

# di-soric nVision-i Software



## Overview

The nVision-i software from di-soric provides a free, easy-to-use camera programming environment that allows you to manage simple as well as more involved vision inspection tasks.

di-soric's nVision-i software gives you more power with less complexity.

This software's wide range of inspection and logic tools helps to make even challenging vision applications easier to handle. For example, you can identify an item's unique feature with one of the Locate tools, and your inspection tools will then track with your workpiece – even if it moves around in the camera's field of view.

Missing hardware, scratches, holes, and many other features unique to your part can be detected and inspected for, counted, and/or measured with this suite of tools to ensure quality for whatever part you are inspecting.

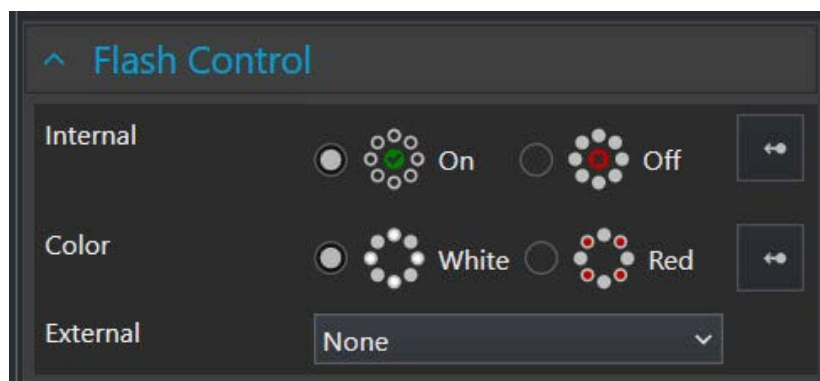
**nVision-i Comms**  
**EtherNet/IP™**



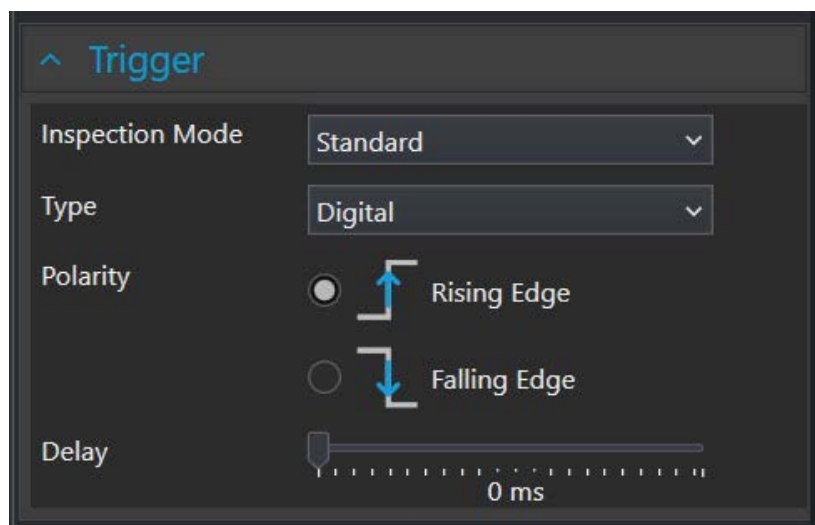
**TCP/IP**  
**Digital I/O**  
**FTP/SFTP**

## Setting Up Internal Lights and Trigger Methods

The di-soric nVision-i software makes it easy to use the camera's internal red or white light or to set up your own external light.

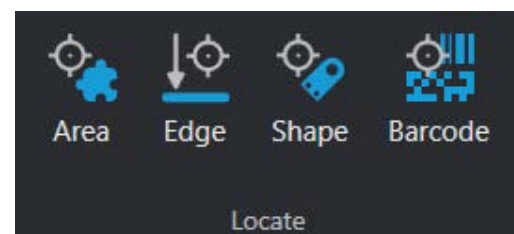


You could use a photoelectric, proximity, or other sensor to send a digital signal to trigger the camera, or you could use an Ethernet/IP, Profinet, or TCP/IP command.

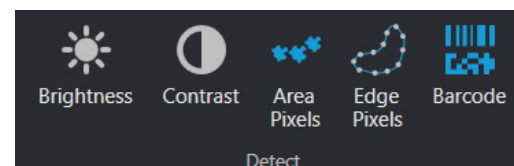


## nVision-i Tools

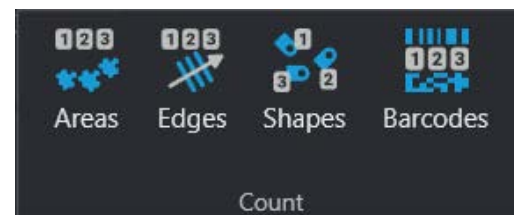
### Locate



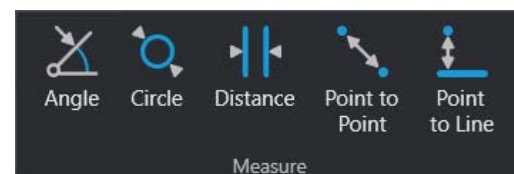
### Detect



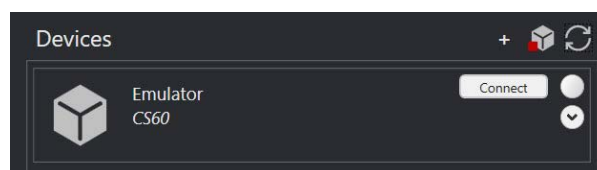
### Count



### Measure



## Simulation Features: Using the Camera Emulator



The built-in emulator allows you to create and test a program on a set of images without being connected to a camera. An internet connection is required for the initial licensing of the emulator. Please refer to the Quickstart guide for specifics.

# di-soric Machine Vision 2D Camera



**CS60-BM28-EP15/300**

The di-soric 2D machine vision camera, working in conjunction with di-soric's nVision-i software, is ideal for use in situations where the application requires increased flexibility or must handle more complex inspection tasks.

Integrated lights, interchangeable lenses, filters, and accessories give you the flexibility to create your own machine vision solution.

## Features

- Image correction and calibration
- High-performance image processing tools
- Intuitive software interface
- Manually adjustable S-mount lens (8mm lens included)
- Integrated white or red LED illumination
- Configurable digital and network communications
- Onboard logic engine
- IP67 (with included lens cover installed)

## Applications

- Defect identification
- Hole detection
- Orientation confirmation
- Presence/absence
- Shape recognition
- Count and measure
- 1D and 2D code reading
- Quality assurance for a wide range of applications

## di-soric Machine Vision 2D Camera Selection Guide

Part Number	Price	Lens Mount	Inspection Tools					Response Time	Resolution (pixels)	Sensor Size	Input	Output	Drawing
			Localization	Detection	Counting	Measurement	Read code						
<a href="#">CS60-BM28-EP15/300</a>	\$995.00	S-mount	✓	✓	✓			30fps	736x480	1/4 in	3 (NPN or PNP)	5 (NPN or PNP)	<a href="#">PDF</a>
<a href="#">CS60-BM28-EP15/400</a>	\$1,316.00	S-mount	✓	✓	✓	✓		30fps	736x480	1/4 in	3 (NPN or PNP)	5 (NPN or PNP)	<a href="#">PDF</a>
<a href="#">CS60-BM28-EP15/300ID</a>	\$1,316.00	S-mount	✓	✓	✓		✓	30fps	736x480	1/4 in	3 (NPN or PNP)	5 (NPN or PNP)	<a href="#">PDF</a>
<a href="#">CS60-BM28-EP15/400ID</a>	\$1,564.00	S-mount	✓	✓	✓	✓	✓	30fps	736x480	1/4 in	3 (NPN or PNP)	5 (NPN or PNP)	<a href="#">PDF</a>
<a href="#">CS60-BM38-EP15/300</a>	\$1,294.00	S-mount	✓	✓	✓			30fps	1440x1080	1/2.9 in	3 (NPN or PNP)	5 (NPN or PNP)	<a href="#">PDF</a>
<a href="#">CS60-BM38-EP15/400</a>	\$1,592.00	S-mount	✓	✓	✓	✓		30fps	1440x1080	1/2.9 in	3 (NPN or PNP)	5 (NPN or PNP)	<a href="#">PDF</a>
<a href="#">CS60-BM38-EP15/300ID</a>	\$1,592.00	S-mount	✓	✓	✓		✓	30fps	1440x1080	1/2.9 in	3 (NPN or PNP)	5 (NPN or PNP)	<a href="#">PDF</a>
<a href="#">CS60-BM38-EP15/400ID</a>	\$1,812.00	S-mount	✓	✓	✓	✓	✓	30fps	1440x1080	1/2.9 in	3 (NPN or PNP)	5 (NPN or PNP)	<a href="#">PDF</a>

## Electrical Connections – Supply

12-Pin A-Coded*			
	Pin	Color	Description
	1	Brown	Input 0
	2	Blue	Input 1
	3	White	Output 2
	4	Green	Output 3
	5	Pink	Ready Output
	6	Yellow	Common
	7	Black	+24VDC
	8	Gray	Ground
	9	Red	Not Connected
	10	Violet	Trigger In
	11	Grey/Pink	Output 0
	12	Red/Blue	Output 1

## Electrical Connections – Ethernet

8-Pin X-Coded		
	Pin	Description
	1	LAN A+
	2	LAN A-
	3	LAN B+
	4	LAN B-
	5	LAN D+
	6	LAN D-
	7	LAN C-
	8	LAN C+

\* This connection chart is for di-soric VKHM-Z cables

# di-soric Machine Vision 2D Camera



## di-soric Machine Vision 2D Camera Technical Specifications

Product Characteristics									
		Part Number							
		CS60-BM28-EP15/300	CS60-BM28-EP15/400	CS60-BM28-EP15/300ID	CS60-BM28-EP15/400ID	CS60-BM38-EP15/300	CS60-BM38-EP15/400	CS60-BM38-EP15/300ID	CS60-BM38-EP15/400ID
Image Resolution	(pixels)	736x480 [0.3 megapixels]				1440x1080 [1.6 megapixels]			
Image Sensor		CMOS - Monochrome (EV76C541)				CMOS - Monochrome (IMX273)			
Sensor Size		1/4 in				1/2.9 in			
Internal Lighting		White (4500K) or red (623nm)							
Shutter Type		Global							
Maximum Frame Rate	(FPS)	30							
Electrical Data									
Operating Voltage	(V)	18-30 VDC							
Current Consumption	(mA)	1000mA (24VDC)							
Reverse Polarity Protection		Yes							
Inputs									
Trigger		Digital, Continuous, EtherNet/IP, Profinet, TCP/IP							
Number of Digital Inputs		3							
Input Function		PNP/NPN (configurable)							
Outputs									
Number of Digital Outputs		5							
Output Function		PNP/NPN							
Max Current Load Per Output	(mA)	100							
Monitoring Range									
Operating Distance		50 to 515 mm [1.9 to 20.3 in] with included lens Up to 2000mm [78.7 in] depending on lens used							
Focus Type		Manual, 8mm lens (interchangeable S-mount lens)							
Readable Codes		N/A	1D: Code 2 of 5, Codabar, Code 128, Code 39, Databar, UPC / EAN, Pharmacode 2D: Aztec Code, Data Matrix, Dotcode, QR, PDF 417			N/A	1D: Code 2 of 5, Codabar, Code 128, Code 39, Databar, UPC / EAN, Pharmacode 2D: Aztec Code, Data Matrix, Dotcode, QR, PDF 417		
Interfaces									
Interface Types		Network comms, digital input/output							
Transmission Standard		10 Base-T; 100 Base-TX; 1000 Base-T							
Transmission Rate		10 MBit/s; 100 MBit/s; 1000 MBit/s							
Protocol		TCP/IP, FTP/SFTP, Profinet, EtherNet/IP							
Factory Settings		IP address: 192.168.3.15 – Subnet mask: 255.255.255.0							
Operating Conditions									
Ambient Temperature		0°C to 50°C [32°F to 122°F]							
Storage Temperature		-10°C to 60°C [14°F to 140°F] at 35% to 85% relative humidity							
IP Rating		IP67 (With lens cover installed)							
Mechanical Data									
Weight	(g [lb])	(265 [0.58])							
Material		Housing: Die-cast zinc (black, powder-coated) Window/optics: PMMA							
Included Accessories									
Included Accessories (with all models)		O-S1-S-080-40 (8 S-mount lens) and CS60-WINDOW (protective lens cover)							

# di-soric Machine Vision Lenses



**O-S1-S-080-40**

di-soric's range of S-mount lenses provides options when setting up your camera, allowing you to customize the system for your specific application. Use a short focal length lens to inspect a smaller portion of your workpiece up-close under high resolution. Use a longer focal length lens to view a wider field.

Use the table below to get an idea of which lens is right for your application

## A Note on Aperture:

A smaller f-stop number indicates a larger aperture opening, letting in more light but creating a shallower depth-of-field. A larger f-stop number indicates a smaller aperture opening, letting in less light but yielding a deeper depth-of-field.

Depth-of-field refers to the distance range over which the portion of the object being viewed is still in focus.

## di-soric S-Mount Lens Selection Guide

Part Number	Price	Focal Length	Aperture	Lens Type	Lens Mount	Maximum Sensor Size	Drawing
<a href="#"><u>O-S1-S-036-40</u></a>	\$42.50	3.6 mm	Fixed f/4.0	Wide angle	S-mount	1/2.5 in	<a href="#"><u>PDF</u></a>
<a href="#"><u>O-S1-S-036-80</u></a>	\$42.50	3.6 mm	Fixed f/8.0	Wide angle	S-mount	1/2.5 in	<a href="#"><u>PDF</u></a>
<a href="#"><u>O-S1-S-080-40 *</u></a>	\$28.00	8mm	Fixed f/4.0	Standard	S-mount	1/3 in	<a href="#"><u>PDF</u></a>
<a href="#"><u>O-S1-S-080-80</u></a>	\$28.00	8mm	Fixed f/8.0	Standard	S-mount	1/3 in	<a href="#"><u>PDF</u></a>
<a href="#"><u>O-S1-S-160-40</u></a>	\$28.00	16mm	Fixed f/4.0	Standard	S-mount	1/3 in	<a href="#"><u>PDF</u></a>
<a href="#"><u>O-S1-S-160-80</u></a>	\$28.00	16mm	Fixed f/8.0	Standard	S-mount	1/3 in	<a href="#"><u>PDF</u></a>
<a href="#"><u>O-S1-S-250-40</u></a>	\$33.00	25mm	Fixed f/4.0	Standard	S-mount	1/2 in	<a href="#"><u>PDF</u></a>
<a href="#"><u>O-S1-S-250-80</u></a>	\$33.00	25mm	Fixed f/8.0	Standard	S-mount	1/2 in	<a href="#"><u>PDF</u></a>

\* Included with camera and also available separately

## di-soric S-Mount Lens Monitoring Range (Field of View)

### With O-S1-S-036-XX Lens

	CS60-BM28 models	CS60-BM38 models
Operating Distance (mm [in])	Field of View (mm [in])	
70 [2.8]	35x22 [1.4x0.9]	92x69 [3.6x2.7]
140 [5.5]	110x67 [4.3x2.6]	202x152 [8.0x6.0]
200 [7.9]	165x102 [6.5x4.0]	271x203 [10.7x8.0]
300 [11.8]	262x165 [10.3x6.5]	410x307 [16.1x12.1]

### With O-S1-S-080-XX Lens

	CS60-BM28 models	CS60-BM38 models
Operating Distance (mm [in])	Field of View (mm [in])	
100 [3.9]	30x19 [1.2x0.8]	57x43 [2.2x1.7]
200 [7.9]	71x46 [2.8x1.8]	120x89 [4.7x3.5]
400 [15.7]	155x100 [6.1x3.9]	243x183 [9.6x7.2]
515 [20.3]	200x130 [7.9x5.1]	306x229 [12.0x9.0]

### With O-S1-S-160-XX Lens

	CS60-BM28 models	CS60-BM38 models
Operating Distance (mm [in])	Field of View (mm [in])	
100 [3.9]	17x11 [0.7x0.4]	26x20 [1.0x0.8]
200 [7.9]	38x25 [1.5x1.0]	43x27 [1.7x1.1]
400 [15.7]	79x52 [3.1x2.0]	119x89 [4.7x3.5]
515 [20.3]	103x67 [4.1x2.6]	150x113 [5.9x4.4]

### With O-S1-S-250-XX Lens

	CS60-BM28 models	CS60-BM38 models
Operating Distance (mm [in])	Field of View (mm [in])	
150 [5.9]	12x8 [0.5x0.3]	25x19 [1.0x0.3]
300 [11.8]	28x21 [1.1x0.8]	55x41 [2.2x1.6]
400 [15.7]	39x26 [1.5x1.0]	74x55 [2.9x2.2]
500 [19.7]	52x38 [2.0x1.5]	94x71 [3.7x2.8]

# di-soric Machine Vision Lenses

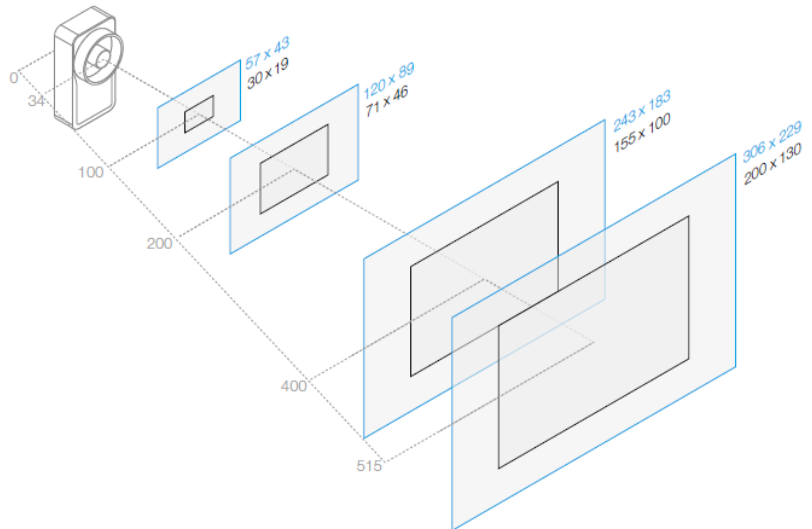
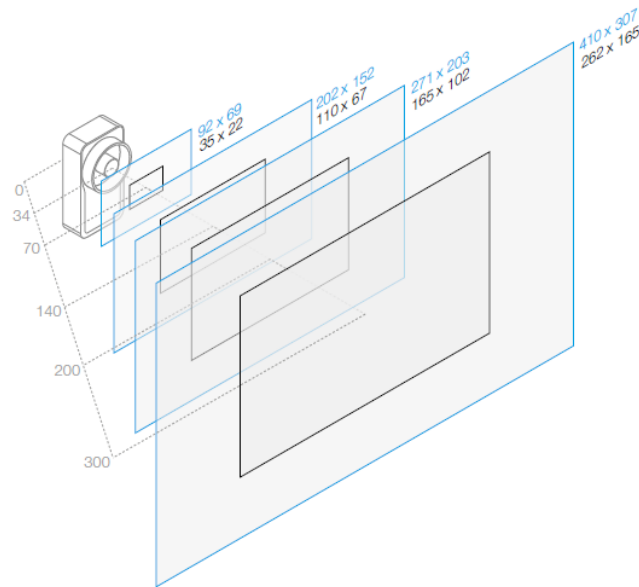


The following illustration shows the representation of fields of view with the available lenses at various working distances for the CS-60 with 736x480 pixels (0.3 MP) and 1440x1080 pixels (1.6 MP).

**Operating distance:** Back of camera body to work piece.

## Field of view, 3.6mm lens<sup>1</sup>

## Field of view, 8mm lens



1.58 MP, 1440x1080 pixels

0.3 MP, 736x480 pixels

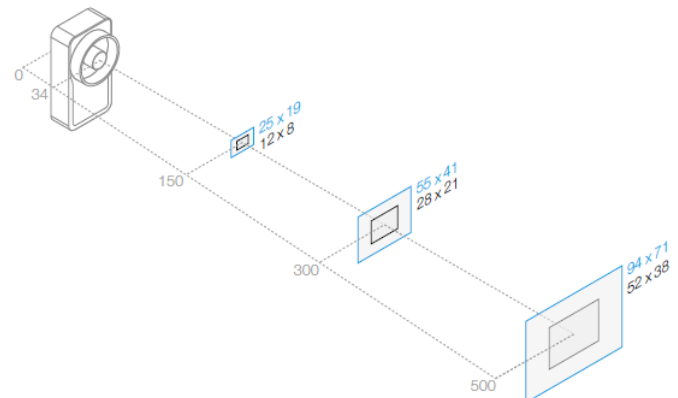
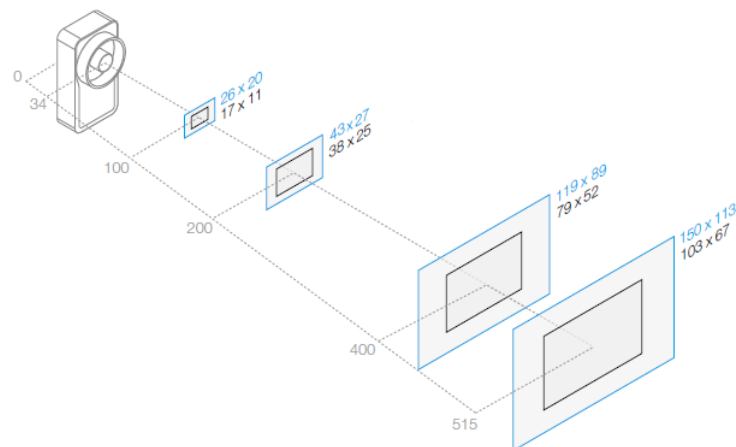
Operating distance ---

All specifications in mm

<sup>1</sup> At 3.6 mm, FOV limited at 1.58 MP if lens cover is used. No IP67 protection with complete FOV.

## Field of view, 16mm lens

## Field of view, 25mm lens



1.58 MP, 1440x1080 pixels

0.3 MP, 736x480 pixels

Operating distance ---

All specifications in mm

<sup>2</sup> Below 250 mm, the lens cover can no longer be used and thus no longer ensures IP67 protection.

# di-soric Machine Vision Filter Accessories



[CS60-BP-635-D11.8](#)



di-soric offers a variety of lens covers and filter accessories to allow you to further customize and optimize a machine vision solution to fit your specific application.

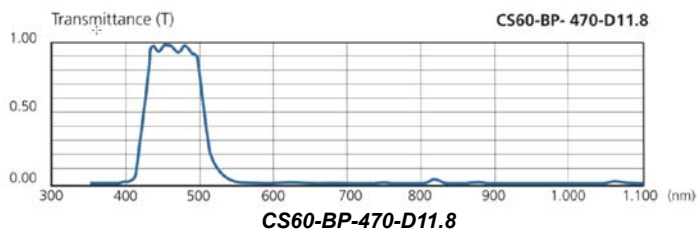
**Bandpass Filters:** These filters allow you to ensure repeatable lighting during inspection by blocking out unwanted light. They are designed to press-fit inside the lens protector.

## di-soric Bandpass Filter Selection Guide

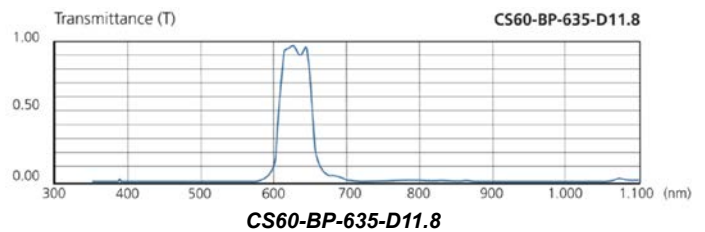
Part Number	Price	Description	Type	Angle of Incidence	Mounting	Drawing
<u><a href="#">CS60-BP-470-D11.8</a></u>	\$313.00	Filter	Blue bandpass (470nm)	0 to 15 degrees	Press fit (inside lens protector)	<u><a href="#">PDF</a></u>
<u><a href="#">CS60-BP-635-D11.8</a></u>	\$104.00	Filter	Red bandpass (635nm)	0 to 15 degrees	Press fit (inside lens protector)	<u><a href="#">PDF</a></u>
<u><a href="#">CS60-BP-850-D11.8</a></u>	\$90.00	Filter	Infrared bandpass (850nm)	0 to 15 degrees	Press fit (inside lens protector)	<u><a href="#">PDF</a></u>

### Filter Bandpass Graphs

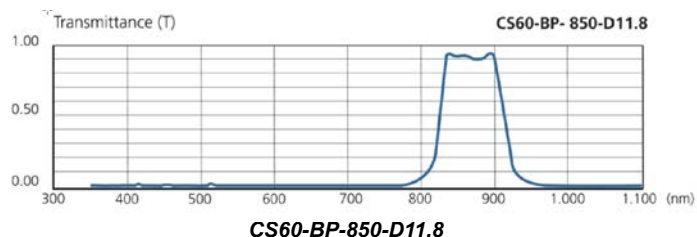
#### Blue Bandpass



#### Red Bandpass



#### Infrared Bandpass



These filters ensure that only the wavelengths of light that you are targeting pass through to the camera. For example, if using a red (635nm) light, choose a filter with a passband centered at 635nm. The bandpass filter will block light at wavelengths outside the passband's range so that only light in the red range comes through the lens to the camera.



[CS60-WINDOW-DIFFUS](#)



[CS60-WINDOW-POLAR](#)



[CS60-WINDOW](#)



[CS60-WINDOW-FOKUS](#)

**Polarizer:** Use the polarizer lens protector/filter to reduce unwanted glare from shiny parts.

**Diffuser:** Use the diffuser lens protector/filter to spread even lighting across a larger portion your workpiece.

**Focus Adjustment Aid:** The focus adjustment aid allows you to change the focus of the camera without the risk of inadvertently touching and smudging the lens with your hands.

## di-soric Lens Cover Selection Guide

Part Number	Price	Description	Type	Size (mm [in])	Mounting	Drawing
<u><a href="#">CS60-WINDOW-DIFFUS</a></u>	\$113.00	Lens protector/filter	Diffuser	45x17 [1.77x0.67]	Press fit (friction fit with O-ring)	<u><a href="#">PDF</a></u>
<u><a href="#">CS60-WINDOW-POLAR</a></u>	\$190.00	Lens protector/filter	Polarizer	45x17 [1.77x0.67]	Press fit (friction fit with O-ring)	<u><a href="#">PDF</a></u>
<u><a href="#">CS60-WINDOW *</a></u>	\$71.00	Lens protector	—	45x17 [1.77x0.67]	Press fit (friction fit with O-ring)	<u><a href="#">PDF</a></u>
<u><a href="#">CS60-WINDOW-FOKUS</a></u>	\$105.00	Focus adjustment aid	—	45x17 [1.77x0.67]	Temporary (no O-ring)	<u><a href="#">PDF</a></u>

\*Included with camera and also available separately

# di-soric Machine Vision Mounting Accessoriess



**SH-G-CSR**



**HS-KL-12-20-V**



**HS-VS-CS60-MP-KK-M3**

di-soric's line of machine vision mounting accessories makes it easy for you solidly position your camera in just the right spot for the application at hand. These accessories are compatible with 12mm mounting rods.

di-soric Mounting Accessory Selection Guide								
Part Number	Price	Description	Orientation	Adjustment	Material	Mounting	Use With	Drawing
<b><u>SH-G-CSR</u></b>	\$40.00	Mounting plate	–	–	Aluminum	–	di-soric CS60 cameras and HS-KL-12-20-V mounting bracket	<a href="#">PDF</a>
<b><u>HS-KL-12-20-V</u></b>	\$10.00	Mounting bracket	Right-angle	–	Stainless steel	12mm rod	SH-G-CSR mounting plate	<a href="#">PDF</a>
<b><u>HS-VS-CS60-MP-KK-M3</u></b>	\$130.00	Mounting bracket	Ball joint	45 degrees vertical 360 degrees horizontal	Aluminum	–	di-soric CS60 cameras	<a href="#">PDF</a>



**E21112**

316L Stainless Steel Rod Selection Guide				
Part Number	Price	Diameter (mm [in])	Length (mm [in])	Drawing
<b><u>E21112</u></b>	\$14.50	12 [0.5]	200 [7.9]	<a href="#">PDF</a>
<b><u>E21113</u></b>	\$16.50	12 [0.5]	300 [11.8]	<a href="#">PDF</a>

# di-soric Machine Vision Cables

**VKHM-Z-5/12-A****VKHM-Z-10/12-A****CS60-Y-1/12-A**

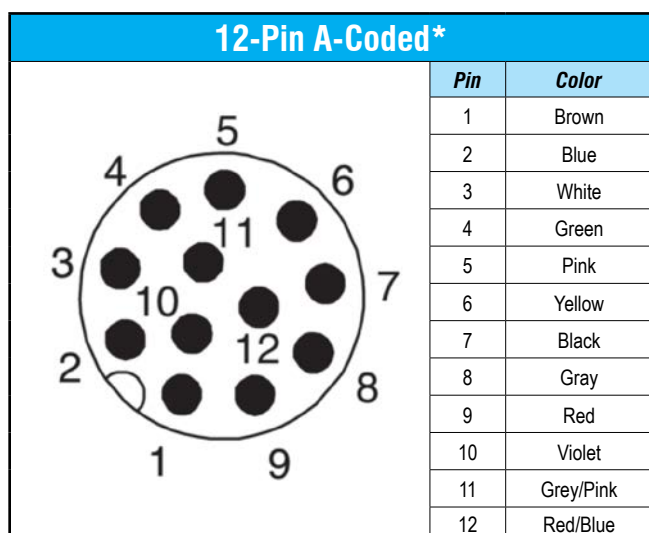
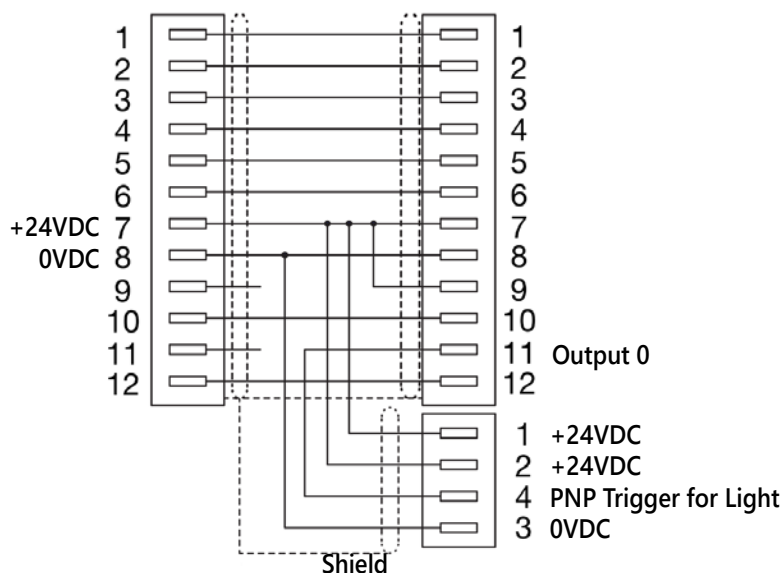
The **VKHM-Z-5/12-A** (with a length of 5m [16.4 ft]) and **VKHM-Z-10/12-A** (with a length of 10m [32.8 ft]) are combination I/O and power cables designed for use with di-soric machine vision cameras.

The **CS60-Y-1/12-A** is a specialized cable designed to allow the user to easily integrate an external light equipped with a 4-pin connector to sync the light with the camera trigger signal.

## di-soric Cables Selection Guide

Part Number	Price	Connection 1	Connection 2	Connection 3	Shielding	Cable Length
<b><u>VKHM-Z-5/12-A</u></b>	\$93.00	12-pin M12 quick-disconnect	Pigtail	N/A	Shielded	16.4 ft [5m]
<b><u>VKHM-Z-10/12-A</u></b>	\$100.00	12-pin M12 quick-disconnect	Pigtail	N/A	Shielded	32.8 ft [10m]
<b><u>CS60-Y-1/12-A</u></b>	\$154.00	12-pin M12 quick-disconnect	12-pin M12 quick-disconnect	4-pin M12 quick-disconnect	Shielded	3.7 ft [1.1 m]

## Cable Pinouts

**VKHM-Z-5/12-A** and **VKHM-Z-10/12-A****CS60-Y-1/12-A**

# Connection Cables X-Coded Data

## Industrial Ethernet Shielded M12 X-Coded Cables

### Features

- High flex industrial Ethernet shielded Cat6a cables
- Resistant to welding sparks
- Flame retardant, chemical resistant
- TPE (thermoplastic elastomer) jacket for typical industrial applications

Ethernet Shielded M12 X-coded Cables								
Part Number	Price	Poles/ Pins	Connectors	Jacket		Length	Drawing	
				Material	Color	m [ft]	Link	
<a href="#">7700-51101-S4X0100</a>	\$69.00	8	Male straight M12 to straight RJ45	TPE Thermoplastic Elastomer	Teal	1.0 [3.2]	<a href="#">PDF</a>	
<a href="#">7700-51101-S4X0300</a>	\$87.00					3.0 [9.8]	<a href="#">PDF</a>	
<a href="#">7700-51101-S4X0500</a>	\$107.00					5.0 [16.4]	<a href="#">PDF</a>	
<a href="#">7700-51201-S4X0100</a>	\$75.00		Male 90-degree M12 to straight RJ45			1.0 [3.2]	<a href="#">PDF</a>	
<a href="#">7700-51201-S4X0300</a>	\$95.00					3.0 [9.8]	<a href="#">PDF</a>	
<a href="#">7700-51201-S4X0500</a>	\$113.00					5.0 [16.4]	<a href="#">PDF</a>	



7700-51101 Series



7700-51201 Series

Specifications			
<b>Nominal Voltage</b>	60VDC UL rated: 30VDC	<b>Locking Material</b>	Zinc die casting, matte nickel plated
<b>Max Current</b>	0.5 A	<b>Protection Degree</b>	M12: IP66K/67 ; RJ45: IP20
<b>Rated Surge Voltage</b>	1.0 kV	<b>Outer Ø</b>	7.4 mm [0.29 in] ±5%
<b>Transfer Parameters</b>	Cat6a, Class EA (ISO/IEC 11801)	<b>Bend Radius</b>	10 x outer Ø*
<b>Transfer Rate</b>	Up to 10Gbps full duplex	<b>Temperature Range</b>	Cable: -40 to +80°C [-40 to +176°F] Connector: -25 to 85°C [13 to 185°F]
<b>Connection</b>	Connector 1: M12 X-coded Connector 2: RJ45	<b>Wire Material</b>	Copper wire, tin plated
		<b>Approvals</b>	cULus File E362618
<b>Tightening Torque</b>	0.6 N·m	To obtain the most current agency approval information, see the Agency Compliance & Certifications Checklist section on the specific part number's web page.	

\*For a linear flex application with a bend radius of 10x of the outside diameter of the cable, you can expect a life of 1 million cycles.  
For a linear flex application with a bend radius of 20x of the outside diameter of the cable, you can expect a life of 10 million cycles.