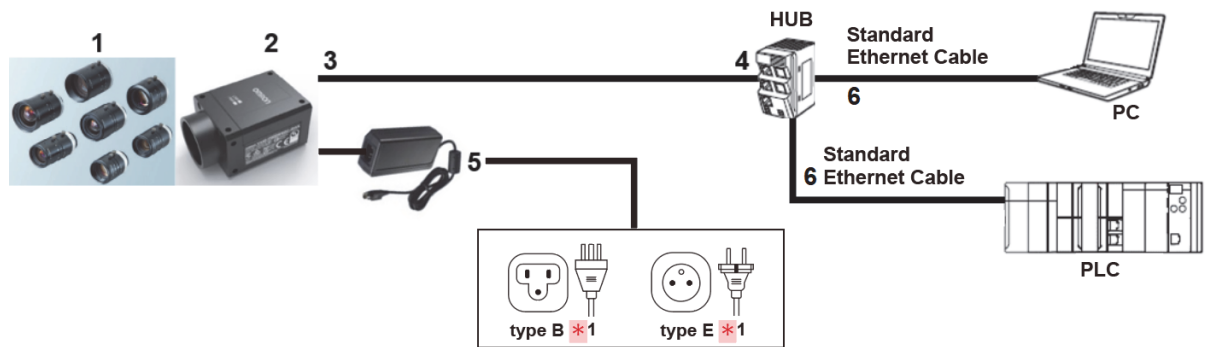
*3. A 24VDC power supply is not needed for F440-F if a PoE switching HUB is used.

Example 4: Minimum Power over Ethernet (PoE) Configuration



Drawing Reference	Category	Part Number
1	C-Mount Lens	3Z4S-□□, 98-9000□□□-01
2	F440-F C-Mount 5 MP Camera	F440-FXXX50M-NN□
3	Industrial High-Flex GigE Ethernet Cable with Jack Screws and RJ45 Connector	98-00013□-0□
4	PoE (Power over Ethernet) HUB	
5	Industrial Ethernet Network Cable	XS6W-5PUR8SS□□□□CM-G

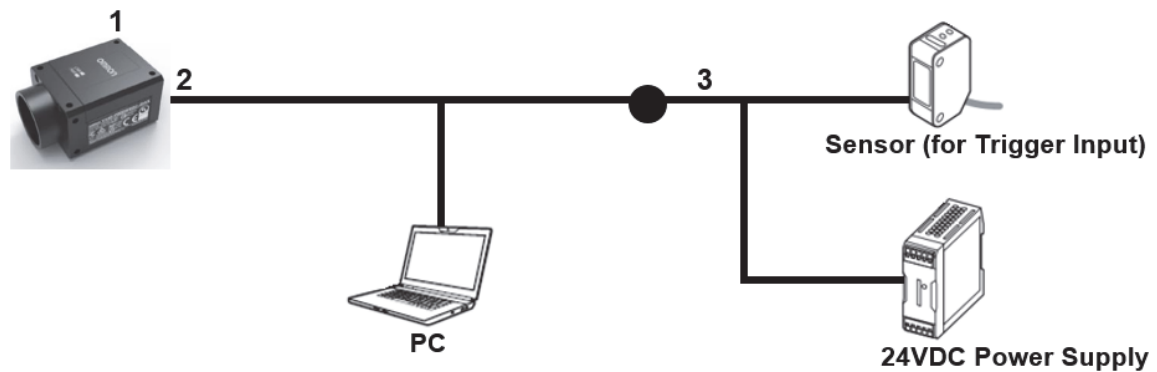
Example 5: Minimum External Power Configuration



Drawing Reference	Category	Part Number
1	C-Mount Lens	3Z4S-□□, 98-9000□□□□-01
2	F440-F C-Mount 5 MP Camera	F440-F□□□□50M-NN□
3	Industrial High-Flex GigE Ethernet Cable with Jack Screws and RJ45 Connector	98-00013□-0□
4	Industrial Switching HUB	Example: W4S1-□□□ Series
5	Power Supply, 100-240VAC, +24VDC, M12 12-Pin Socket	97-000012-01
6	Industrial Ethernet Network Cable	XS6W-5PUR8SS□□□□CM-G

*There are many types of outlet plugs for the power supply. Select a suitable plug type for your environment. (Example: type B for Japan, type E for Europe.)

Example 6: USB Configuration

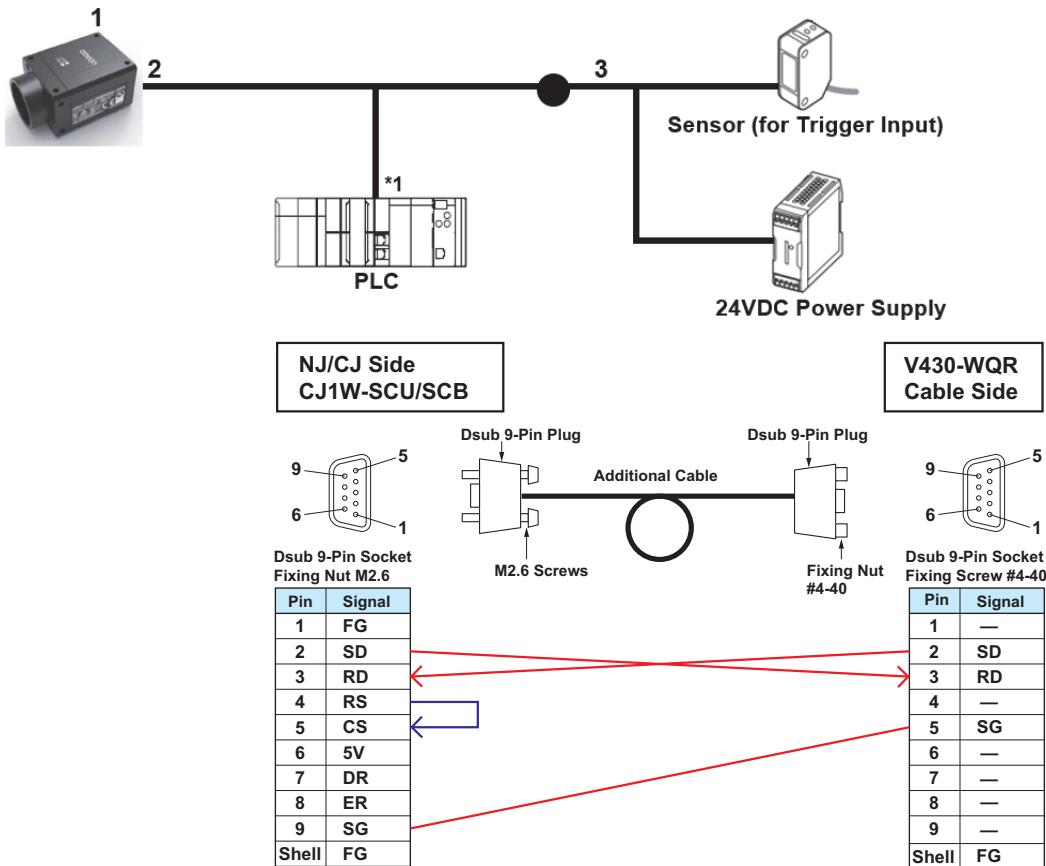


Drawing Reference	Category	Part Number
1	F440-F C-Mount 5 MP Camera	F440-F□□□□50M-NN□
2	Camera-to-QX-1 Interconnect Cable with USB Keyboard Wedge Breakout	V430-WQK-3M*
3	M12-to-Flying Leads Cable	V430-W8□□□□-□M

*Insert the V430-WQK-3M cable between the F440-F and the V430-W8□□□□-□M cable.

*Standard Ethernet cable required to PC for initial job download to F440-F Smart Camera.

Example 7: RS-232C Configuration



Note: If the communication is non-procedural, only the three red connections are required.

Drawing Reference	Category	Part Number
1	F440-F C-Mount 5 MP Camera	F440-FXXX50M-NN□
2	Camera-to-QX-1 Interconnect Cable with RS-232 Breakout	V430-WQR-3M*
3	M12-to-Flying Leads Cable	V430-W8□□□□-□M

*1. If connecting Omron's CS/CJ/NJ Controller, check the connector shape and signal lines (pin assignments) and prepare the additional RS-232C conversion cable. If connecting to Omron's NX Machine Automation Controller, no additional RS-232C cable is required.

*Insert the V430-WQR-3M cable between the F440-F and the V430-W8 cable.

*Standard Ethernet cable required to PC for initial job download to F440-F Smart Camera.

Example 8: Power over Ethernet (PoE) Standalone Configuration



Drawing Reference	Category	Part Number
1	C-Mount Lens	3Z4S-□□, 98-9000□□□□-01
2	F440-F C-Mount 5 MP Camera	F440-FXXX50M-NN□
3	Industrial High-Flex GigE Ethernet Cable with Jack Screws and RJ45 Connector	98-00013□-0□
4	Single Port PoE Injector, 30W, IEEE802.3at Compliant*	98-9000311-01 (Coming Soon)
5	Industrial Ethernet Network Cable	XS6W-5PUR8SS□□□□CM-G

*Power cord NOT included with 98-9000311-01. There are many types of outlet plugs for the PoE Injector (C13 connector required). Select a suitable plug type for your environment. (Example: Type B for Japan, type E for Europe.)

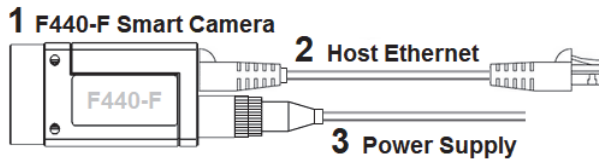
2-2 Check Hardware

2-2-1 Basic Hardware Table and Configuration Diagram

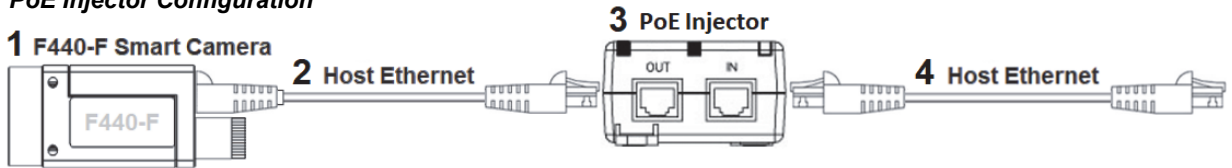
Item	Description	Part Number
1	F440-F, No Optics, 5MP, Mono, No Light, AutoVISION Sensor	F440-FXXX50M-NNS
	F440-F, No Optics, 5MP, Mono, No Light, AutoVISION + Verification	F440-FXXX50M-NNA
	F440-F, No Optics, 5MP, Mono, No Light, AutoVISION + Verification + Visionscape	F440-FXXX50M-NNV
2	Industrial High-Flex GigE Ethernet Cable with Jack Screws and RJ45 Connector	98-00013□-02
3	Power Supply, 100-240VAC, +24VDC, M12 12-Pin Socket	97-000012-01
	OR	
	Single Port PoE Injector, 30W, IEEE802.3at-Compliant*1	98-000311-01 (Coming Soon)
4	Industrial Ethernet Network Cable	XS6W-5PUR8SS□□□□CM-G

*1. Power cord NOT included with 98-9000311-01. There are many types of outlet plugs for the PoE Injector (C13 connector required). Select a suitable plug type for your environment.

Standard Configuration

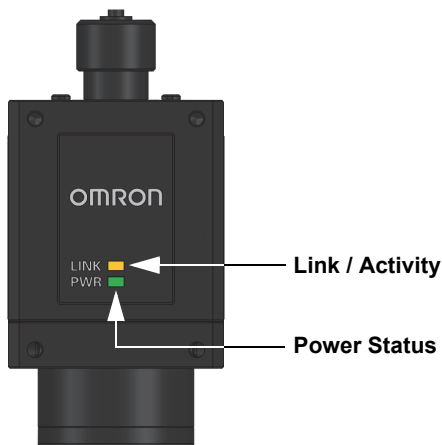


PoE Injector Configuration



2-2-2 LED Indicators

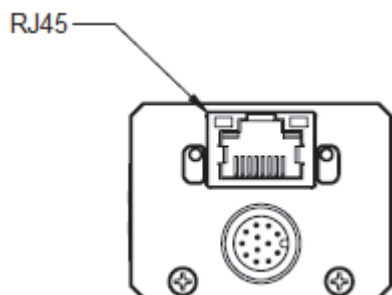
The top of the F440-F has two LEDs that indicate **Link** status and activity, and **Power** status.



LED	Status	Description
LINK	On Steady (Amber)	Link Established
	Flashing On / Off (Amber)	Link Activity
	Off	No Link Established, No Link Activity
PWR	On Steady (Green)	Power On
	Off	No Power Applied to Unit

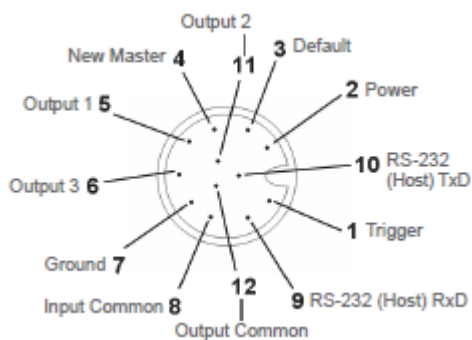
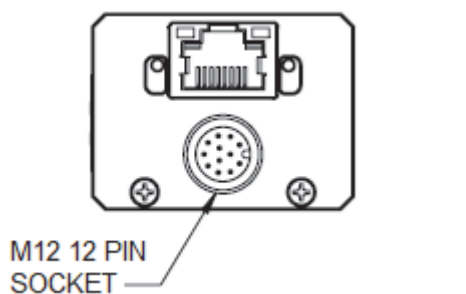
2-2-3 Connectors

RJ45 Connector



Pin	Function
1	TA+
2	TA-
3	TB+
4	TC+
5	TC-
6	TB-
7	TD+
8	TD-

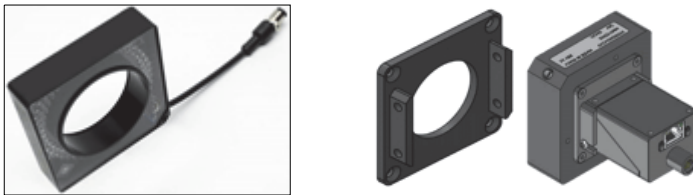
M12 12-Pin Socket Connector



M12 12-Pin Socket

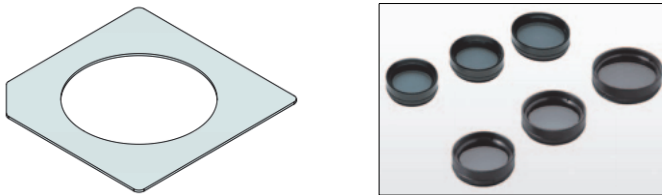
2-3 Position the Smart Camera and Set Up Optics

- Use the **C-Mount Lens Options** tables in 2-3-1, **Determining the Optical Setup**, to find a C-Mount lens that achieves the camera standoff and field of view required for your application. Be sure that the resulting image resolution is adequate for your application.
- An external light will likely be needed to illuminate the work area where images will be captured. You can choose lighting from any vendor, including NERLITE or FLV from Omron. NERLITE Smart Series Illuminators are an example of such lighting. The **NERLITE Smart Series Ring Illuminator** shown below left can be used with a **Bracket Kit** shown below right designed for mounting the Ring Light to the F440-F.



Note: Refer to the *F440-F Datasheet* for Ring Light and Bracket Kit options, dimensions, and part numbers.

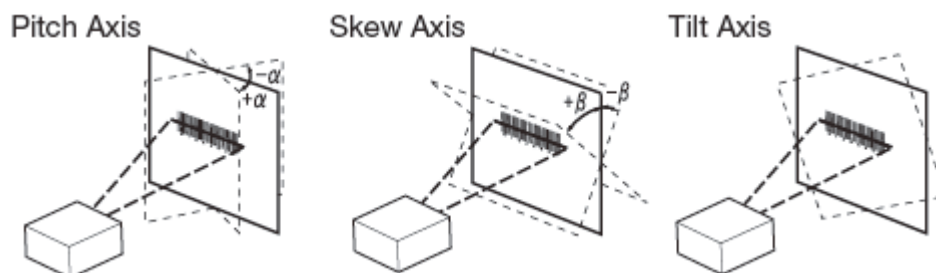
- If possible, tip the camera relative to the workpiece to avoid the glare of direct specular reflection.
- If your application requires the camera to be oriented perpendicular to the workpieces it will be inspecting, you can use a **Ring Light Polarizer** shown below left and a **Lens Polarizer** shown below right to avoid the glare of direct specular reflection.



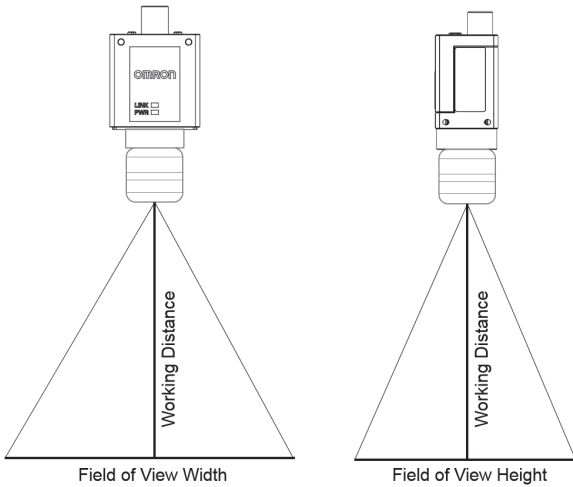
Note: Refer to the *F440-F Datasheet* for Polarizer Kit and Lens Polarizer options, dimensions, and part numbers.

- In the case of code reading, symbols can be rotated or tilted at any angle. However, for best results, symbols should be aligned with the field of view. In the case of linear symbols, aligning the bars in the direction of movement ladder orientation will minimize image blurring and will result in more consistent decodes.

Important: Avoid excessive skew or pitch. Maximum skew is $\pm 30^\circ$ and maximum pitch is $\pm 30^\circ$. The illustration below shows approximate skew axis, pitch axis, and tilt axis.



2-3-1 Determining the Optical Setup



General lens formulas for any combination, given working distance, focal length, or field of view width:

Field of View Width = 8.5 x Working Distance / Focal Length

Field of View Height = 7.093 x Working Distance / Focal Length

Focal Length = 8.5 x Working Distance / Field of View Width

Working Distance = Field of View Width x Focal Length / 8.5

Field of View for 25* to 500 mm Working Distance

Lens FL	Field of View (mm x mm) at Specific Working Distances (mm)											
	25	50	75	100	150	200	250	300	350	400	450	500
F = 6	35 x 30	71 x 59	106 x 89	142 x 118	213 x 177	283 x 236	354 x 296	425 x 355	496 x 414	567 x 473	638 x 532	708 x 591
F = 8	27 x 22	53 x 44	80 x 66	106 x 89	159 x 133	213 x 177	266 x 222	319 x 266	372 x 310	425 x 355	478 x 399	531 x 443
F = 9	24 x 20	47 x 39	71 x 59	94 x 79	142 x 118	189 x 158	236 x 197	283 x 236	331 x 276	378 x 315	425 x 355	472 x 394
F = 12.5	17 x 14	34 x 28	51 x 43	68 x 57	102 x 85	136 x 113	170 x 142	204 x 170	238 x 199	272 x 227	306 x 255	340 x 284
F = 16	13 x 11	27 x 22	40 x 33	53 x 44	80 x 66	106 x 89	133 x 111	159 x 133	186 x 155	213 x 177	239 x 199	266 x 222
F = 25	9 x 7	17 x 14	26 x 21	34 x 28	51 x 43	68 x 57	85 x 71	102 x 85	119 x 99	136 x 113	153 x 128	170 x 142
F = 35	6 x 5	12 x 10	18 x 15	24 x 20	36 x 30	49 x 41	61 x 51	73 x 61	85 x 71	97 x 81	109 x 91	121 x 101
F = 50	4 x 4	9 x 7	13 x 11	17 x 14	26 x 21	34 x 28	43 x 35	51 x 43	60 x 50	68 x 57	77 x 64	85 x 71
F = 75	3 x 2	6 x 5	9 x 7	11 x 9	17 x 14	23 x 19	28 x 24	34 x 28	40 x 33	45 x 38	51 x 43	57 x 47
F = 100	2 x 2	4 x 4	6 x 5	9 x 7	13 x 11	17 x 14	21 x 18	26 x 21	30 x 25	34 x 28	38 x 32	43 x 35

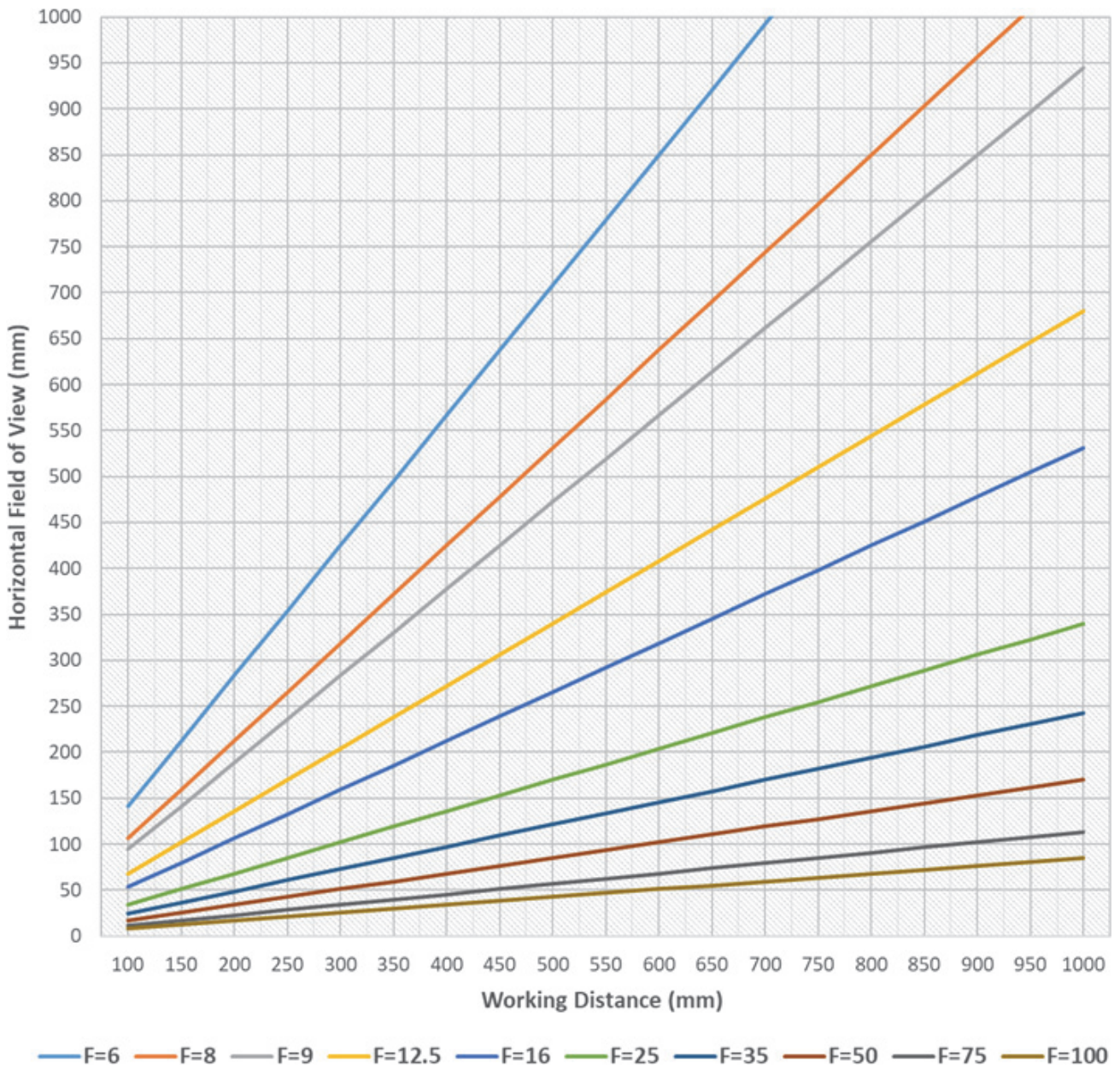
*For working distances shorter than the minimum working distance specified for the lens, an extension ring is required to focus the lens.

Field of View at 600 to 2500 mm Working Distance

Lens FL	Field of View (mm x mm) at Specific Working Distances (mm)									
	600	700	800	900	1000	1250	1500	1750	2000	2500
F = 6	850 x 709	992 x 828	1133 x 946	1275 x 1064	1417 x 1182	1771 x 1478	2125 x 1773	2479 x 2069	2833 x 2364	3542 x 2956
F = 8	638 x 532	744 x 621	850 x 709	956 x 798	1063 x 887	1328 x 1108	1594 x 1330	1859 x 1552	2125 x 1773	2656 x 2217
F = 9	567 x 473	661 x 552	756 x 631	850 x 709	944 x 788	1181 x 985	1417 x 1182	1653 x 1379	1889 x 1576	2361 x 1970
F = 12.5	408 x 340	476 x 397	544 x 454	612 x 511	680 x 567	850 x 709	1020 x 851	1190 x 993	1360 x 1135	1700 x 1419
F = 16	319 x 266	372 x 310	425 x 355	478 x 399	531 x 443	664 x 554	797 x 665	930 x 776	1063 x 887	1328 x 1108
F = 25	204 x 170	238 x 199	272 x 227	306 x 255	340 x 284	425 x 355	510 x 426	595 x 497	680 x 567	850 x 709
F = 35	146 x 122	170 x 142	194 x 162	219 x 182	243 x 203	304 x 253	364 x 304	425 x 355	486 x 405	607 x 507
F = 50	102 x 85	119 x 99	136 x 113	153 x 128	170 x 142	213 x 177	255 x 213	298 x 248	340 x 284	425 x 355
F = 75	68 x 57	79 x 66	91 x 76	102 x 85	113 x 95	142 x 118	170 x 142	198 x 166	227 x 189	283 x 236
F = 100	51 x 43	60 x 50	68 x 57	77 x 64	85 x 71	106 x 89	128 x 106	149 x 124	170 x 142	213 x 177

Important: See [External Illumination Control and Wiring](#) on the next page.

F440-F Lens Selection Based on Focal Length



2-4 External Illumination Control and Wiring

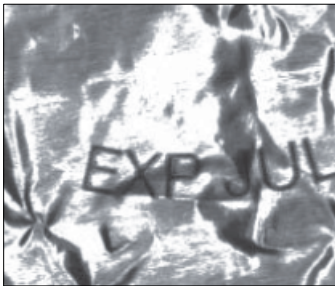
2-4-1 Machine Vision Lighting Principles

Proper lighting is critical to the success of a machine vision application. Depending on the requirements of your application, you may also need external lighting from Omron Microscan's NERLITE family of machine vision lighting products.

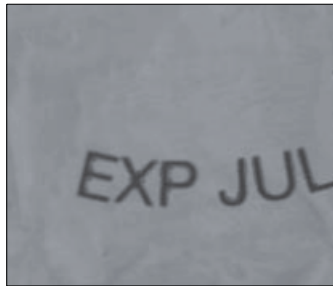
Consider the following when setting up your application:

- Is the surface of the object flat, slightly bumpy, or very bumpy?
- Is the surface matte or shiny?
- Is the object curved or flat?
- What is the color of the object or area being inspected?
- Is the object moving or stationary?

Machine vision lighting should maximize contrast of the areas or features being inspected while minimizing the contrast of everything else.



Before Correct Lighting



After Correct Lighting with
a NERLITE Illuminator

2-4-2 External Illumination Control and Wiring

The F440-F Smart Camera supports external lighting with Omron Microscan's **NERLITE Smart Series Illuminators**. The diagrams below demonstrate how cameras and lights can be configured. The light is controlled with the **Lighting** control in **AutoVISION Software's Camera** configuration settings.

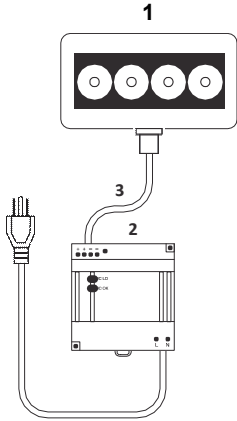


Figure A
MAX Series Illuminator with Power Supply

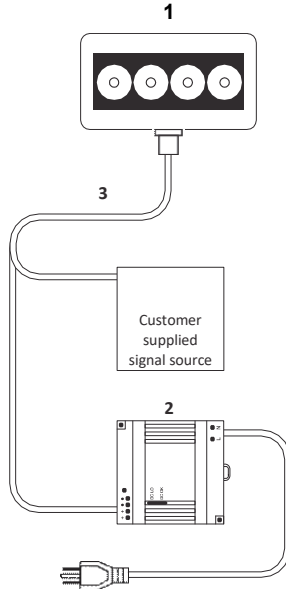


Figure B
MAX Series Illuminator with Customer-Supplied Dimming or On/Off Signal Source

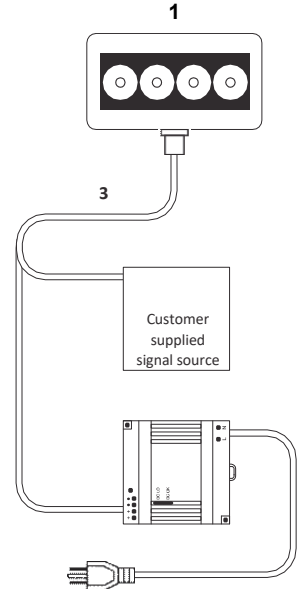


Figure C
MAX Series Illuminator with Customer-Supplied Strobe Trigger Signal Source

Item	Description	Part Number
1	MAX Series Lights	NER-011660XXXG
2	Power Supply DSP100 24VDC 4.2A DIN Mount	97-000006-01
	Power Supply DSP60 24VDC 2.5A DIN Mount	NER-011504100
3	Cable, 5P M12 Socket To Flying Leads, 3M	61-000186-01
	Cable, 5P M12 Socket To Flying Leads, 5M	61-000187-01
4	Cable, 5P M12 Plug To 5P M12 Socket, 1M	61-000184-01
	Cable, 5P M12 Plug To 5P M12 Socket, 3M	61-000185-01
5	Cable, Power Smart Series to QX-1	61-000204-01

QX-1 Interface

In **Strobe Mode**, the external illuminator is strobed with the exposure of the camera to maximize light for the short exposure times needed in dynamic applications.

ON/OFF allows the external illuminator to be enabled and disabled using the F440-F's I/O.

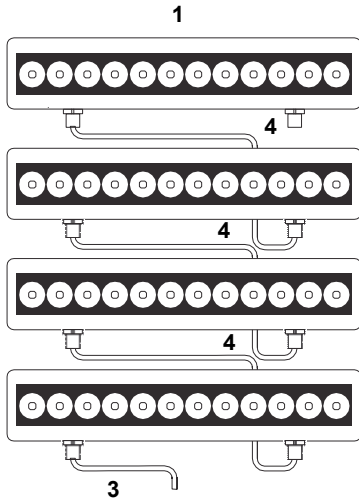


Figure D

MAX Series Illuminators in a daisy chain configuration. See Figures A, B, or C for the correct power supply and signal connections for your application.

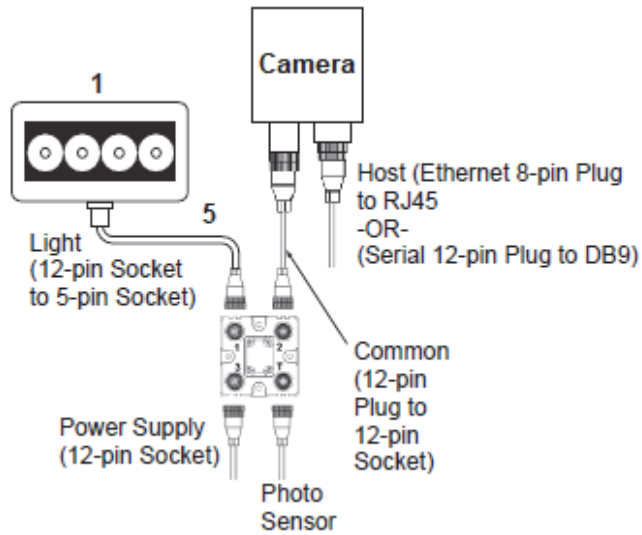


Figure E

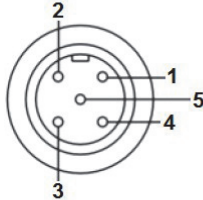
MAX Series Illuminator with a QX-1 Interface Device.

Warning: Figure E is not compatible with daisy chain configuration. Attempting to power more than one MAX Series Illuminator with the QX-1 will exceed the QX-1's current capacity.

Item	Operation	Cable
1	Strobe	61-000218-01, Smart Series-to-QX-1, Strobe, NPN
2	ON/OFF	61-000207-01, Smart Series-to-QX-1, ON/OFF (NPN Only)
3	Continuous ON	61-000204-01, Smart Series-to-QX-1, Continuous

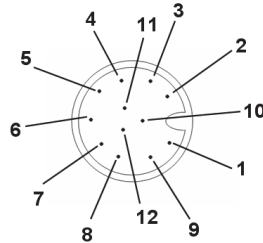
Wiring for Strobe Illumination (NPN)

Warning: Contact between Pin 5 (gray wire) and any ground or voltage source less than or equal to 3.5 VDC may cause erratic operation in this configuration. Contact between Pin 5 (gray wire) and any voltage source greater than 3.5VDC will damage the Illuminator.



Smart Series Illuminator Connector

Smart Series Illuminator	
Pin	Signal Name
1	+24VDC
2	Trigger -
3	DC Ground
4	Trigger +
5	Dim



F440-F Connector A

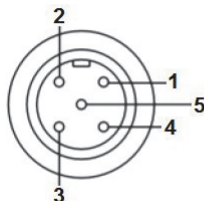
to
to
to
to
to

(Connector A)	
Pin	Signal Name
2	Power
6	Output 3
7 and 12	Ground and Output Common
2	Power
No Connection*	N/A

Insulate Pin 5 (Gray Wire)

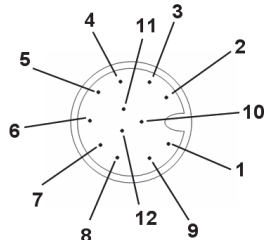
Wiring for Strobe Illumination (PNP)

Warning: Contact between Pin 5 (gray wire) and any ground or voltage source less than or equal to 3.5 VDC may cause erratic operation in this configuration. Contact between Pin 5 (gray wire) and any voltage source greater than 3.5 VDC will damage the Illuminator.



Smart Series Illuminator Connector

Smart Series Illuminator	
Pin	Signal Name
1	+24VDC
2	Trigger -
3	DC Ground
4	Trigger +
5	Dim



F440-F Connector A

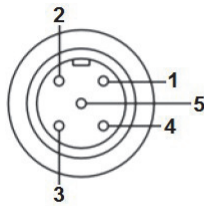
to
to
to
to
to

(Connector A)	
Pin	Signal Name
2 and 12	Power and Output Common
7	Ground
7	Ground
6	Output 3
No Connection*	N/A

Insulate Pin 5 (Gray Wire)

Wiring for ON/OFF Illumination (NPN Only)

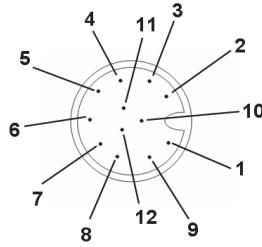
Warning: Contact between Pin 5 (gray wire) and any voltage source greater than 3.5 VDC will damage the Illuminator.



Smart Series Illuminator Connector

Smart Series Illuminator	
Pin	Signal Name
1	+24VDC
2	Trigger –
3	DC Ground
4	Trigger +
5	Dim

to
to
to
to



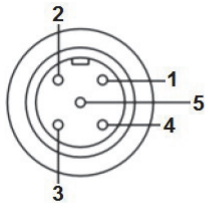
F440-F Connector A

(Connector A)	
Pin	Signal Name
	Power
7 and 12	Ground and Output Common
7 and 12	Ground and Output Common
2	Power
6	Output 3

Insulate Pin 5 (Gray Wire)

Wiring for Continuous Illumination

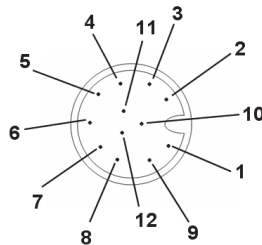
Warning: Contact between Pin 5 (gray wire) and any ground or voltage source less than or equal to 3.5VDC may cause erratic operation in this configuration. Contact between Pin 5 (gray wire) and any voltage source greater than 3.5VDC will damage the illuminator.



Smart Series Illuminator Connector

Smart Series Illuminator	
Pin	Signal Name
1	+24VDC
2	Trigger –
3	DC Ground
4	Trigger +
5	Dim

to
to
to
to



F440-F Connector A

(Connector A)	
Pin	Signal Name
2	Power
7	Ground
7	Ground
2	Power
No Connection*	N/A

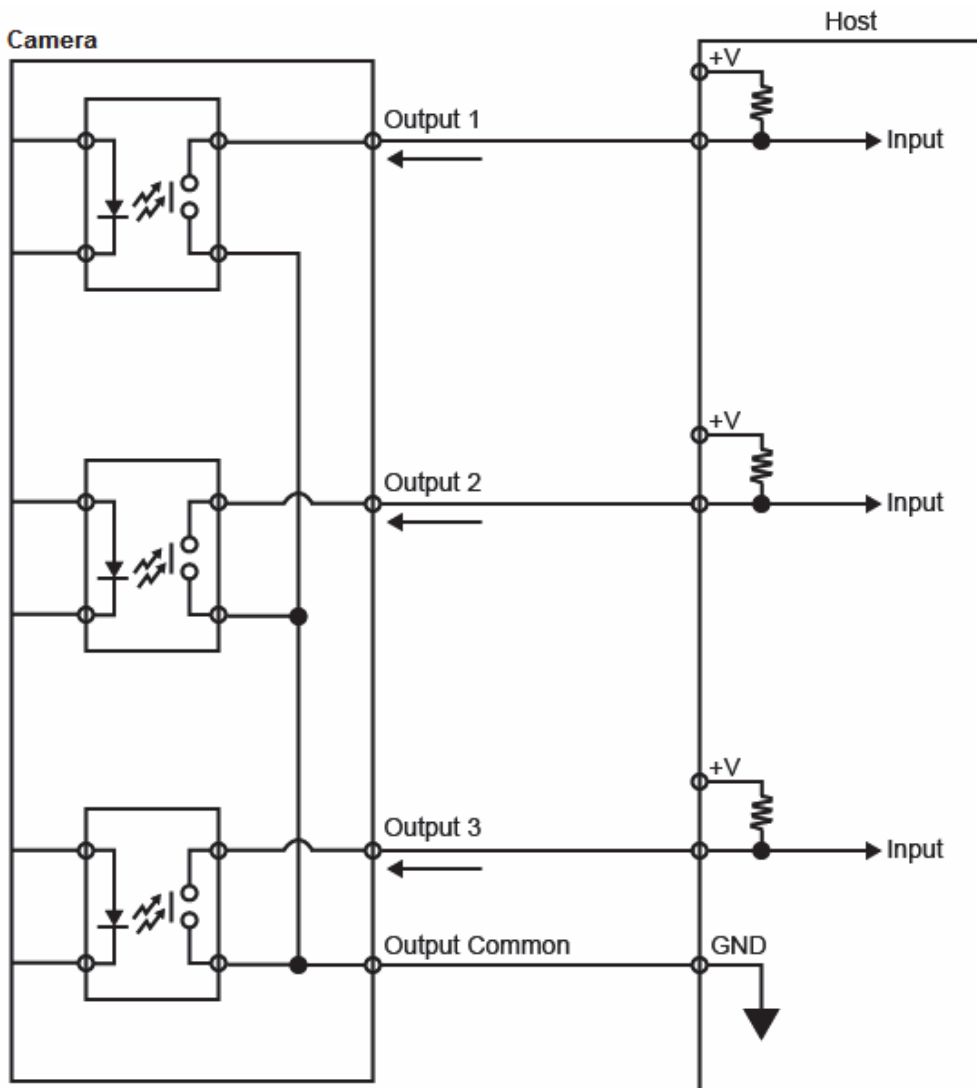
Insulate Pin 5 (Gray Wire)

2-5 I/O Wiring

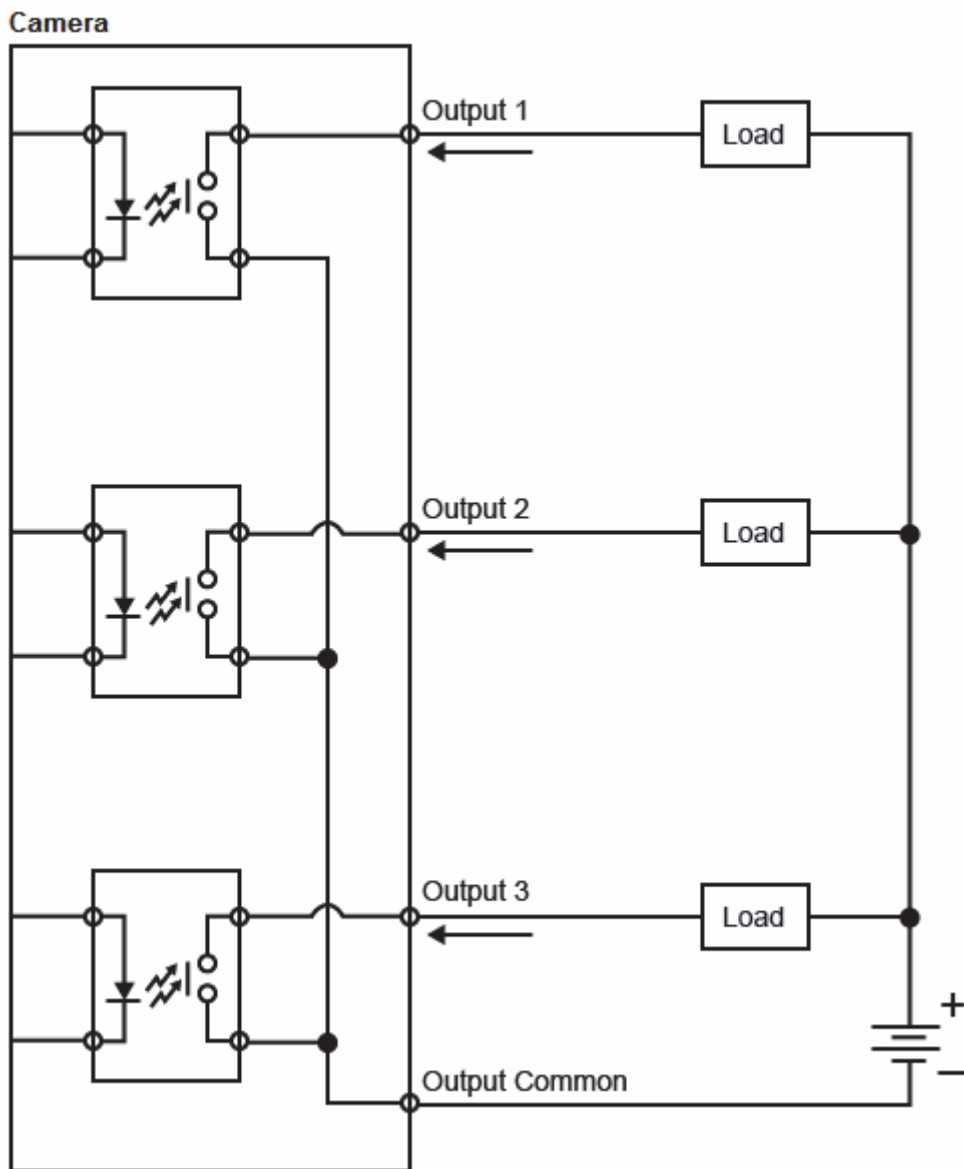
2-5-1 Optoisolated Outputs

The camera has optoisolated outputs that can transfer signals from the camera to peripherals. Outputs can be configured as either NPN or PNP, but NPN and PNP cannot be mixed in a system, because the output common is shared by all outputs.

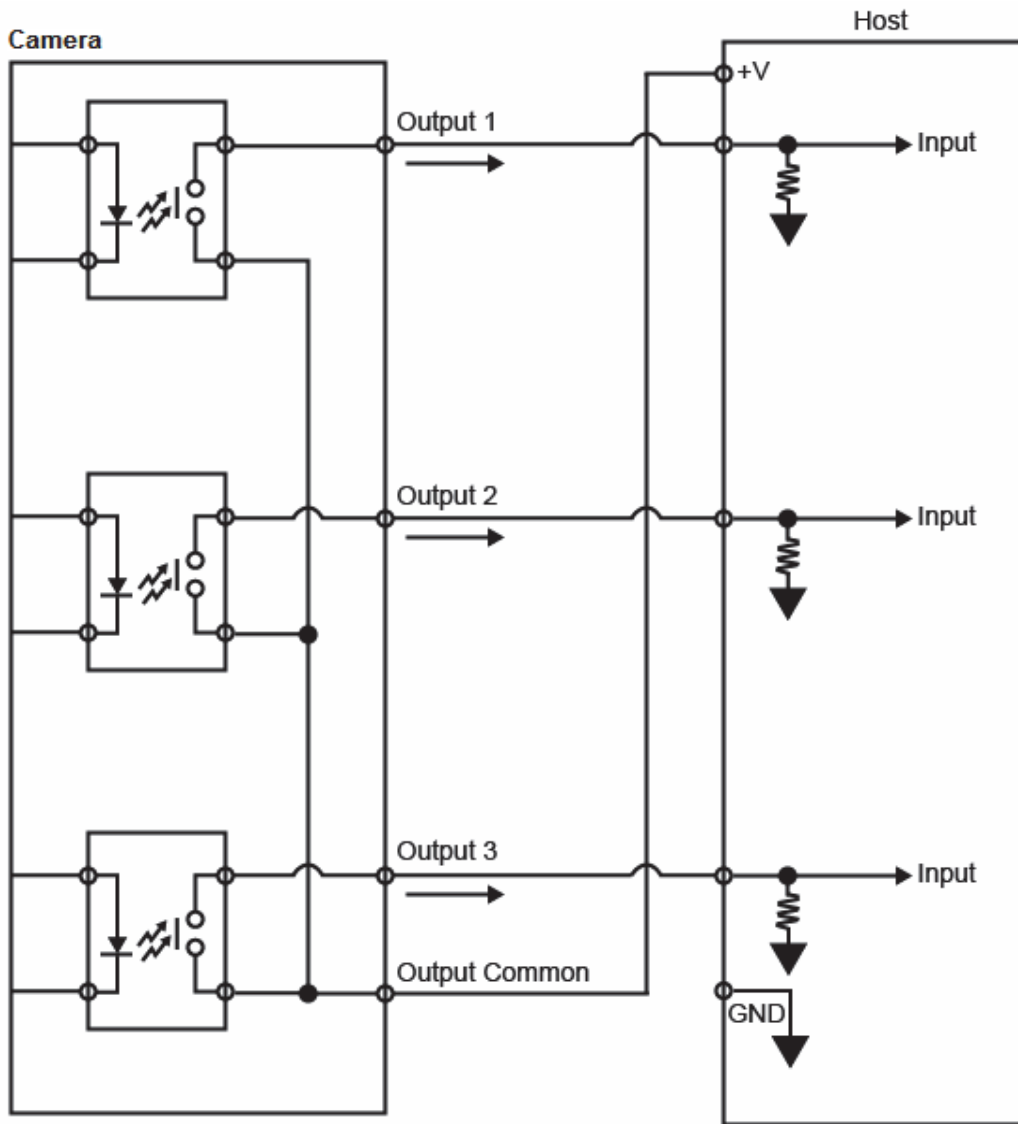
- NPN Output for Host Input



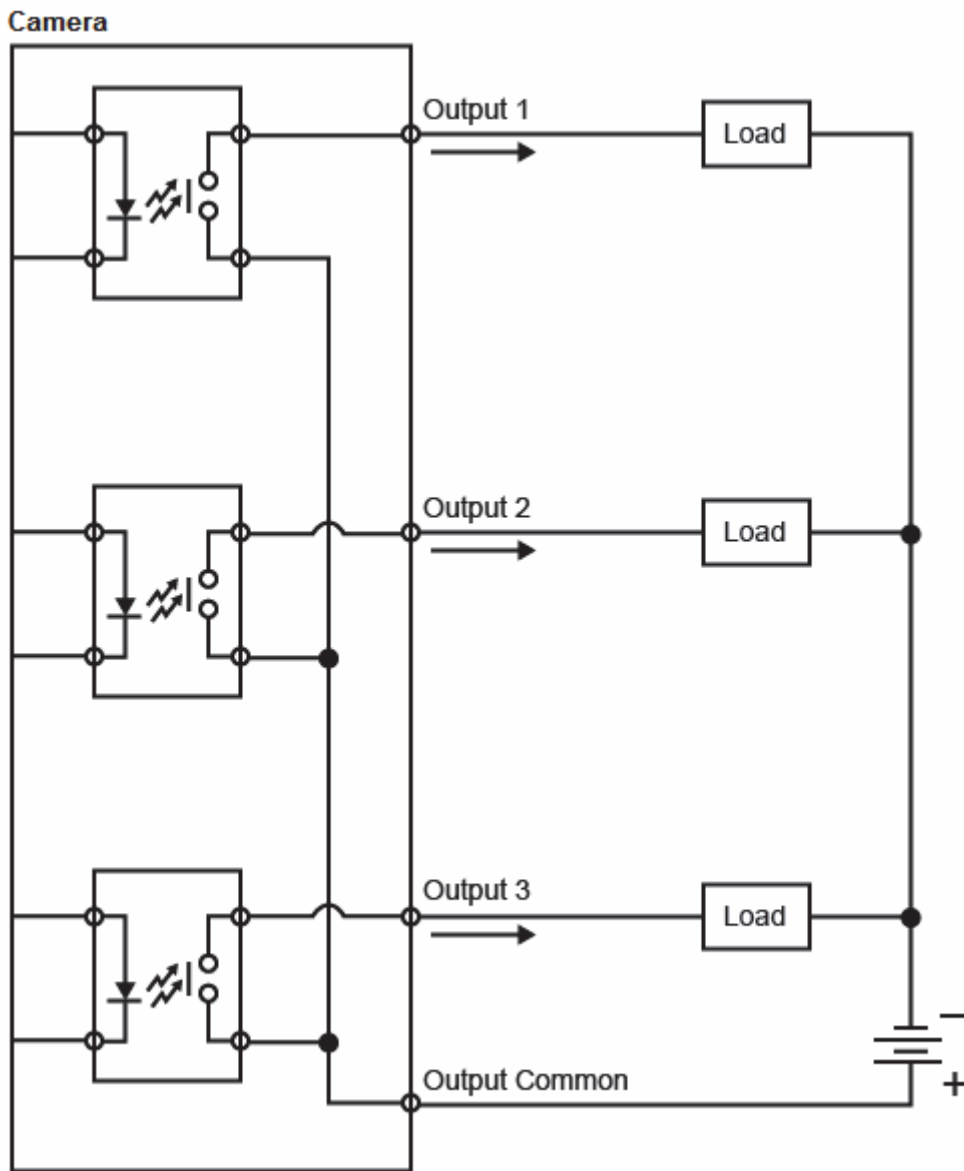
● NPN Output for External Load



● PNP Output for Host Input



● PNP Output for External Load

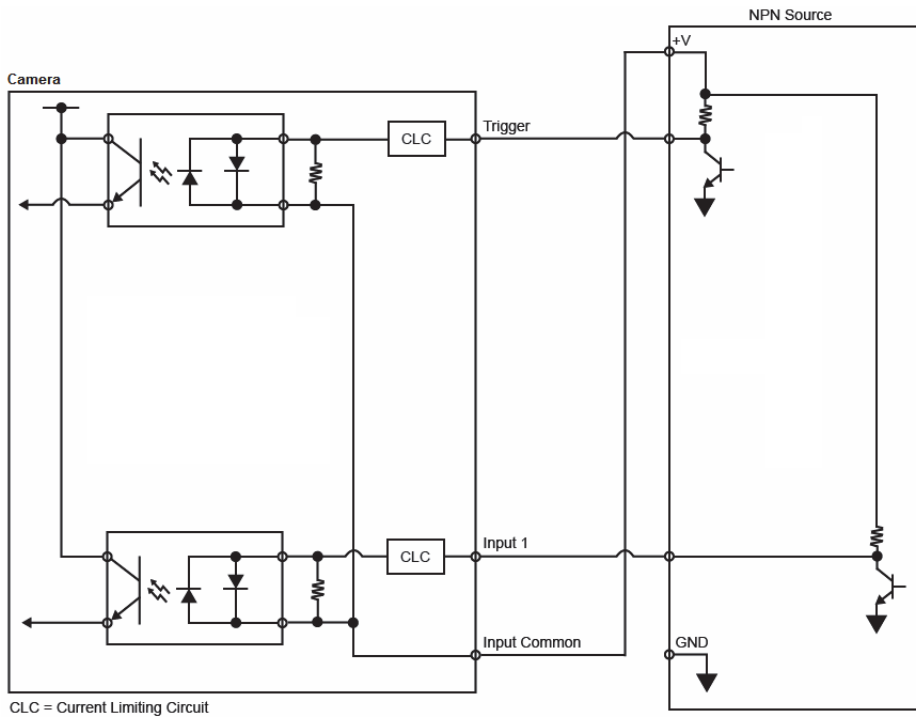


Optoisolated Inputs

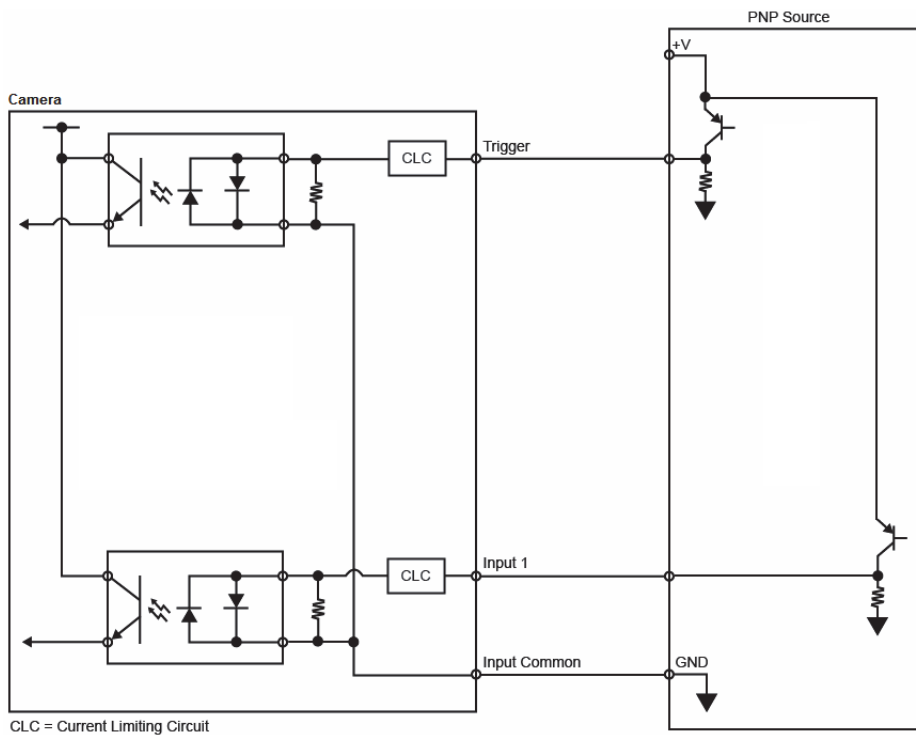
● NPN Input for Host Output

All discrete inputs are optoisolated. Inputs can be configured as either NPN or PNP, but NPN and PNP cannot be mixed in a system, because the input common is shared by all inputs.

● NPN

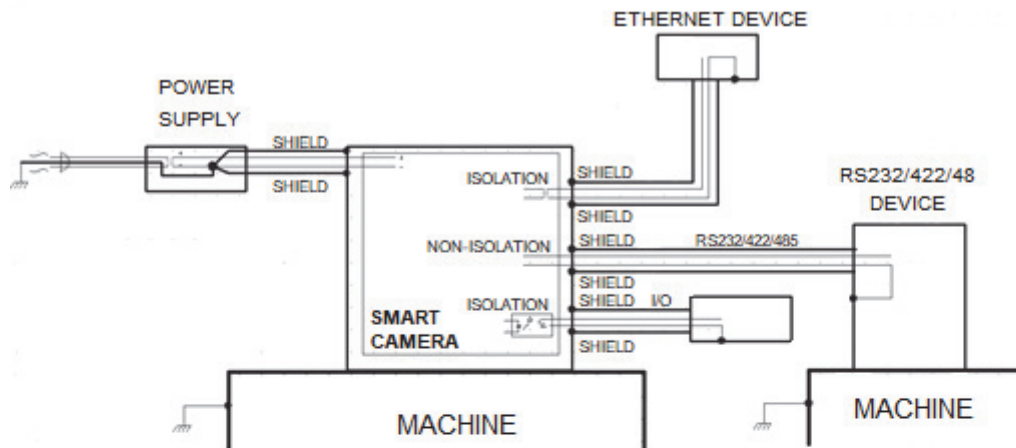


● PNP



2-5-2 Grounding and Power

Proper grounding is necessary for operator safety, noise reduction, and the protection of equipment from voltage transients. Buildings, including any steelwork, all circuits, and all junction boxes must be grounded directly to an earth ground in compliance with local and national electrical codes.



An earth ground is provided through the cable shields and chassis of the camera.

If the camera malfunctions due to influence of the environment by shield cables grounded, try any of the ones below.

- Disconnect the chassis and the shield cable of the power supply from the earth.
- Ground the shield cable of the power supply to $-(0V)$.
- Ground any of one part of the shield cable, chassis, or RJ-45 connector of Ethernet cable to earth with D class grounding. Use a Class 2 power supply for the DC source.

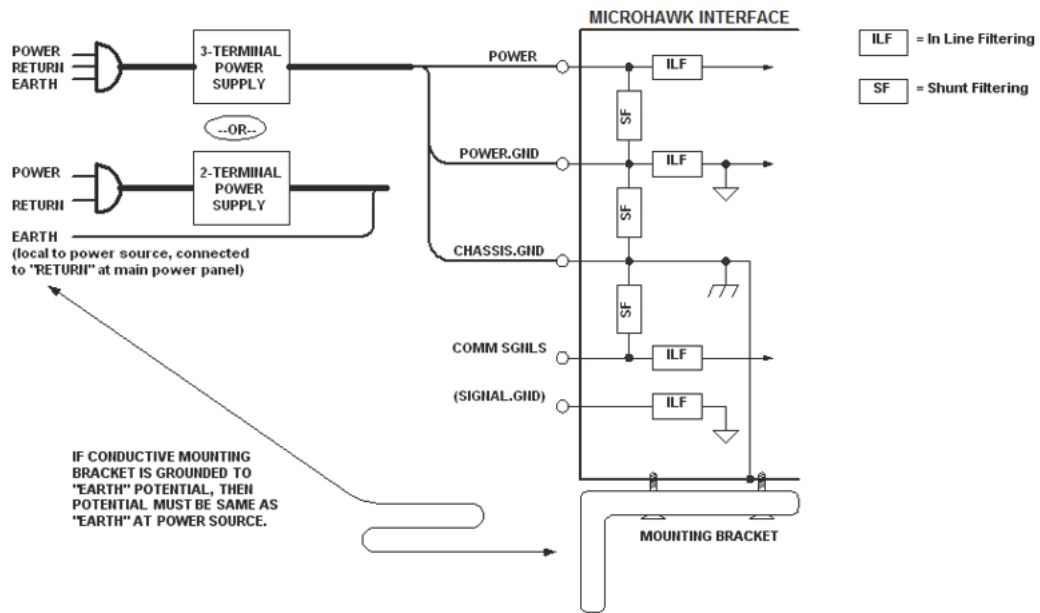
Note: In the case of this connection, must not ground the $+(24V)$ of the power supply. If connected, the device will break down due to a short circuit.

Ground Loops

Ground loops (signal degradation due to different ground potentials in communicating devices) can be eliminated or minimized by ensuring that both the host, camera, and their power supplies are connected to a common earth ground.

Note: If a malfunction occurred to your reader by noise, mount a noise filter (RSAL2001W manufactured by TDK-Lambda Corp.) close to the camera's power-supply terminals and ground the chassis of the filter.

Expected Power and Ground Connections for Proper Operation



Grounding Notes

- Ensure that mounting bracket “Earth” is at the same potential as power source “Earth”.
- Supply “Return” and “Earth” ground must be stable, low-impedance reference points.
- “2-Terminal Power Supply” must still provide an “Earth” connection to the imager.
- “Signal Ground” can be used for communications and/or discrete signal ground reference. It must **not** be used as Power Ground or Earth Ground.

2-5-3 I/O Filtering and Debounce

Trigger Debounce is the ability of the system to accommodate switching noise on a trigger state change – a common issue with relays that have some intermittent contact while engaging.

Trigger overruns (when the vision system is triggered faster than the device can process) can be avoided by increasing the “debounce” time in the camera definition file located in the **C:\Omron\Vscape\Drivers\CamDefs** directory.

The I/O Line Debounce High Time and I/O Line Debounce Low Time can be added to the file as in the example below. Debounce time is **1 ms (1,000 µs)**.

Note: Although the value entered for the "I/O Line Debounce Time" is in microseconds, it will only be rounded up to a millisecond value. For example, entering the value **1001** will resolve to **2 ms**; entering a value of **2800** will resolve to **3 ms**.

The min value for "I/O Line Debounce Time" is **0**, which disables software debounce altogether. The maximum value is **100000 (100 ms)**.

This is the the standard debounce as described for the trigger:

```
I/O Line Debounce High Time      1000 //usecs (default is 0)
I/O Line Debounce Low Time       1000 //usecs (default is 0)
```

The smart cameras have an I/O Line Filter Time as well:

```
I/O Line Filter High Time        100 //usecs (default is 100)
I/O Line Filter Low Time         100 //usecs (default is 100)
```

I/O Filter is the ability to ignore any signals on the I/O lines that are less that the “Filter Time” long. Sometimes, electrical interference puts spikes on the line. This feature makes it ignore them until the signal that is seen on the I/O line is longer than the filter time.

2-5-4 Camera Definition File Example

```

// Camera Definition File
// Version: 1.04

Camera Name                F440 2464x2048// Name Displayed in Camdef Selection
                           Dialog
Digitizer Type            8000// Number associated with F440-F 5MP Sensor

Stride                    2464// Image Width
Rows                     2048// Image Height
X Offset                  0// Image X Offset
Y Offset                  0// Image Y Offset
Bits Per Pixel            8// Bits that represent Pixel Value
Pixel Type                0// Type of Pixel: MONOCHROME=0, COLOR_RGB=1,
                           COLOR_BGR=2, COLOR_BAYGR8=3, COLOR_BAYRG8=4,
                           COLOR_BAYGB8=5, COLOR_BAYBG8=6, COLOR_HSI=7

Image Structure           1// Pixel Organization: Packed=1, TwoPlanes = 2,
                           ThreePlanes = 3

Async Control             1// Controllable shutter time. Usually using a pulse
                           width specified in usecs
Usecs Per Frame           28571// Fastest time to acquire a frame: 35 FPS
                           // -1 Disables timeout feature
Binning                   0
Zoomed                    0

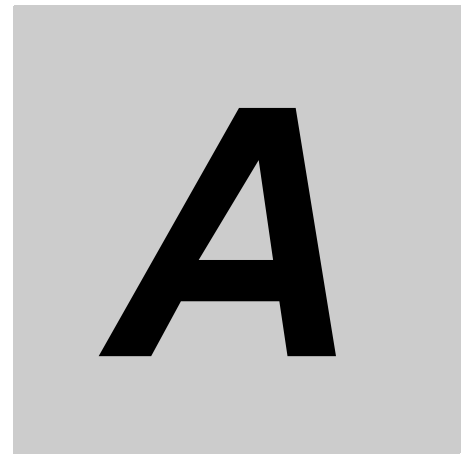
// IO Configuration
GPIO Edit Mask            0x0000
GPIO Defaults             0x0003// 2 General Purpose Input 3 General Purpose
                           Outputs
GPIO Count                5
GPIO Inputs                2
GPIO Outputs              3
Sensors                   1// One input dedicated to Trigger signal
Strobes                   0

Virtual IO                2048

IO Line Debounce High Time 100//usecs (valid range: 0 to 268432 such that
                           debounce time * 1000 must be divisible by 16)
IO Line Debounce Low Time 100//usecs (valid range: 0 to 268432 such that
                           debounce time * 1000 must be divisible by 16)
Custom External Strobe Delay Time 0//usecs

// Focus & Photometry Ranges
Gain Dflt                 20
Gain Min                  0
Gain Max                  100// 0 to 100%
Exp Dflt                  1000
Exp Min                   16
Exp Max                   400000// 16 usec to 400 msec
Focus Dflt                100// 100 step default
Focus Min                 0
Focus Max                 1023// 0 to 1023 step

```

General Specifications

A

This section contains general information about the F440-F Smart Camera.

A-1	General Specifications	A-2
A-2	Camera Dimensions	A-4
A-3	C-Mount Lens Options	A-5
A-4	Accessories and Cables	A-7
A-5	Lighting Options	A-19
A-6	Other Accessories	A-22

A-1 General Specifications

F440-F		
Symbologies *1	1D Symbologies	Code 39, Code 128, BC412, Interleaved 2 of 5, UPC/EAN, Codabar, Code 93, Pharmacode, PLANET, Postnet, Japanese Post, Australian Post, Royal Mail, Intelligent Mail, KIX
	2D Symbologies	Data Matrix (ECC 0-200), QR Code, Micro QR Code, Aztec Code, DotCode, DMRE
	Stacked Symbologies	PDF417, MicroPDF417, GS1 Databar (Composite and Stacked)
Reading Performance *2	Number of Reading Digits	No Upper Limit (depending on bar width and reading distance)
	Reading Distance / Field of View	Based on Lens Selection and Code Size
	Pitch Angle (α) *3	±30°
	Skew Angle (β) *3	±30°
	Tilt Angle (γ) *3	±180°
Vision Tools		Locate, Decode, Optical Character Recognition (OCR), Count, Presence/Absence, Measure, Match String, String Format, Logic, Optical Character Verification (OCV), Symbol Quality Verification
Image	Resolution, Pixel Size	2464 (H) x 2056 (V) – 3.45 μm Pixel Size
	Monochrome	Monochrome CMOS
	Shutter	Global Shutter
	Frames per Second	35 FPS for 5 MP
	Exposure	16 μs to 400 msec
Image Logging		FTP
Trigger		External Trigger (Edge or Level), Communication Trigger (Ethernet, RS-232C)
Trigger to Strobe Latency + Jitter		320 μs + 65 μs
I/O Specifications	Input Signals	Trigger Input, Input 1, and Default – Bi-Directional Inputs, Optoisolated, 4.5 – 28 V rated (10 mA @ 28 VDC)
	Output Signals	3 Signals: Bi-Directional, Optoisolated, 1 – 28 V rated, (I _{CE} < 100 mA at 24 VDC, current limited by user)
Communication	Connectivity	RS-232C, Ethernet TCP/IP, EtherNet/IP™, PROFINET
	Ethernet Specifications	1000BASE-T
Indicator LEDs		LINK (Amber), PWR (Green)
Power Supply Voltage		Power over Ethernet (IEEE 802.3af) / 24 VDC +/- 20%, External Input via IO *4
Current Consumption		PoE (44-57 VDC): 0.10 A or 24 VDC: 0.15 A
Environmental /Immunity *5	Ambient Temperature Range	Operating: 0 to 40° C; Storage: -25 to 65° C (No Icing or Condensation)
	Ambient Humidity Range	Operating and Storage: 25% to 85% (Non-Condensing)
	Ambient Atmosphere	No Corrosive Gases
	Vibration Tolerance	Oscillation Frequency: 10 to 150 Hz; Half Amplitude: 0.35 mm; Vibration Direction: X/Y/Z; Sweep Time: 8 Minutes/Count; Sweep Count: 10 Times
	Shock Resistance (Destructive)	Impact Force: 150 m/s ² , Test Direction: 6 Directions, 3 Times Each (Up / Down, Front / Behind, Left / Right)
	Degree of Protection	IEC 60529 – IP40
Weight	Main Body Only	103.4 g
	Packaging Weight	219.1 g
Dimensions		40 mm (W) × 61 mm (D) × 30 mm (H) Note: Depth measurement excludes connector.
Accessories		ReadMeFirst, CE Compliance Sheet, Protocol Support Table
EMC / Safety		FCC part 15 Subpart B, ICES-003, EN 55032, EN 55035, AS/NZS CISPR32, CNS 13438, KN32, KN35, UL 62368-1, UL 60950-1 FCC, UL, CE, UKCA, RCM, KC *6
Materials		Aluminum Diecast, Alumite (Black)
Software		AutoVISION

*1. These symbologies are supported based on Omron's read capability validation standard. Omron recommends that validation be performed for each application.

*2. Unless otherwise specified, reading performance is defined with center of field of view, angle R = ∞.



*4. Camera operates External Input at 24 VDC when supplied at the same time as PoE.

*5. In an electrically noisy environment, use only the F440-F in combination with a noise filter cable (V430-W□F-□M) to ensure proper operation.

*6. FCC = United States
UL = United States
CE = European Union
UKCA = Great Britain (England / Wales / Scotland)
RCM = Australia / New Zealand
KC = South Korea

F440-F Cable and Accessory Specifications

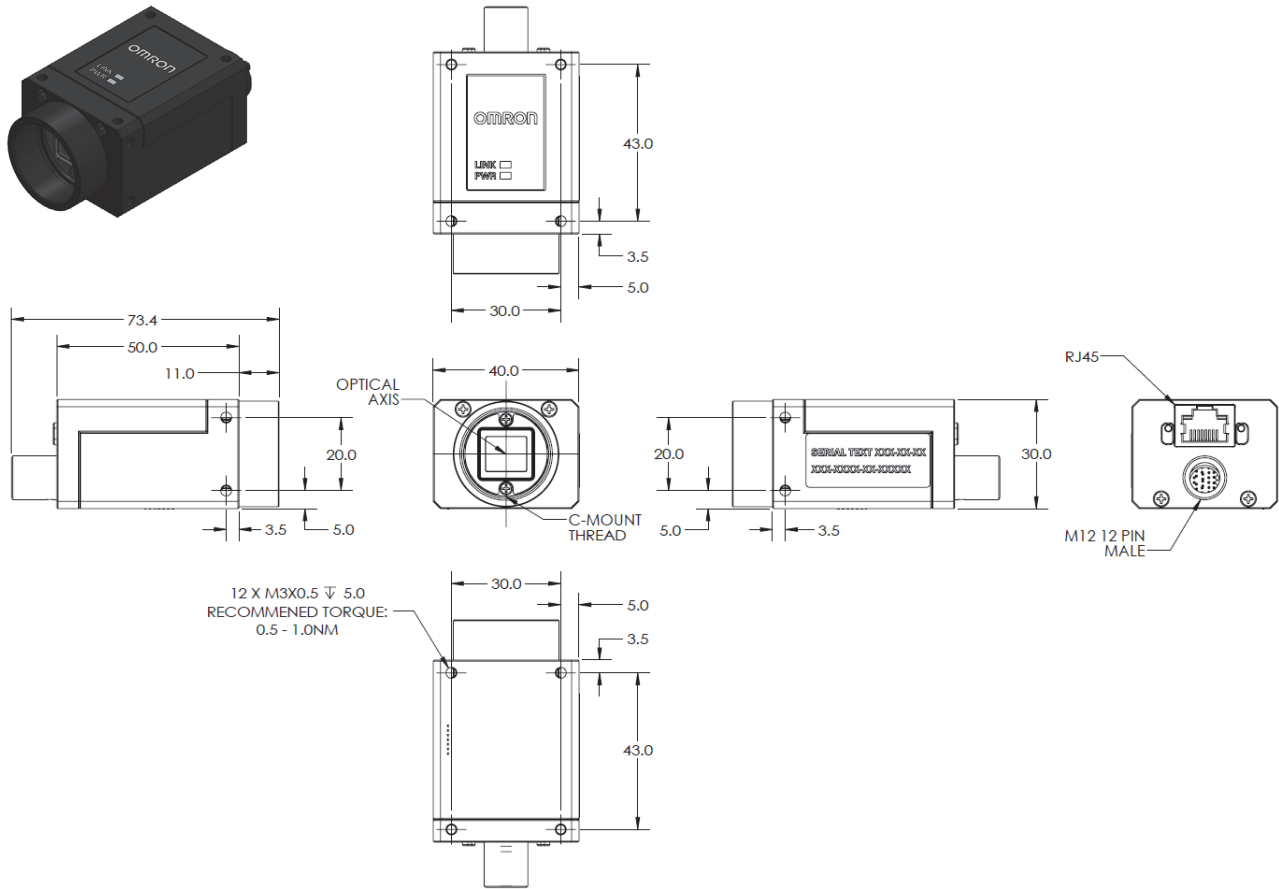
Item	V430-W8□□-_M	V430-W□□□F-_M	V430-WQ-_M	V430-WE□□-_M
Cable Type	Robot cable	Robot cable. Overmolded filter must be protected from flexing	Robot cable	Robot cable
Connector Type	Straight LD: Right Angle Down LU: Right Angle Up	Straight LD: Right Angle Down LU: Right Angle Up	Straight	Straight LD: Right Angle Down LU: Right Angle Up
Category	I/O			Ethernet
Size	AWG24			AWG24
Outer Diameter	7.11mm			7.37mm
Min. Bending Radius	53mm			73.7mm
Usage Environment	Ambient Temperature Range	Operating: 0-45C Storage: -50 to 75C (No Icing or Condensation)		
	Ambient Humidity Range	5-95% (Non-Condensing)		
	Ambient Atmosphere	No Corrosive Gases		
	Vibration Tolerance	Oscillation Frequency: 10 to 150Hz, Half Amplitude: 0.35 mm, Vibration Direction: X/Y/Z, Sweep Time: 8 minute/count, Sweep Count: 10 times		
	Shock Resistance	Impact Force: 150 m/s ² , Test Direction: 6 directions, three times each (up/down, front/back, left/right)		
Material	Connector Overmold: Thermoplastic Polyamide, Cable Jacket: Polyurethane			
Weight	V430-W8-3M: 259g V430-W8-5M: 422g V430-W8LD-3M: 253g V430-W8LU-3M: 253g	V430-WQF-1M: 79g V430-W8F-3M: 285g V430-W8F-5M: 447g V430-W8LDF-3M: 278g V430-W8LUF-3M: 278g	V430-WQ-1M: 109g V430-WQ-3M: 272g V430-WQ-5M: 351g	V430-WE-1M: 94g V430-WE-3M: 215g V430-WE-5M: 352g V430-WELD-3M: 218g V430-WELU-3M: 218g

Item	V430-WQR-3M	V430-WR-_M	V430-WQK-3M
Cable Type	Robot cable. "Y" must be produced from flexing	Robot cable	Robot cable (2M long section only). Protect "Y" from flexing.
Connector Type	Straight		
Category	I/O and RS232		Keyboard Wedge
Size	AWG24		
Outer Diameter	7.11mm		
Min. Bending Radius	53mm		
Usage Environment	Ambient Temperature Range	Operating: 0-45C Storage: -50 to 75C (No Icing or Condensation)	
	Ambient Humidity Range	5-95% (Non-Condensing)	
	Ambient Atmosphere	No Corrosive Gases	
	Vibration Tolerance	Oscillation Frequency: 10 to 150Hz, Half Amplitude: 0.35 mm, Vibration Direction: X/Y/Z, Sweep Time: 8 minute/count, Sweep Count: 10 times	
	Shock Resistance	Impact Force: 150 m/s ² , Test Direction: 6 directions, three times each (up/down, front/back, left/right)	
Material	Connector Overmold: Thermoplastic Polyamide, Cable Jacket: Polyurethane		
Weight	273g	V430-WR-1M: 107g V430-WR-3M: 276g	270g

A

A-2 Camera Dimensions

F440-F C-Mount Smart Camera



A-3 C-Mount Lens Options

Compact C-Mount Reading Lenses*

- Low Cost
- Small Size
- Reading Lens – 85 lp/mm
- Locking Screws for Focus and Iris
- F-Number of 1.2 to 16



Part Number	Focal Length	Minimum Working Distance (mm)	Size (mm) – Length x Diameter	Filter Size	Polarizer Part Number	Smart Ring Light Compatibility
98-9000167-01	6 mm	100	36.7 x 29.5	M27 P0.5	3Z4S-LE SV-PL270-SS	R-70/R-100
98-9000168-01	9 mm	100	35 x 29.5	M27 P0.5	3Z4S-LE SV-PL270-SS	R-70/R-100
98-9000169-01	12.5 mm	100	29.5 x 29.5	M25.5 P0.5	3Z4S-LE SV-PL255-SS	R-70/R-100
98-9000170-01	16 mm	100	29.5 x 29.5	M25.5 P0.5	3Z4S-LE SV-PL255-SS	R-70/R-100
98-9000171-01	25 mm	150	29.5 x 29.5	M25.5 P0.5	3Z4S-LE SV-PL255-SS	R-70/R-100
98-9000172-01	35 mm	250	29.5 x 29.5	M25.5 P0.5	3Z4S-LE SV-PL255-SS	R-70/R-100

*For working distances shorter than the minimum working distance specified for the lens, an extension tube is required to focus the lens.

Standard C-Mount Reading Lenses*

- Medium Size
- Reading Lens – 100 lp/mm
- Locking Screws for Focus and Iris
- F-Number of 1.4 to 16



Part Number	Focal Length	Minimum Working Distance (mm)	Size (mm) – Length x Diameter	Filter Size	Polarizer Part Number	Smart Ring Light Compatibility
3Z4S-LE SV-0614H	6 mm	100	57.5 x 42	M40.5 P0.5	3Z4S-LE SV-PL405-SS	R-100
3Z4S-LE SV-0814H	8 mm	100	52.5 x 39	M35.5 P0.5	3Z4S-LE SV-PL355-SS	R-100
3Z4S-LE SV-1214H	12 mm	100	51 x 30	M27 P0.5	3Z4S-LE SV-PL270-SS	R-70/R-100
3Z4S-LE SV-1614H	16 mm	100	47.5 x 30	M27 P0.5	3Z4S-LE SV-PL270-SS	R-70/R-100
3Z4S-LE SV-2514H	25 mm	150	36 x 30	M27 P0.5	3Z4S-LE SV-PL270-SS	R-70/R-100
3Z4S-LE SV-3514H	35 mm	200	45.5 x 44	M35.5 P0.5	3Z4S-LE SV-PL355-SS	R-100
3Z4S-LE SV-5014H	50 mm	300	57.5 x 44	M40.5 P0.5	3Z4S-LE SV-PL405-SS	R-100
3Z4S-LE SV-7525H	75 mm	1200	54.6 x 36	M34.0 P0.5	3Z4S-LE SV-PL340-SS	R-100
3Z4S-LE SV-10028H	100 mm	2000	71.6 x 39	M37.5 P0.5	3Z4S-LE SV-PL375-SS	R-100

*These are the standard lenses offered in the Omron Vision Accessories Catalog.

*For working distances shorter than the minimum working distance specified for the lens, an extension tube is required to focus the lens.

High-Resolution Code Reading / Grading C-Mount Lenses*

- Medium Size
- Reading / 1D and 2D Code Grading Lens – 145 lp/mm
- Locking Screws for Focus and Iris
- F-Number of 1.4 to 16



Part Number	Focal Length	Minimum Working Distance (mm)	Size (mm) – Length x Diameter	Filter Size	Polarizer Part Number	Smart Ring Light Compatibility
98-9000192-01	6 mm	100	51 x 39	M37.5 x 0.5	3Z4S-LE SV-PL375-SS	R-100
98-9000165-01	8 mm	100	51.5 x 29.5	M25.5 x 0.5	3Z4S-LE SV-PL255-SS	R-70/R-100
98-9000166-01	12 mm	100	51.5 x 29.5	M25.5 x 0.5	3Z4S-LE SV-PL255-SS	R-70/R-100
98-9000154-01	16 mm	100	46.0 x 29.5	M25.5 x 0.5	3Z4S-LE SV-PL255-SS	R-70/R-100
98-9000164-01	25 mm	100	46.5 x 29.5	M25.5 x 0.5	3Z4S-LE SV-PL255-SS	R-70/R-100
98-9000163-01	35 mm	200	41.5 x 29.5	M25.5 x 0.5	3Z4S-LE SV-PL255-SS	R-70/R-100

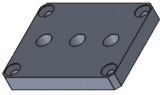
*For working distances shorter than the minimum working distance specified for the lens, an extension tube is required to focus the lens.

C-Mount Lens Polarizing Filters (only for Standard C-Mount Reading Lenses)

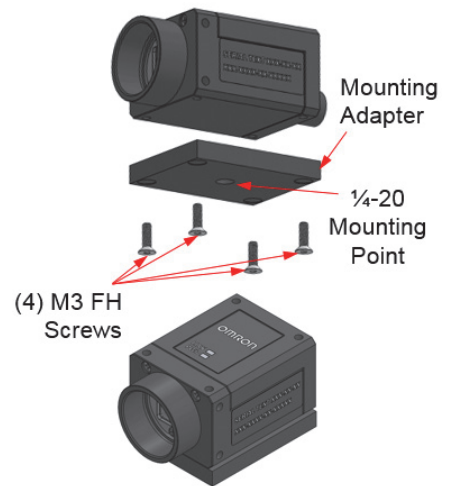
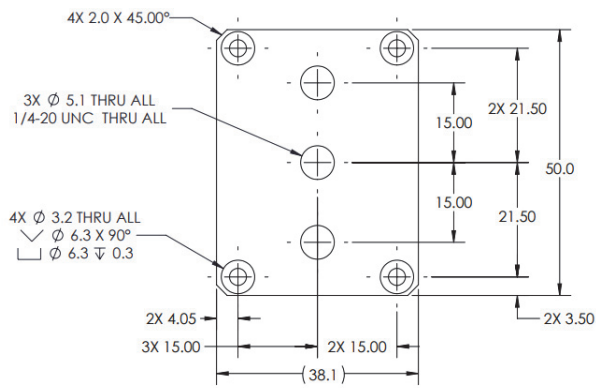
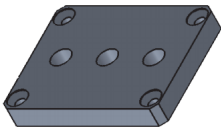


Model	Filter Size
3Z4S-LE SV-PL225-SS	M22.5 P0.5
3Z4S-LE SV-PL255-SS	M25.5 P0.5
3Z4S-LE SV-PL270-SS	M27.0 P0.5
3Z4S-LE SV-PL305-SS	M30.5 P0.5
3Z4S-LE SV-PL340-SS	M34.0 P0.5
3Z4S-LE SV-PL355-SS	M35.5 P0.5
3Z4S-LE SV-PL375-SS	M37.5 P0.5
3Z4S-LE SV-PL405-SS	M40.5 P0.5
3Z4S-LE SV-PL520-SS	M52.0 P0.75
3Z4S-LE SV-PL550-SS	M55.0 P0.75
3Z4S-LE SV-PL620-SS	M62.0 P0.75

A-4 Accessories and Cables

Appearance	Type	Part Number
	<p>1/4-20 Camera Mounting Block Kit (F440-F series only)</p>	<p>V440-AM0</p>

1/4-20 Camera Mounting Block Kit V440-AM0



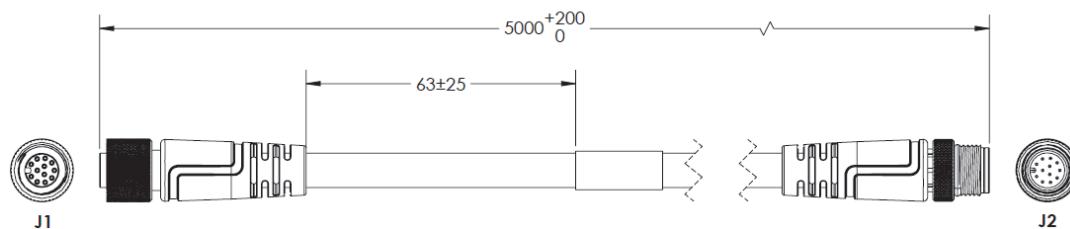
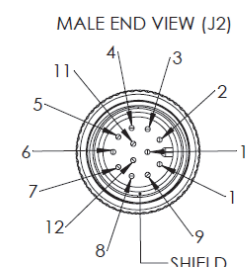
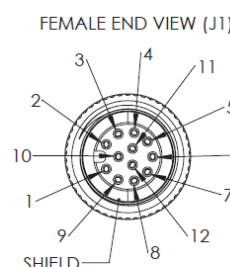
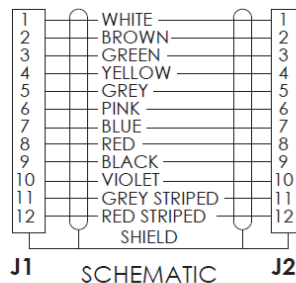
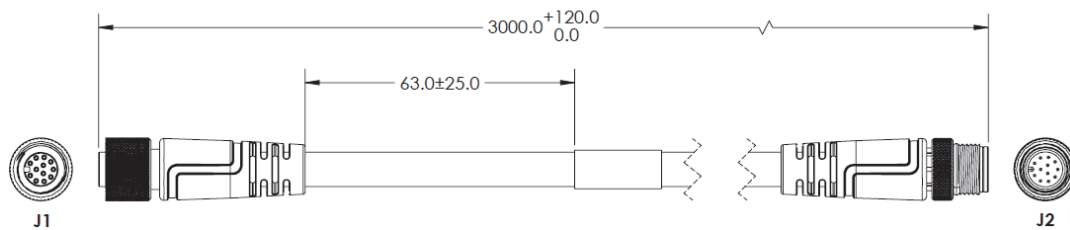
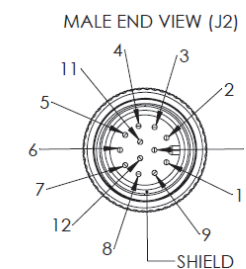
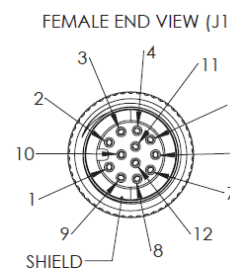
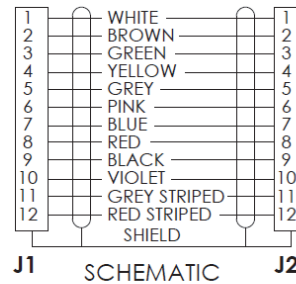
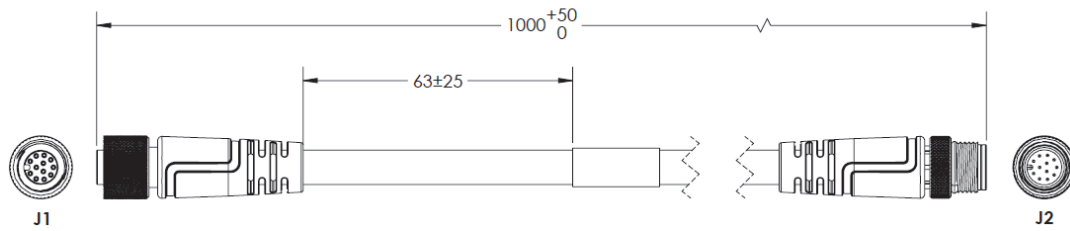
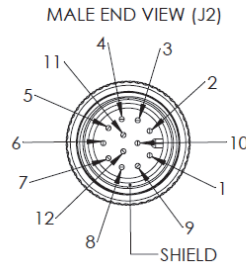
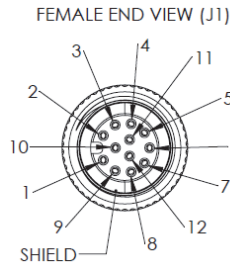
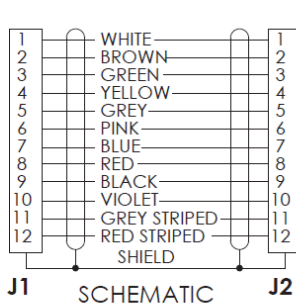
A

General Wiring Options

Appearance	Category	Length / Spec	Part Number
	Standard Ethernet Cables - Industrial High-Flex GigE Ethernet Cables with Jack Screws and RJ45 Connector*	2 Meters	98-000133-01
		5 Meters	98-000134-01
		7 Meters	98-000134-02
	Camera to QX-1 Interconnect Cables M12 Socket to M12 Plug QX-1 is used as breakout module for common IO signals and power.	1 Meter	V430-WQ-1M
		M12 Socket to M12 Plug, with Power Filter	300 mm
	Camera to QX-1 Interconnect Cables M12 Socket to M12 Plug QX-1 is used as breakout module for common IO signals and power.	3 Meters	V430-WQ-3M
		5 Meters	V430-WQ-5M
	QX-1 M12 to Smart Light Power and Strobe Control Cables M12 Plug on QX-1 to 5 Pin Socket on Light	3 Meters – Continuous Power	61-000204-01
		3 Meters – Strobe Control	61-000218-01
	Y Cable, Camera/Power and Smart Light Power (Continuous On)	1 Meter	61-9000135-01
	Y Cable, Camera/Power and Smart Light Strobe Control	1 Meter	61-9000137-01
	M12 to Flying Leads Cable, Straight Power, IO, RS-232, USB M12 to Flying Leads Cable, with Power Filter	3 Meters	V430-W8-3M
			V430-W8F-3M
	M12 to Flying Leads Cable, Straight Power, IO, RS-232, USB M12 to Flying Leads Cable, with Power Filter	5 Meters	V430-W8-5M
			V430-W8F-5M
	M12 to RS-232 Breakout	1 Meter	V430-WR-1M
		3 Meters	V430-WR-3M
	Camera to QX-1 Interconnect Cables with RS-232 Breakout	2.7 Meters	V430-WQR-3M
	Camera to QX-1 Interconnect Cables with USB Keyboard Wedge Breakout	2.7 Meters	V430-WQK-3M

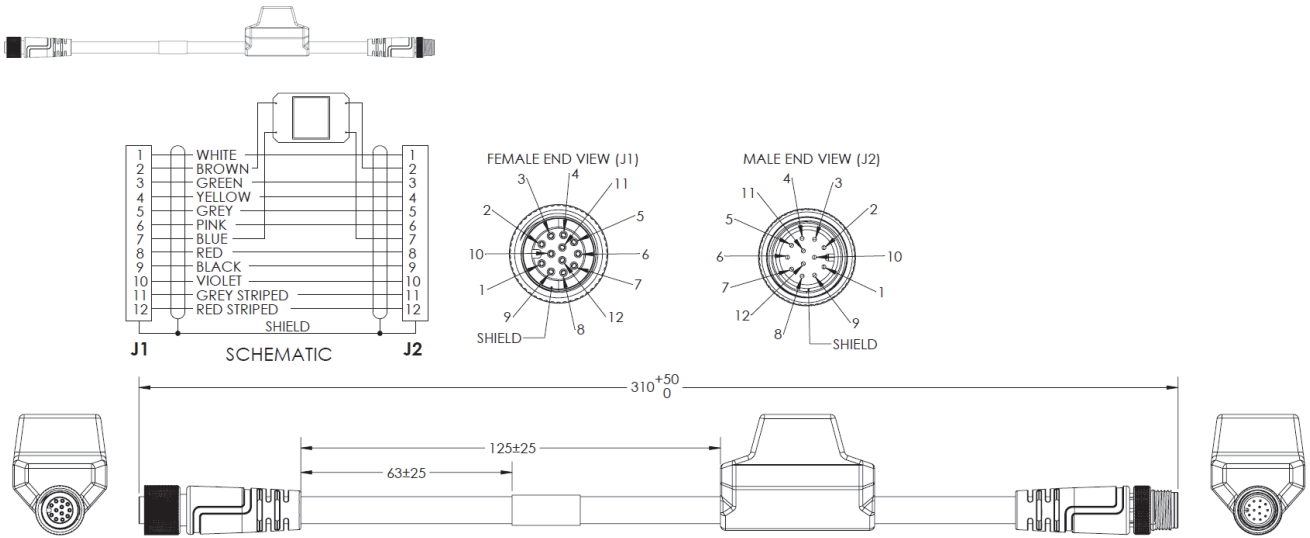
***Important:** Standard Omron FJ-VSG Ethernet cables are available in alternative and longer lengths.

Camera to QX-1 Interconnect Cables – 1 Meter, 3 Meters, or 5 Meters
M12 Socket to M12 Plug
QX-1 is used as breakout module for common IO signals and power.
V430-WQ-1M
V430-WQ-3M
V430-WQ-5M

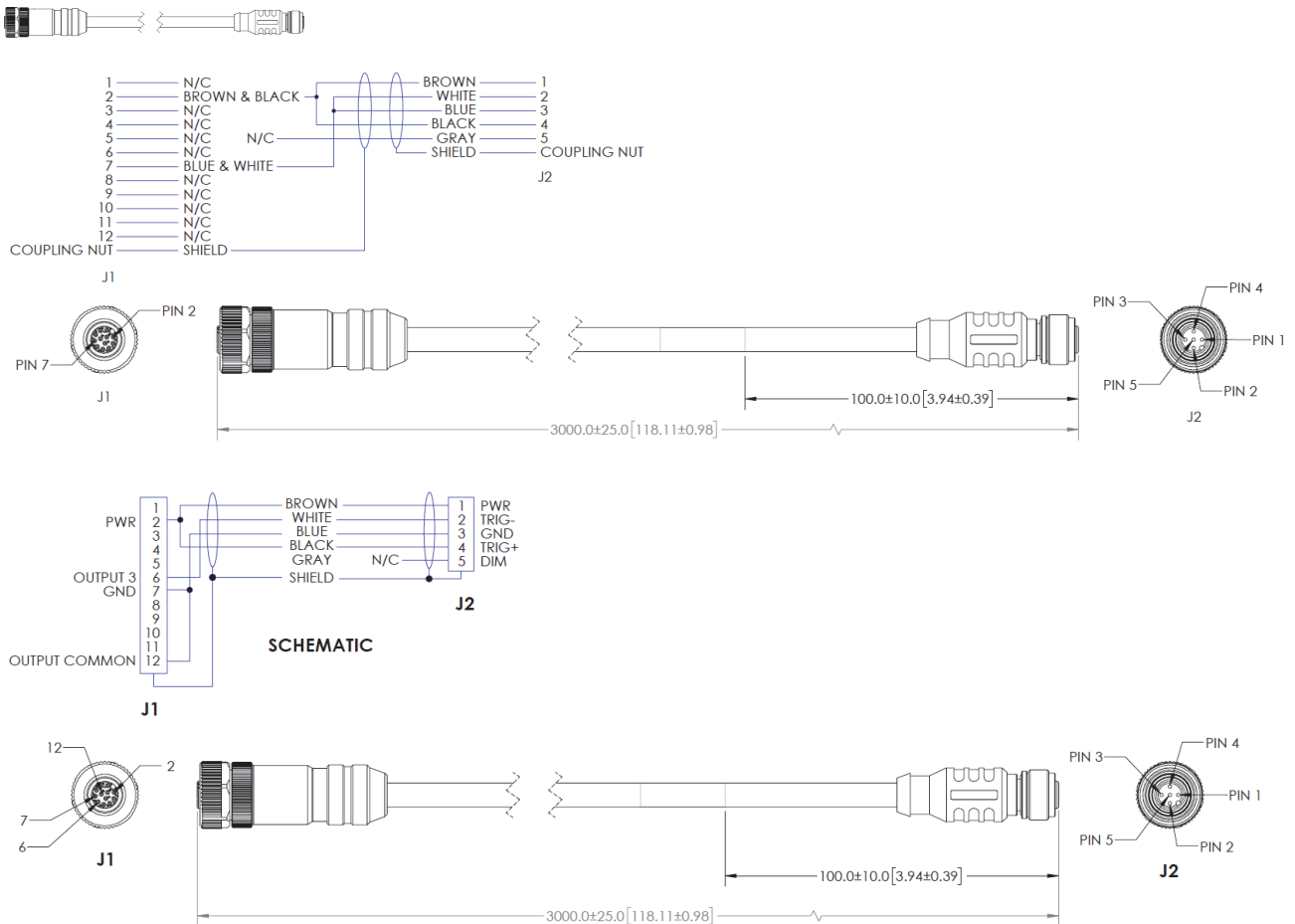


A

**M12 Socket to M12 Plug, with Power Filter – 300 mm
V430-WQF-1M**

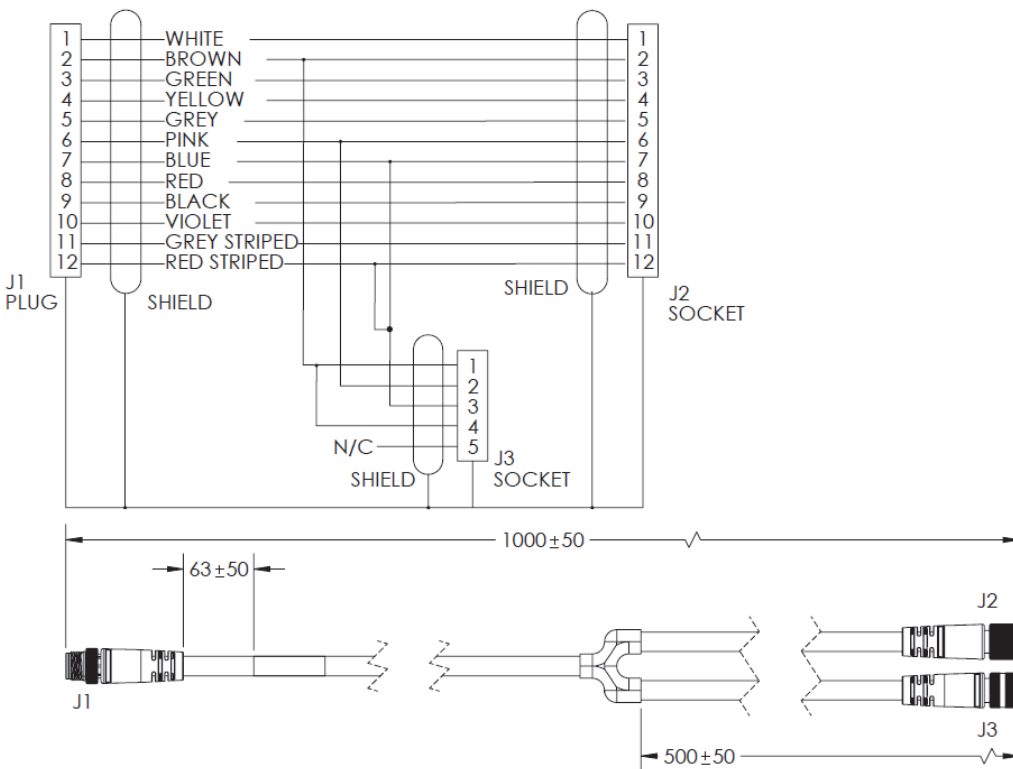
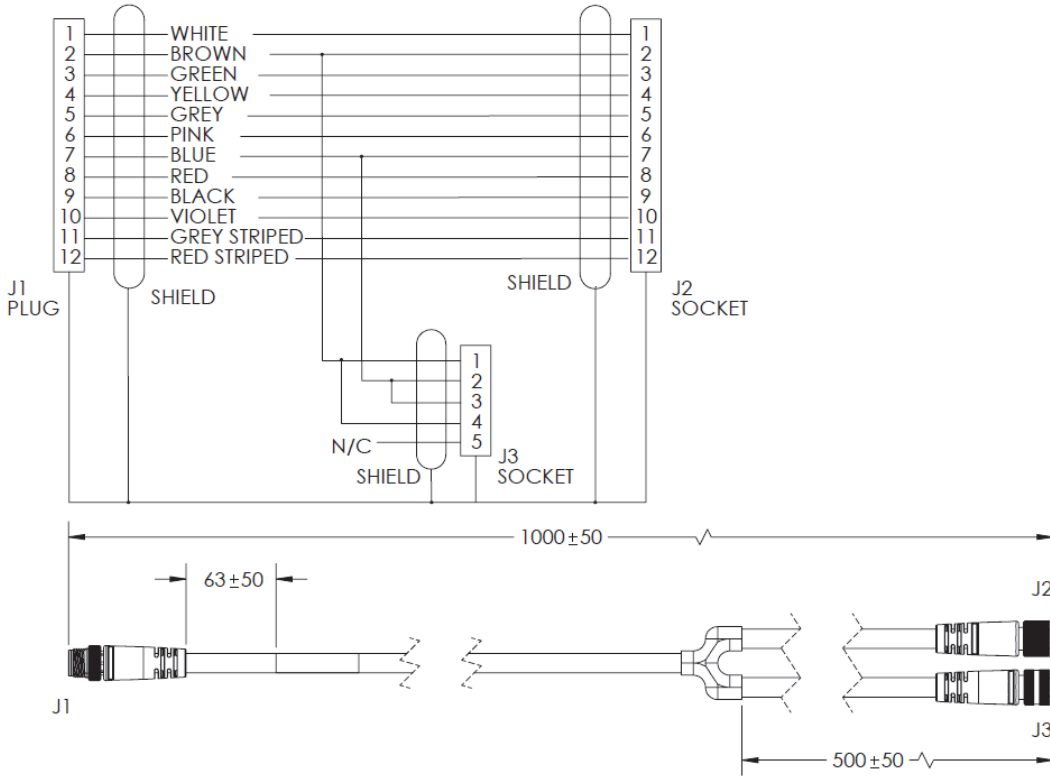
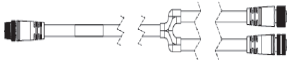


**QX-1 M12 to Smart Light Power and Strobe Control Cables – 3 Meters
M12 Plug on QX-1 to 5 Pin Socket on Light
61-000204-01 (Continuous Power)
61-000218-01 (Strobe Control)**



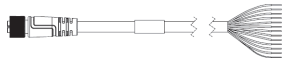
Y Cable, Camera/Power and Smart Light Power (Continuous On) – 1 Meter
61-9000135-01

Y Cable, Camera/Power and Smart Light Strobe Control – 1 Meter
61-9000137-01

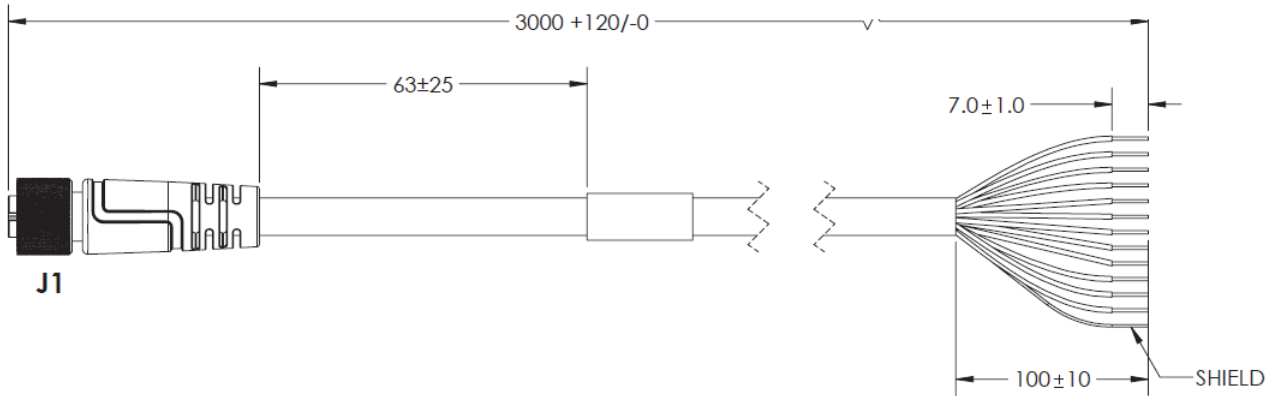
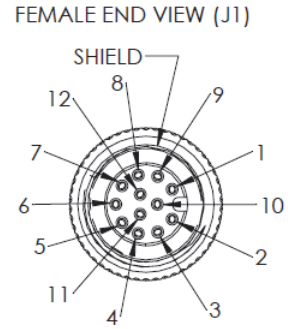
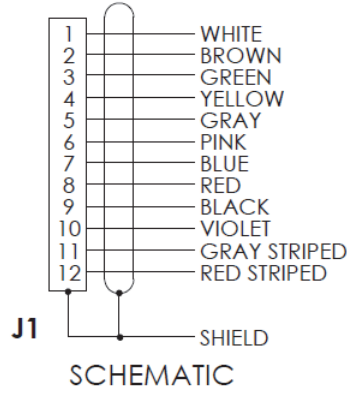


A

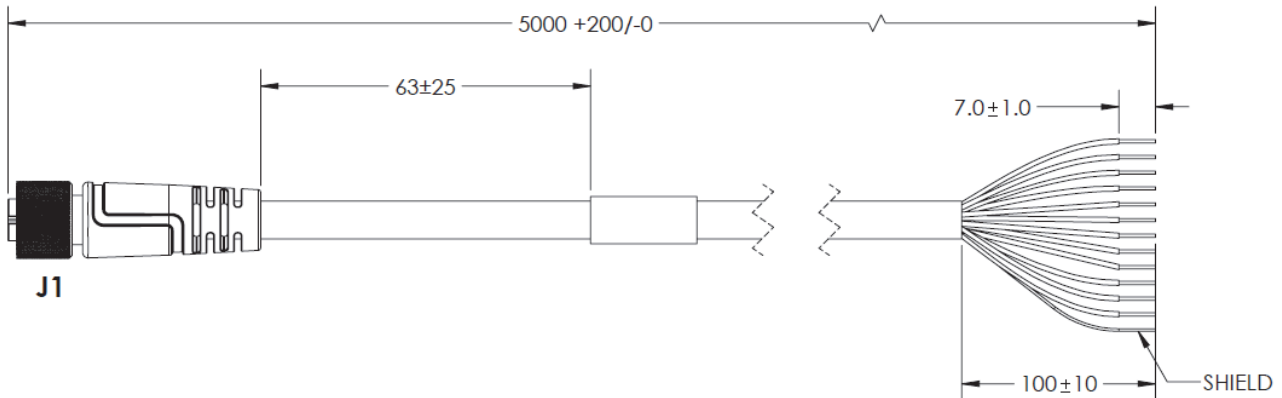
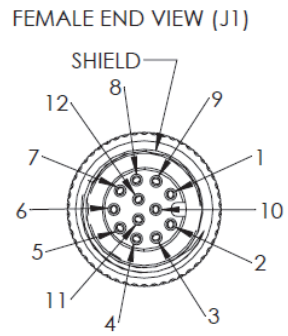
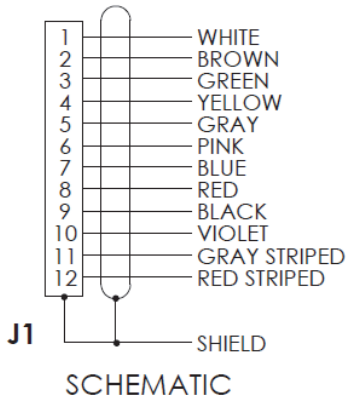
M12 to Flying Leads Cable, Straight Power, IO, RS-232, USB – 3 Meters or 5 Meters
V430-W8-3M
V430-W8-5M



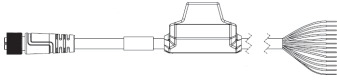
Pin	Function
1	Trigger
2	Power (+VIN)
3	Default
4	New Master
5	Output 1
6	Output 3
7	Ground (-VIN)
8	Input Common
9	RS-232 (Host) RxD
10	RS-232 (Host) TxD
11	Output 2
12	Output Common



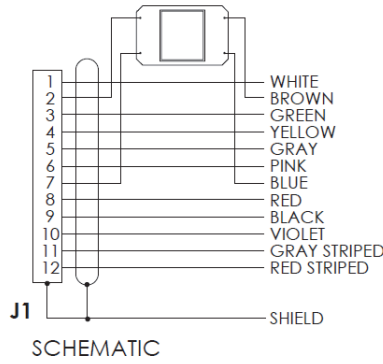
Pin	Function
1	Trigger
2	Power (+VIN)
3	Default
4	New Master
5	Output 1
6	Output 3
7	Ground (-VIN)
8	Input Common
9	RS-232 (Host) RxD
10	RS-232 (Host) TxD
11	Output 2
12	Output Common



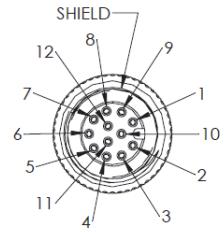
M12 to Flying Leads Cable, with Power Filter – 3 Meters or 5 Meters
V430-W8F-3M
V430-W8F-5M



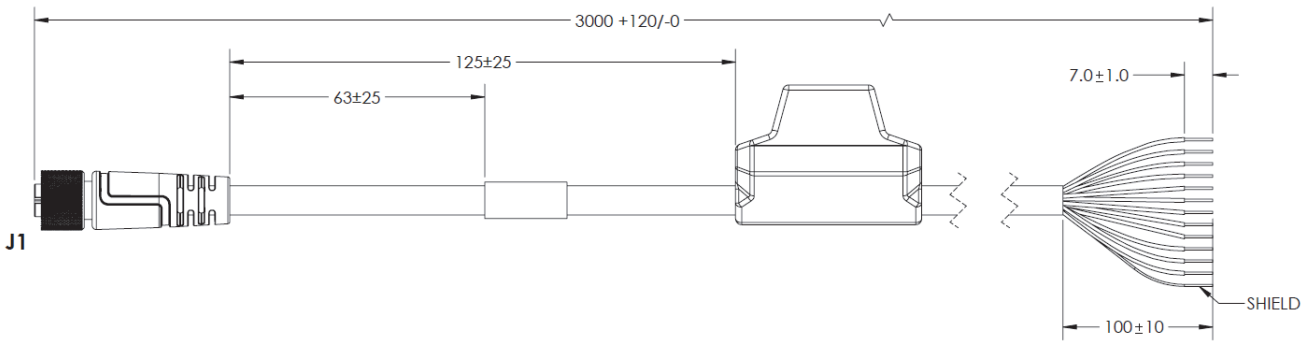
Pin	Function
1	Trigger
2	Power (+VIN)
3	Default
4	New Master
5	Output 1
6	Output 3
7	Ground (-VIN)
8	Input Common
9	RS-232 (Host) RxD
10	RS-232 (Host) TxD
11	Output 2
12	Output Common



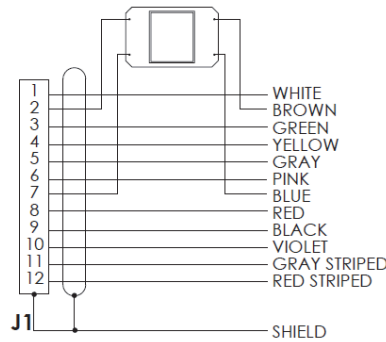
FEMALE END VIEW (J1)



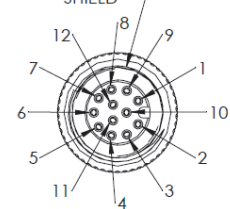
SCHMATIC



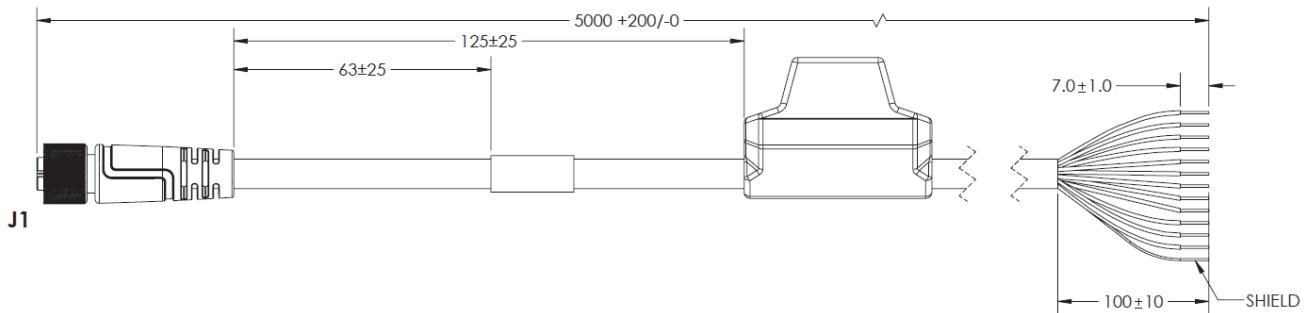
Pin	Function
1	Trigger
2	Power (+VIN)
3	Default
4	New Master
5	Output 1
6	Output 3
7	Ground (-VIN)
8	Input Common
9	RS-232 (Host) RxD
10	RS-232 (Host) TxD
11	Output 2
12	Output Common



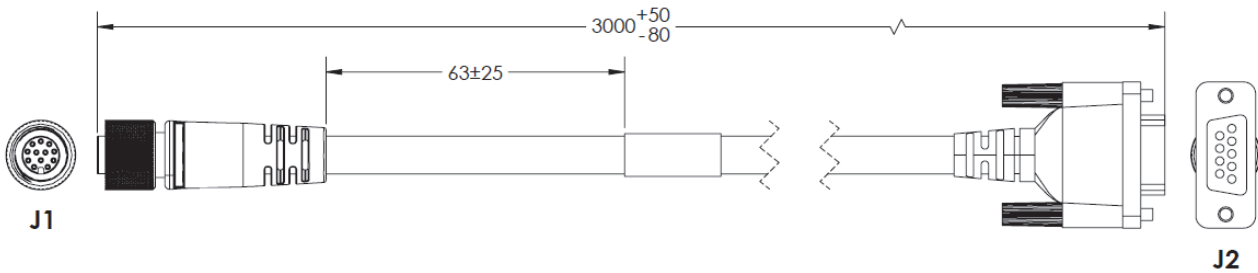
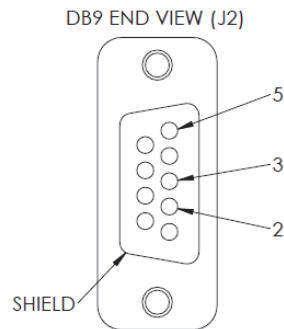
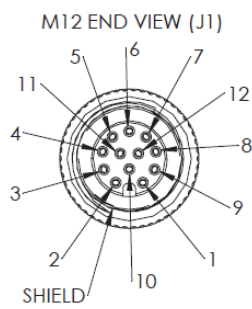
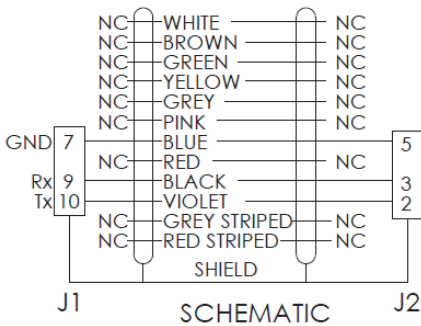
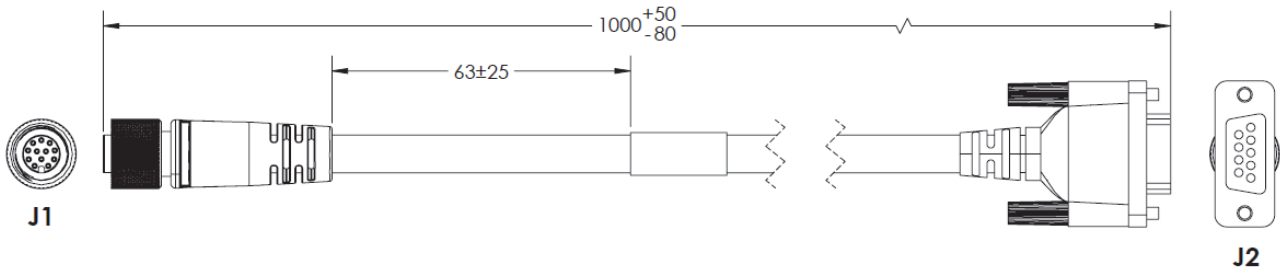
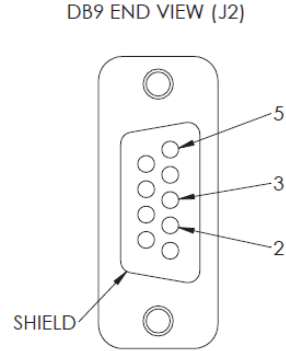
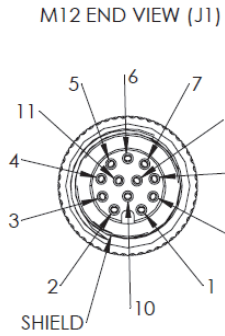
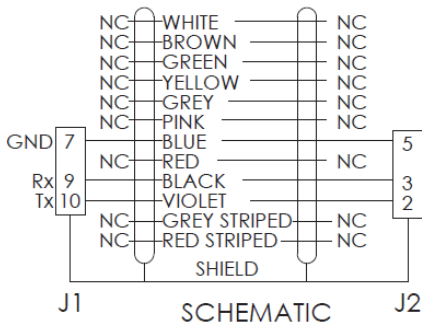
FEMALE END VIEW (J1)



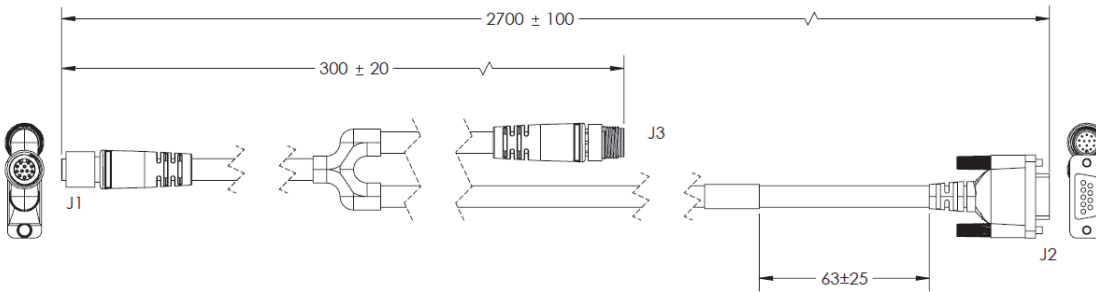
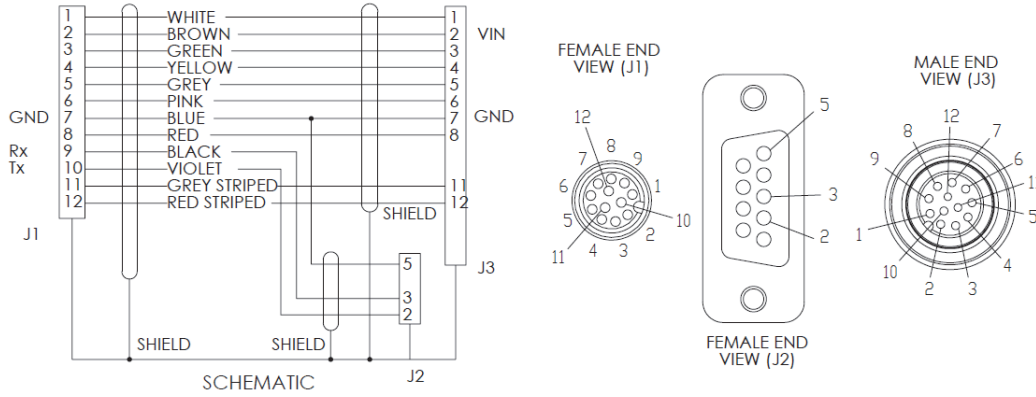
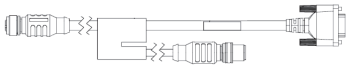
SCHMATIC



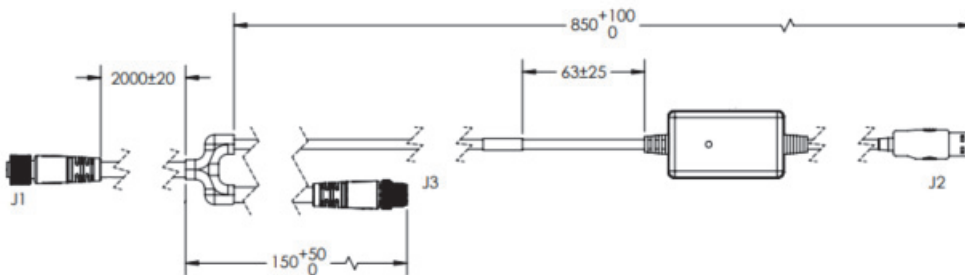
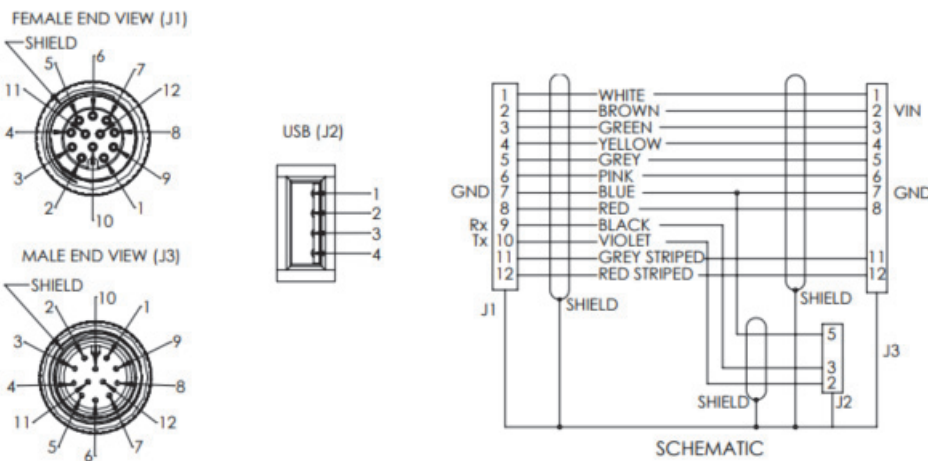
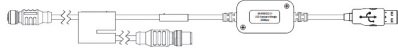
M12 to RS-232 Breakout – 1 Meter or 3 Meters
V430-WR-1M
V430-WR-3M



**Camera to QX-1 Interconnect Cables with RS-232 Breakout – 2.7 Meters
V430-WQR-3M**

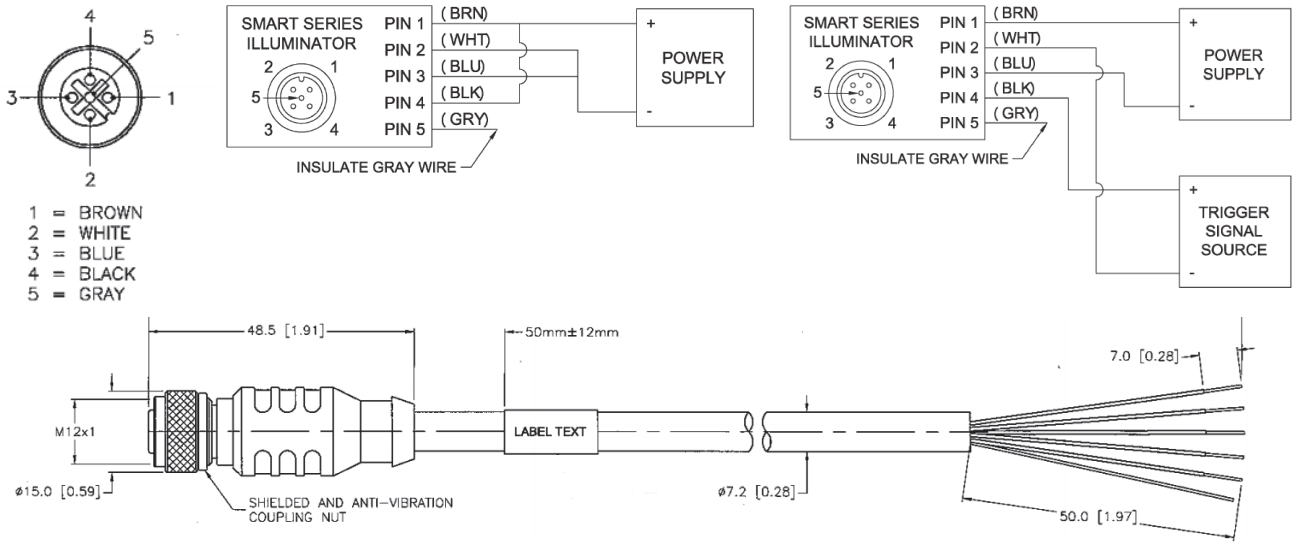


**Camera to QX-1 Interconnect Cables with USB Keyboard Wedge Breakout – 2.7 Meters
V430-WQK-3M**

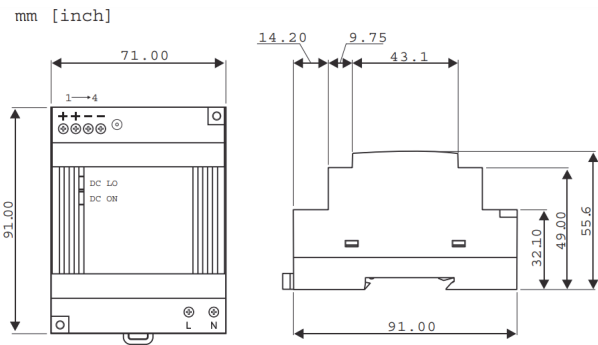


A

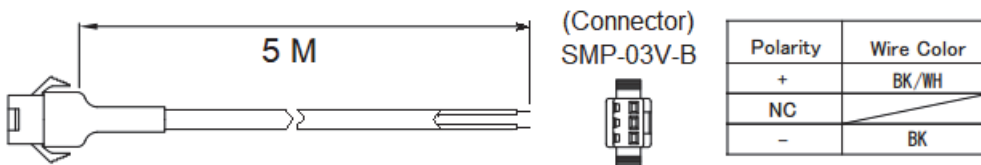
Smart Series Light Cable 5 Pin M12 Female to Flying Leads, 3 Meters and 5 Meters
61-000186-01
61-000187-01



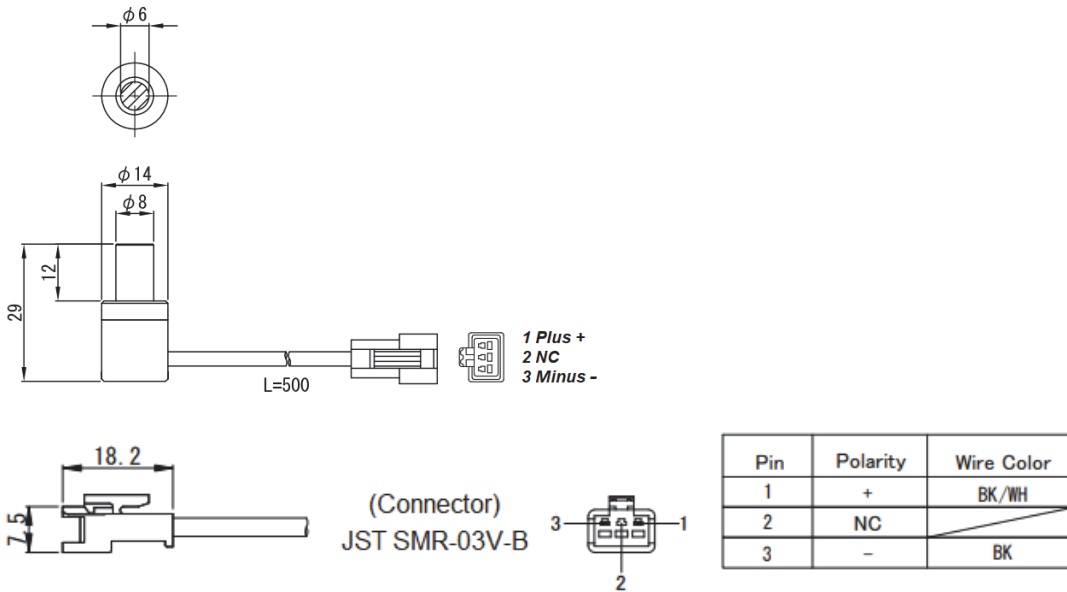
DSP60 24VDC 2.5A DIN Mount Power Supply
NER-011504100



Spot Light Extension Cable, Flying Leads, 5M

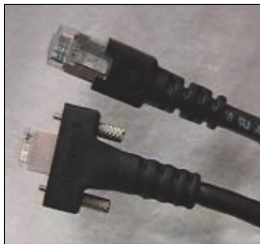


Kit, Spot Light, Blue, Telecentric Lens with Flying Leads Extension Cable
98-9000304-01



A

Industrial High-Flex Ethernet Cables with Jack Screws and RJ45, 2 Meters, 5 Meters, and 7 Meters
98-000133-01
98-000134-01
98-000134-02



Industrial High-Flex Ethernet Cables

Industrial High-Flex cables provide an interface between F440-F smart cameras and other devices.

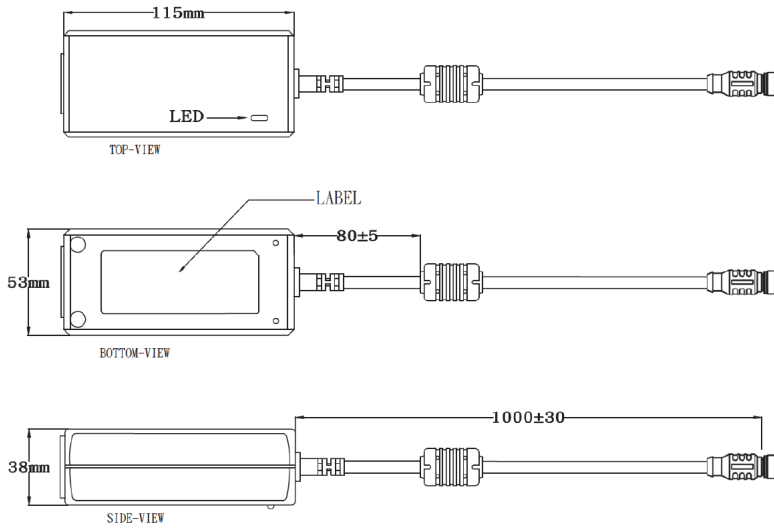
These cables are designed for harsh environments that could damage a traditional CAT 5 cable. The overmold design provides increased strain relief. Thumbscrew locking keeps the connection secure despite shock and vibration. The double-shielded design provides extra protection in industrial applications.

High-Flex cables are designed to withstand 12 million+ flex cycles. The TPE jacket provides additional protection from elements such as oil, water, and abrasion.

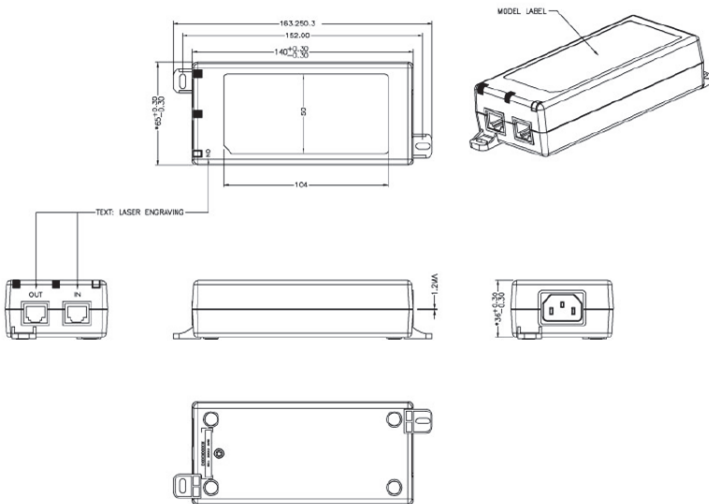
Cable Specifications	
Overall Diameter	.245 Inches
Max. Temperature	80 Degrees C
Jacket Color	Black
UL/CSA Rated	Yes
Min. Bend Radius	2.45 Inches
Flame Rating	FT-1

Primary Components	
Cable	4 Twisted Pairs
Connector A	Standard RJ45
Connector B	Standard RJ45

**Power Supply, 100-240VAC, +24VDC, M12 12-Pin Socket – 1 Meter – U.S. / Euro Plug
97-000012-01**




**Single Port PoE Injector, 30W, IEEE802.3at Compliant, 2 x RJ45 Connector, 90 to 264VAC (Coming Soon)
98-9000311-01**



Important: Power cord NOT included. (C13 connector required.)

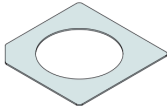
A-5 Lighting Options

NERLITE Smart Series R-70 and R-100 Ring Lights

Product	Appearance	Type	Part Number
F440-F Smart Series Ring Light Kits 		R-70, 70 mm RED Ring Light	NER-011660900G*
		R-70, 70 mm WHITE Ring Light	NER-011660910G
		R-70, 70 mm BLUE Ring Light	NER-011660920G
		R-100, 100 mm RED Ring Light	NER-011661100G*
		R-100, 100 mm WHITE Ring Light	NER-011661110G
		R-100, 100 mm BLUE Ring Light	NER-011661120G


*Note: The R-70 and R-100 Red Ring Lights are normally stock lights with short lead times. Blue and White Ring Lights are subject to standard NERLITE lead times. Check on availability before placing order.

NERLITE Smart Series R-70 and R-100 Ring Light Polarizer Kits

Appearance	Type	Part Number
	R-70 Smart Series Ring Light Polarizer Kit	98-9000301-01*
	R-100 Smart Series Ring Light Polarizer Kit	98-9000302-01*

*Note: Smart Series Ring Light Polarizer Kits must be used in conjunction with a cross-polarizer on the lens. See lens polarizer section of the datasheet to determine the correct part number to match the filter thread size of the lens.

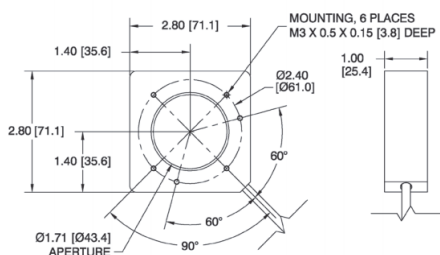
NERLITE Smart Series R-70 and R-100 Ring Light Mounting Kits

Appearance	Type	Part Number
	R-70 Smart Series Ring Light Mounting Kit	V440-AM1*
	R-100 Smart Series Ring Light Mounting Kit	V440-AM2*

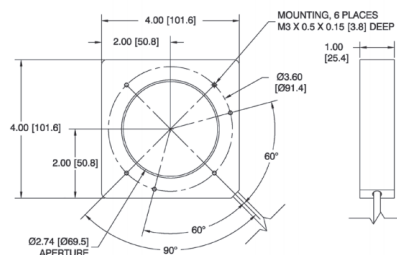
*Note: The C-Mount lens nests down inside the light aperture. The R-70 has a 43.4 mm opening. The R-100 has a 69.5 mm opening. Larger diameter lenses may not fit inside the R-70 ring light. Please see light size compatibility chart in the lens tables.

NERLITE Smart Series R-70 and R-100 Ring Light Specifications, Dimensions, Connections

Size	Part Number	Description	Wavelength	Current @ 24 V	Strobe Current	Millicandela Continuous	Millicandela Strobe
R-70	NER-011660900G	70 mm, RED	623 nm	172 mA	1.2 A	349281	3062913
	NER-011660910G	70 mm, WHITE	6700 K	160 mA	850 mA	352205	1739631
	NER-011660920G	70 mm, BLUE	470 nm	160 mA	850 mA	143217	618814
R-100	NER-011661100G	100 mm, RED	623 nm	255 mA	1.7 A	516015	4370388
	NER-011661110G	100 mm, WHITE	6700 K	235 mA	1.1 A	495814	2338577
	NER-011661120G	100 mm, BLUE	470 nm	235 mA	1.1 A	201005	848215

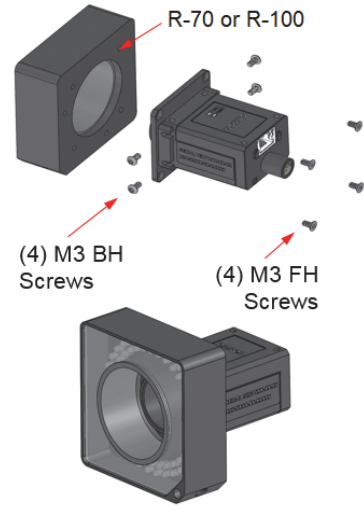
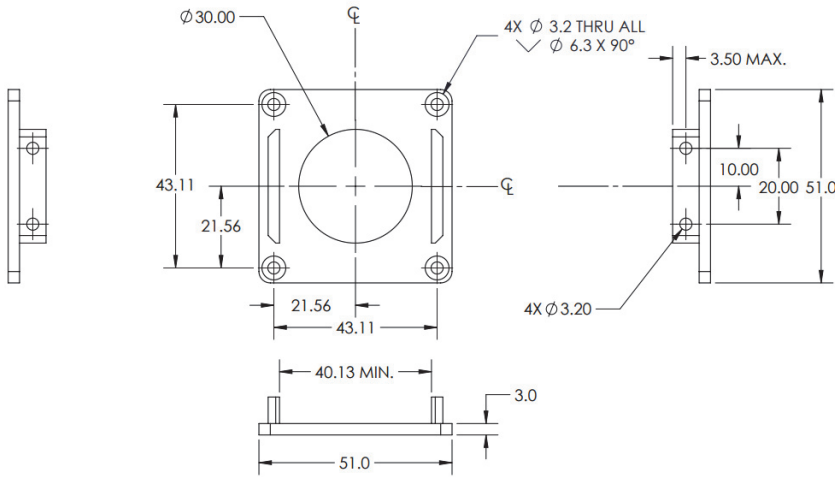
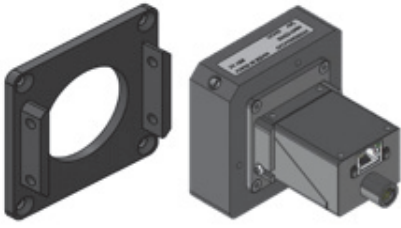


Smart Series R-70 Ring Light Dimensions

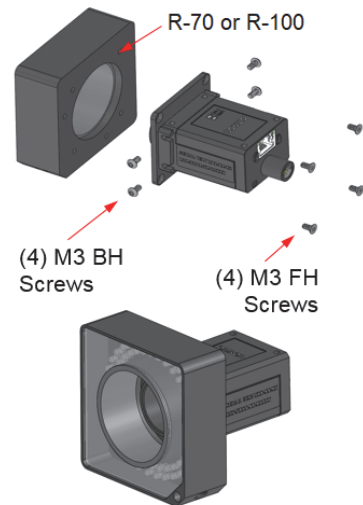
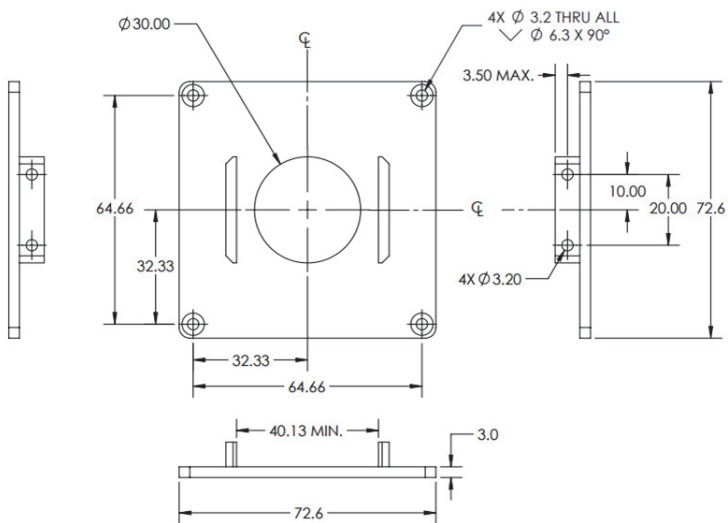
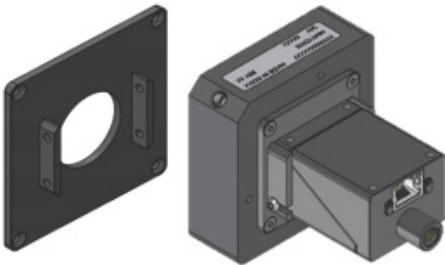


Smart Series R-100 Ring Light Dimensions

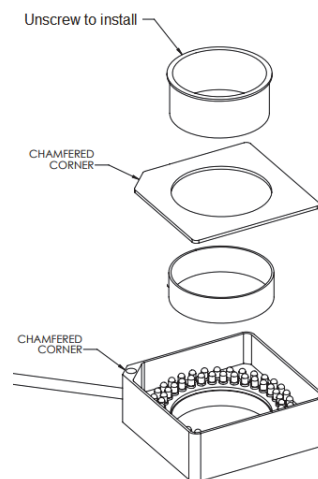
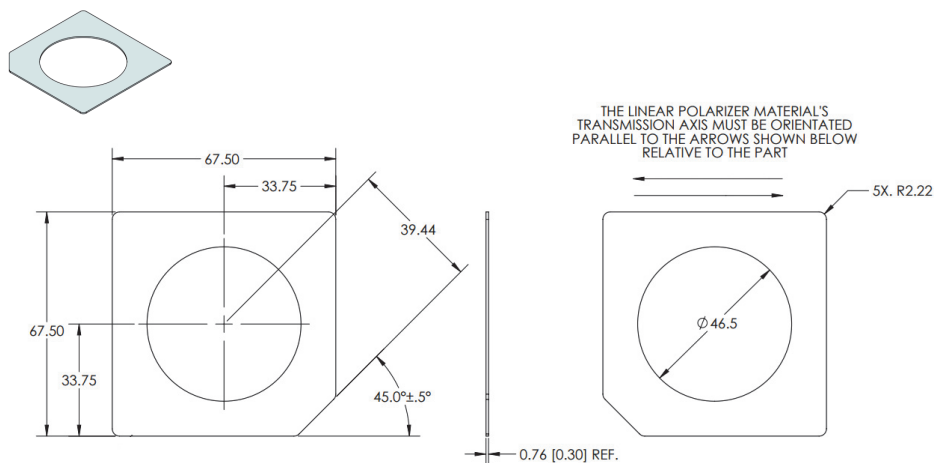
Smart Series R-70 Ring Light to F440-F Mounting Bracket Kit V440-AM1



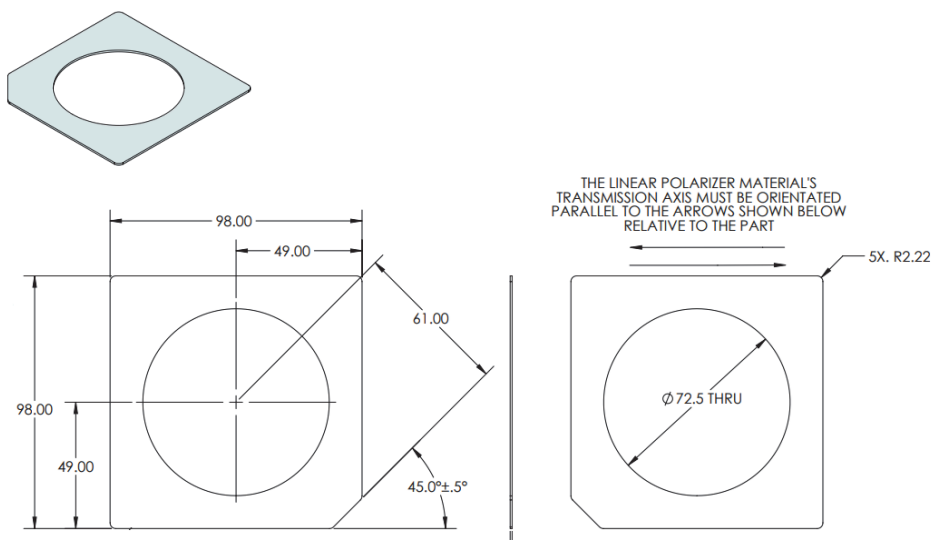
Smart Series R-100 Ring Light to F440-F Mounting Bracket Kit V440-AM2



**Smart Series R-70 Ring Light Polarizer Kit
98-9000301-01**






**Smart Series R-100 Ring Light Polarizer Kit
98-9000302-01**

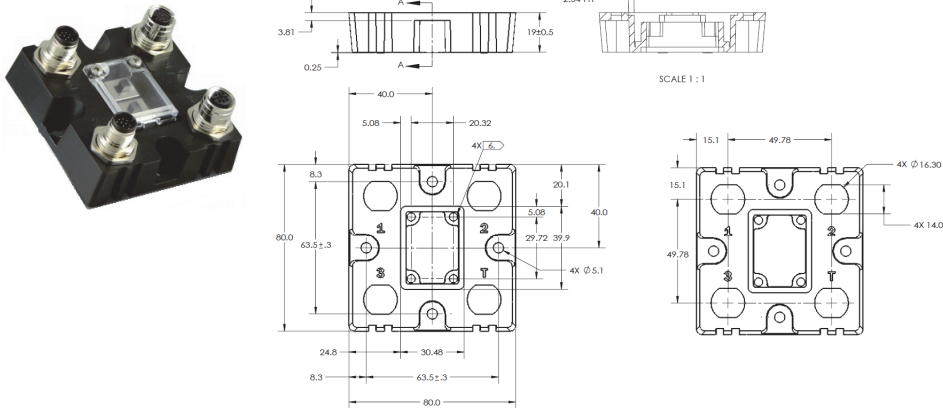


A

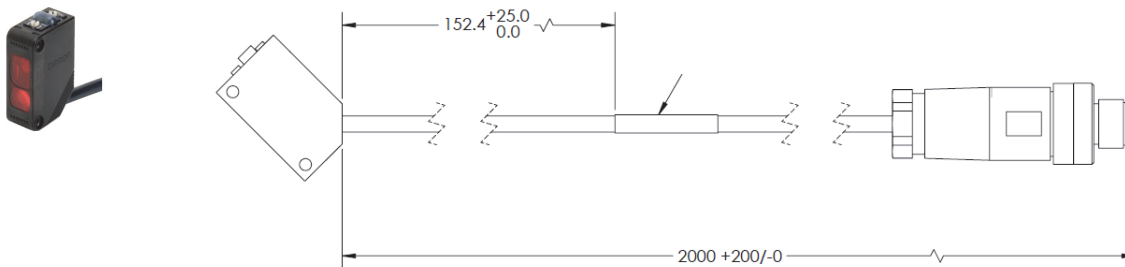
A-6 Other Accessories

Appearance	Category	Length / Spec	Part Number
	QX-1 Interconnect Module – Power, Trigger, Smart Light Control Breakout	N/A	98-000103-02
	QX-1 Photo Sensor, M12 4-Pin Plug, NPN	2 Meters – Light ON/Dark ON	99-9000016-01
	QX-1 Field-Wireable M12 4-Pin Plug for Any Trigger Source or Photo Sensor	Screw Terminals	98-9000239-01

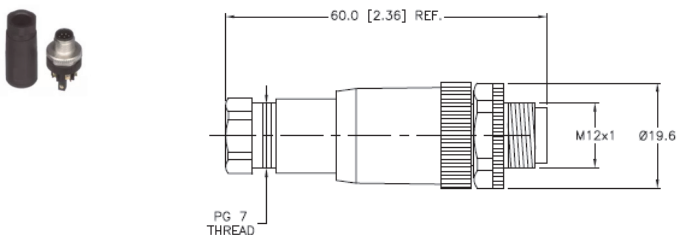
**QX-1 Interconnect Module – Power, Trigger, Smart Light Control Breakout
98-000103-02**



**QX-1 Photo Sensor, M12 4-Pin Plug, NPN – 2 Meters – Light ON / Dark ON
99-9000016-01**



**QX-1 Field-Wireable M12 4-Pin Plug for Any Trigger Source or Photo Sensor – Screw Terminals
98-9000239-01**





Firmware Update

This section describes how to update F440-F C-Mount Smart Camera firmware.

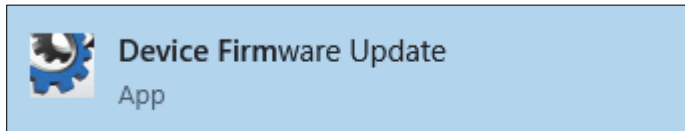
B-1	Firmware Update	B-2
B-2	Licensing Information	B-5

B-1 Firmware Update

AutoVISION's simple **Device Firmware Update** feature makes it easy to download and install firmware on your camera.

To download and install firmware:

- Navigate to **Windows Start Menu > Programs > OMRON AutoVISION > Device Firmware Update**.



- After you click **Device Firmware Update**, the **Smart Camera Firmware Update Tool** will appear. Select your camera from the **Please Select a Smart Camera to Update** dropdown menu.

Note: Only cameras on the same network as your PC will be visible in this menu.

- Once you have selected your camera, its identifying details, such as **Model**, **Firmware Version**, **MAC Address**, **IP Address**, **Status**, and **PC Version** will be displayed.

Smart Camera Firmware Update Tool

Please Select a Smart Camera to Update

F440-F21CDA6

Model	F440 QSXGA
Firmware Version	9.3.0 Build 3019 UPDATE RECOMMENDED
MAC Address	00:0B:43:21:CD:A6
IP Address	192.168.188.2 [mask: 255.255.0.0]
Status	NO JOB LOADED
PC Version	9.3.0 Build 3024

Select the Firmware Version

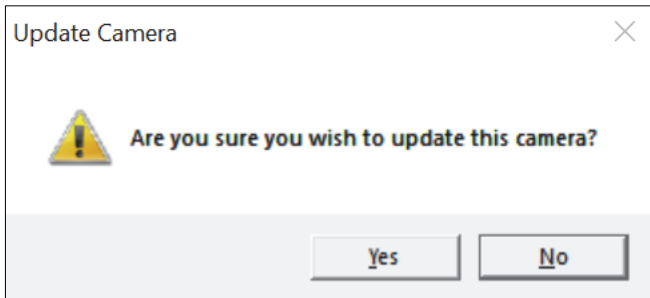
9.3.0 Build 3024

Exit Update Firmware

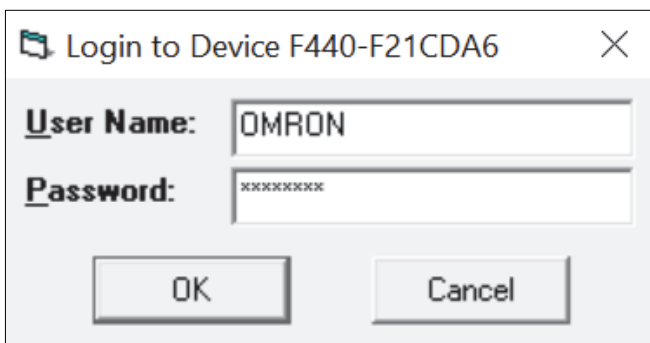
- Select the desired version of firmware from the **Select the Firmware Version** dropdown menu. This menu will list all the firmware versions on your PC.

Note: The firmware versions shown below are representative examples and may not necessarily reflect what you see on the dropdown menu.

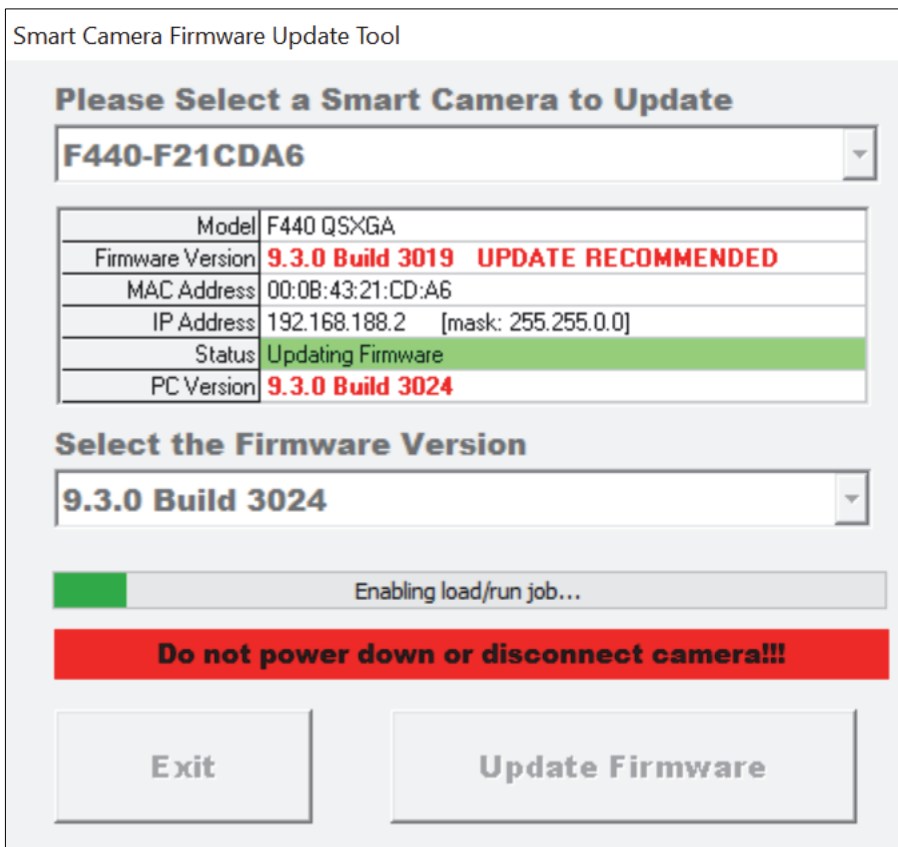
- Click the **Update Firmware** button.
- A dialog will appear asking **Are you sure you wish to update this camera?** Click **Yes**.



- If a username and password have been defined for the camera, a second dialog will then appear prompting you for your username and password.
- Important:** The user name and password are both case-sensitive. Click **OK** after you have entered your user name and password to begin the download and install process.



The firmware update process may take more than a minute.



Once the firmware is downloaded and installed, the camera will reboot.

Smart Camera Firmware Update Tool

Please Select a Smart Camera to Update

F440-F21CDA6

Model	F440 QSXGA
Firmware Version	9.3.0 Build 3019 UPDATE RECOMMENDED
MAC Address	00:0B:43:21:CD:A6
IP Address	192.168.188.2 [mask: 255.255.0.0]
Status	Updating Firmware
PC Version	9.3.0 Build 3024

Select the Firmware Version

9.3.0 Build 3024

Update Complete - Rebooting Smart Camera (Stage 5 of 5)

Do not power down or disconnect camera!!!

Exit Update Firmware

- When the entire firmware update process is complete, click the **Exit** button to close the utility.

Smart Camera Firmware Update Tool

Please Select a Smart Camera to Update

F440-F21CDA6

Model	F440 QSXGA
Firmware Version	9.3.0 Build 3019 UPDATE RECOMMENDED
MAC Address	00:0B:43:21:CD:A6
IP Address	192.168.188.2 [mask: 255.255.0.0]
Status	NO JOB LOADED
PC Version	9.3.0 Build 3024

Select the Firmware Version

9.3.0 Build 3024

Update Successful

Exit Update Firmware

B-2 Licensing Information

Software License	Vision Toolset
F440-FXXXY50M-NNS: AutoVISION Sensor	Locate Tool, Presence/Absence Tool, Count Tool, Measure Tool, Logic Tool
F440-FXXXY50M-NNA: AutoVISION + Verification	All of the Above + Decode Tool, OCR Tool, Match Strings Tool, String Format Tool, OCV Tool, Symbol Quality Verification Tool
F440-FXXXY50M-NNV: AutoVISION + Verification + Visionscape	All of the Above + Visionscape Extensive Machine Vision Tool Set

OMRON Corporation Industrial Automation Company

Kyoto, JAPAN

Contact : www.ia.omron.com

Regional Headquarters

OMRON EUROPE B.V.

Wegalaan 67-69, 2132 JD Hoofddorp
The Netherlands
Tel: (31) 2356-81-300 Fax: (31) 2356-81-388

OMRON ELECTRONICS LLC

2895 Greenspoint Parkway, Suite 200
Hoffman Estates, IL 60169 U.S.A.
Tel: (1) 847-843-7900 Fax: (1) 847-843-7787

OMRON ASIA PACIFIC PTE. LTD.

438B Alexandra Road, #08-01/02 Alexandra
Technopark, Singapore 119968
Tel: (65) 6835-3011 Fax: (65) 6835-3011

OMRON (CHINA) CO., LTD.

Room 2211, Bank of China Tower,
200 Yin Cheng Zhong Road,
PuDong New Area, Shanghai, 200120, China
Tel: (86) 21-6023-0333 Fax: (86) 21-5037-2388

Authorized Distributor:

©OMRON Corporation 2023 All Rights Reserved.
In the interest of product improvement, specifications
are subject to change without notice.

Z475-E-02 (84-9007434-02-B)

0523 (1222)