Code Handheld Barcode Scanners

Advanced, cost-effective barcode readers

The Code Reader™ line of advanced barcode readers have been designed to provide reliable data capture in a variety of settings, while maintaining an ergonomic, lightweight form factor. Code has developed the world's best image capture by using a powerful vision sensor and built-in lighting to reliably capture the barcode while not relying on external light sources.

In addition to leading-edge technical capabilities, all Code handheld barcode scanners feature housings made from specially engineered CodeShield™ plastics. These case materials are designed to provide superior, long-term protection against most commonly used chemicals and chemical disinfectants without damage to the housing.

CR950

The Code Reader™ 950 (CR950) is an aggressive barcode reader that rapidly decodes 1D and 2D barcodes. Its lightweight, ergonomic design makes it comfortable to use over long shifts, and unmatched durability makes it an investment that will last.

CR1500

The Code Reader™ 1500 (CR1500) is a compact tethered barcode reader that features a high-performance scan engine, patented dual-field optical platform, and intuitive targeting that makes reading 1D, 2D, and postal bar codes extremely fast and reliable.

CR1100

The Code Reader™ 1100 (CR1100) is a compact, corded barcode reader that takes up limited workspace without compromising barcode reading performance. The patented dual-field optical platform of the CR1100 allows users to quickly scan both wide 1D barcodes and small dense 2D barcodes.

CR5210

The Code Reader™ 5210 (CR5210) is designed for use in fast-paced environments and handles data from 1D, 2D and postal barcodes with speed and accuracy. The tabletop design allows for hands-free operation or optional trigger reading of large, heavy or bulky items.

CR2701 / CR2702

The Code Reader™ 2700 (CR2701/CR2702) is Code's fourth-generation (Bluetooth 5) barcode scanner, combining nearly 20 years of market experience with new features to improve workflow in any setting. Code has taken their unparalleled scanning performance and stepped it up a notch, tackling even more damaged or poorly-printed barcodes to keep your business moving.

Code Handheld Barcode Scanners

CR950 Advanced Cost-Effective Barcode Scanner

CR950

The Code Reader™ 950 (CR950) is a versatile barcode reader that is easy to set up and use in a variety of different settings. It is available with either USB or RS-232 communication capabilities. The USB version can connect to the ***C-more*** HMI. AutomationDirect provides sample code which can be used to connect the reader to Click, BRX, and Productivity PLCs.

Features

- High-speed, omnidirectional reading of 1D and 2D barcode symbologies.
- Manual or automatic triggering. Stand (sold separately) is required for automatic triggering.
- User feedback with LED and audible tone.
- All-inclusive kits include reader and cable.
- Reads barcodes on backlit screens such as those found on mobile devices.
- Optional stand (sold separately).

Code Handheld Barcode Reader – Selection Chart

Part Number	Price	Description	Communication Protocol	Corded/ Cordless	Form Factor	Weight (lb [kg])	Dimensional Drawing
CR950-K301-C298	$;;04t!_:	Code barcode scanner, 6ft [1.83 m] USB cable included.	USB	Corded	Handheld	0.25 [0.11]	PDF
CR950-K302-C298	$;;04t!#:	Code barcode scanner, 6ft [1.83 m] RS-232 (DB9) cable and power supply included.	RS-232	Corded	Handheld	0.25 [0.11]	PDF

Code Handheld Barcode Scanners Typical Working Range (in [mm])

Size and Type of Barcode (in [mm])	CR950-K30x-C298	
	Min	Max
3 mil Code 39	–	–
7.5 mil Code 39	2 [50]	9.6 [245]
10.5 mil GS1 DataBar	1.4 [35]	8.9 [225]
5.8 mil PDF417	3.3 [85]	6.1 [155]
6.7 mil PDF417	2.6 [65]	6.9 [175]
13 mil UPC	1.6 [40]	14.6 [370]
4.2 mil Data Matrix	–	–
5 mil Data Matrix	3.0 [75]	3.5 [90]
6.3 mil Data Matrix	2.8 [70]	5.3 [135]
10 mil Data Matrix	2.0 [50]	8.1 [205]
20.8 mil Data Matrix	1.2 [30]	15.7 [400]

Note: Working ranges may vary depending on barcode quality and reading environment. The above numbers are a combination of both the wide and high density fields. All samples were high quality barcodes and were read along a physical center line at a 10 degree angle. Distances are measured from the front of the reader. Default automatic gain control settings were used with regular office lighting. Accuracy = +/- 10%. Test conditions may affect working ranges.

Code Handheld Barcode Scanners Specifications

	CR950-K30x-C298
Power Requirements	5VDC (USB versions are powered from the host device) (RS232 versions utilize a 120VAC-to-5VDC power adapter)
Sensor	CMOS 1.2 megapixel monochrome
Operating Temperature	-20 to 50°C [-4 to 122°F]
Storage Temperature	-30 to 65°C [-22 to 150°F]
Humidity	5% to 95% non-condensing
Field Selection	Wide Field (used for long barcodes)
Field of View	51° horizontal by 39.4° vertical
Focal Point	Approximately 130mm [5.12 in]
Optical Resolution	1280 x 960
Pitch	± 65° (from front to back)
Skew	± 60° from plane parallel to symbol (side to side)
Rotational Tolerance	±180°
Symbol Contrast	15% minimum reflectance difference
Target Beam	Single, blue targeting bar
Ambient Light Immunity	Sunlight: Up to 9,000 ft candles
Shock	Withstands multiple drops of 6ft [1.8 m] to concrete
IP Rating	IP54
Agency Approval	CE

Code Handheld Barcode Scanners

CR1100 Advanced Cost-Effective Barcode Scanner

CR1100

The Code Reader™ 1100 (CR1100) is a versatile barcode reader that is easy to set up and use in a variety of different settings. It is available with either USB or RS-232 communication capabilities. The USB version can connect to the ***C-more*** HMI. AutomationDirect provides sample code which can be used to connect the reader to Click, BRX, and Productivity PLCs.

Features

- High-speed, omnidirectional reading of 1D and 2D barcode symbologies.
- Manual or automatic triggering.
- Pre-threaded screw holes to allow for mounting.
- User feedback with LED and audible tone.
- Reads barcodes on mobile device screens.
- Efficient power consumption (lowest in its class).
- Optional stand (sold separately).

Code Handheld Barcode Reader – Selection Chart

Part Number	Price	Description	Communication Protocol	Corded/ Cordless	Form Factor	Weight (lb [kg])	Dimensional Drawing
CR1100-K201-C298	$;;;04t!!:	Code barcode scanner, 6ft [1.83 m] USB cable included.	USB	Corded	Handheld/ presentation	0.15 [0.07]	PDF
CR1100-K202-C298	$;04t?4:	Code barcode scanner, 6ft [1.83 m] RS-232 (DB9) cable and power supply included.	RS-232	Corded	Handheld/ presentation	0.15 [0.07]	PDF

Code Handheld Barcode Scanners Typical Working Range (in [mm])

Size and Type of Barcode (in [mm])	CR1100-K20x-C298	
	Min	Max
3 mil Code 39	3.3 [84]	4.3 [109]
7.5 mil Code 39	1.9 [47]	7 [177]
10.5 mil GS1 DataBar	0.6 [16]	7.7 [196]
5.8 mil PDF417	–	–
6.7 mil PDF417	–	–
13 mil UPC	1.3 [33]	11.3 [286]
4.2 mil Data Matrix	–	––
5 mil Data Matrix	1.9 [48]	4.8 [121]
6.3 mil Data Matrix	1.4 [35]	5.6 [142]
10 mil Data Matrix	0.6 [14]	7.2 [182]
20.8 mil Data Matrix	1.0 [25]	12.6 [319]

Note: Working ranges may vary depending on barcode quality and reading environment. The above numbers are a combination of both the wide and high density fields. All samples were high quality barcodes and were read along a physical center line at a 10 degree angle. Distances are measured from the front of the reader. Default automatic gain control settings were used with regular office lighting. Accuracy = +/- 10%. Test conditions may affect working ranges.

Code Handheld Barcode Scanners Specifications

	CR1100-K20x-C298
Power Requirements	5VDC (USB versions are powered from the host device) (RS232 versions utilize a 120VAC-to-5VDC power adapter)
Sensor	CMOS 1.2 megapixel monochrome
Operating Temperature	-20 to 55°C [-4 to 131°F]
Storage Temperature	-30 to 65°C [-22 to 150°F]
Humidity	5% to 95% non-condensing
Field Selection	High Density (used for small/dense barcodes) and Wide Field (used for long barcodes)
Field of View	High Density: 30° horizontal by 20° vertical Wide Field 50° horizontal by 35.5° vertical
Focal Point	High Density: ~100mm [3.94 in] Wide Field ~115mm [4.53 in]
Optical Resolution	High Density: 960 x 640 Wide Field: 960 x 640
Pitch	± 65° (from front to back)
Skew	± 60° from plane parallel to symbol (side to side)
Rotational Tolerance	±180°
Symbol Contrast	15% minimum reflectance difference
Target Beam	Single, blue targeting bar
Ambient Light Immunity	Sunlight: Up to 9,000 ft candles
Shock	Withstands multiple drops of 6ft [1.8 m] to concrete
IP Rating	Not tested
Agency Approval	CE

Code Handheld Barcode Scanners

CR1500 Advanced Cost-Effective Barcode Scanner

CR1500

The Code Reader™ 1500 (CR1500) is a dual-field barcode reader that is easy to set up and use in a variety of different settings. It is available with either USB or RS-232 communication capabilities. The USB version can connect to the ***C-more*** HMI. AutomationDirect provides sample code which can be used to connect the reader to Click, BRX, and Productivity PLCs.

Features

- Dual-field imager enhances readability and processing time.
- High-speed, omnidirectional reading of 1D and 2D barcode symbologies.
- Manual or automatic triggering. Stand (sold separately) is required for automatic triggering.
- User feedback with LED and audible tone.
- All-inclusive kits include reader and cable.
- Reads barcodes on backlit screens such as those found on mobile devices.
- Optional stand (sold separately).

Code Handheld Barcode Reader – Selection Chart

Part Number	Price	Description	Communication Protocol	Corded/ Cordless	Form Factor	Weight (lb [g])	Dimensional Drawing
CR1500-K201-C298	$06229:	Code barcode scanner, 6ft [1.83 m] USB cable included.	USB	Corded	Handheld	0.26 [116]	PDF
CR1500-K202-C298	$06224:	Code barcode scanner, 8ft [2.44 m] RS-232 (DB9) cable and power supply included.	RS-232	Corded	Handheld	0.26 [116]	PDF

Code Handheld Barcode Scanners Typical Working Range (in [mm])

Size and Type of Barcode (in [mm])	CR1500-K20x-C298	
	Min	Max
3 mil Code 39	3.3 [84]	4.2 [107]
7.5 mil Code 39	0.7 [18]	6.6 [167]
10.5 mil GS1 DataBar	0.2 [5]	8.1 [205]
5.8 mil PDF417	–	–
6.7 mil PDF417	–	–
13 mil UPC	0.5 [13]	10.4 [265]
4.2 mil Data Matrix	–	–
5 mil Data Matrix	1.1 [28]	3.9 [100]
6.3 mil Data Matrix	0.7 [18]	5.3 [135]
10 mil Data Matrix	0.2 [5]	6.5 [165]
20.8 mil Data Matrix	0.5 [13]	12.9 [328]

Code Handheld Barcode Scanners Specifications

	CR1500-K20x-C298
Power Requirements	5VDC (USB versions are powered from the host device) (RS232 versions utilize a 120VAC-to-5VDC power adapter)
Sensor	CMOS 1.2 megapixel monochrome
Operating Temperature	-20 to 55°C [-4 to 131°F]
Storage Temperature	-30 to 65°C [-22 to 150°F]
Humidity	5% to 95% non-condensing
Field Selection	High Density (used for small/dense barcodes) Wide Field (used for long barcodes)
Field of View	High Density: 30° horizontal by 20° vertical Wide Field 50° horizontal by 35.5° vertical
Focal Point	High Density: ~100mm [3.94 in] Wide Field ~115mm [4.53 in]
Optical Resolution	High Density: 960 x 640 Wide Field: 960 x 640
Pitch	± 65° (from front to back)
Skew	± 60° from plane parallel to symbol (side to side)
Rotational Tolerance	±180°
Symbol Contrast	15% minimum reflectance difference
Target Beam	Single, blue targeting bar
Ambient Light Immunity	Sunlight: Up to 9,000 ft candles [96,890 lux]
Shock	Withstands multiple drops of 6ft [1.8 m] to concrete
IP Rating	IP54
Agency Approval	CE

Code Handheld Barcode Scanners

CR5210 Advanced Cost-Effective Barcode Scanner

CR5210

The Code Reader™ 5210 (CR5210) is a dual-field barcode reader that is easy to set up and use in a variety of different settings. It is available with either USB or RS-232 communication capabilities. The USB version can connect to the ***C-more*** HMI. AutomationDirect provides sample code which can be used to connect the reader to Click, BRX, and Productivity PLCs.

Features

- Dual-field imager enhances readability and processing time.
- High-speed, omnidirectional reading of 1D and 2D barcode symbologies.
- Manual or automatic triggering.
- User feedback with LED and audible tone.
- All-inclusive kits include reader and cable.
- Reads barcodes on backlit screens such as those found on mobile devices.

Code Handheld Barcode Reader – Selection Chart

Part Number	Price	Description	Communication Protocol	Corded/ Cordless	Form Factor	Weight (lb [g])	Dimensional Drawing
CR5210-C500-C298	$06226:	Code barcode scanner, 6ft [1.83 m] USB cable included.	USB	Corded	Presentation	0.7 [318]	PDF
CR5210-C502-C298	$06225:	Code barcode scanner, 6ft [1.83 m] RS-232 (DB9) cable and power supply included.	RS-232	Corded	Presentation	0.7 [318]	PDF

Code Handheld Barcode Scanners Typical Working Range (in [mm])

Size and Type of Barcode (in [mm])	CR5210-C50x-C298	
	Min	Max
3 mil Code 39	–	–
7.5 mil Code 39	0.4 [10]	5.9 [150]
10.5 mil GS1 DataBar	0.4 [10]	6.7 [170]
5.8 mil PDF417	0.6 [15]	4.0 [102]
6.7 mil PDF417	0.4 [10]	4.8 [122]
13 mil UPC	0.4 [10]	8.0 [203]
4.2 mil Data Matrix	–	–
5 mil Data Matrix	1.2 [31]	2.3 [59]
6.3 mil Data Matrix	0.9 [23]	3.5 [89]
10 mil Data Matrix	0.4 [10]	5.7 [146]
20.8 mil Data Matrix	0.4 [10]	8.9 [225]

Note: Working ranges may vary depending on barcode quality and reading environment. The above numbers are a combination of both the wide and high density fields. All samples were high quality barcodes and were read along a physical center line at a 10 degree angle. Distances are measured from the front of the reader. Default automatic gain control settings were used with regular office lighting. Accuracy = +/- 10%. Test conditions may affect working ranges.

Code Handheld Barcode Scanners Specifications

	CR5210-C50x-C298
Power Requirements	5VDC (USB versions are powered from the host device) (RS232 versions utilize a 120VAC-to-5VDC power adapter)
Sensor	CMOS 1.2 megapixel monochrome
Operating Temperature	-20 to 55°C [-4 to 131°F]
Storage Temperature	-30 to 65°C [-22 to 150°F]
Humidity	5% to 95% non-condensing
Field Selection	Single field
Field of View	51° horizontal by 39.4° vertical
Focal Point	~40mm [1.6 in]
Optical Resolution	1280 x 960
Pitch	± 65° (from front to back)
Skew	± 60° from plane parallel to symbol (side to side)
Rotational Tolerance	±180°
Symbol Contrast	15% minimum reflectance difference
Target Beam	Single, blue targeting bar
Ambient Light Immunity	Sunlight: Up to 9,000 ft candles [96,890 lux]
Shock	Withstands multiple drops of 6ft [1.8 m] to concrete
IP Rating	IP 52
Agency Approval	CE

Code Handheld Barcode Scanners

CR2700 Advanced Cordless Barcode Scanner

CR2701-200-C298

CR2702-200-C298

The Code Reader™ 2700 (CR2700) is a cordless, rechargeable, rugged barcode reader that is easy to set up and use in a variety of different settings. It features Bluetooth-to-USB communication and can connect to the ***C-more*** HMI.

Features

- Dual-field imager enhances readability and processing time.
- High-speed, omnidirectional reading of 1D and 2D barcode symbologies.
- Manual or automatic triggering.
- User feedback with LED and audible tone.
- All-inclusive kits include reader and cable.
- Reads barcodes on backlit screens such as those found on mobile devices.

Code Handheld Barcode Reader – Selection Chart

Part Number	Price	Description	Communication Protocol	Corded/ Cordless	Form Factor	Weight (lb [g])	Dimensional Drawing
CR2701-200-C298	$0622b:	Code barcode scanner (Bluetooth) with removable battery and charging base, 3ft [0.91 m] USB cable included.	Bluetooth to USB	Cordless	Palm	0.29 [131]	PDF
CR2702-200-C298	$0622a:	Code barcode scanner (Bluetooth) with removable battery and charging base, 3ft [0.91 m] USB cable included.	Bluetooth to USB	Cordless	Handheld	0.39 [177]	PDF

Code Handheld Barcode Scanners Typical Working Range (in [mm])

Size and Type of Barcode (in [mm])	CR270x-200-C298	
	Min	Max
3 mil Code 39	3.5 [90]	4.4 [112]
7.5 mil Code 39	0.9 [23]	6.8 [172]
10.5 mil GS1 DataBar	0.4 [10]	8.3 [210]
5.8 mil PDF417	–	–
6.7 mil PDF417	–	–
13 mil UPC	0.7 [18]	10.6 [270]
4.2 mil Data Matrix	–	–
5 mil Data Matrix	1.3 [33]	4.1 [105]
6.3 mil Data Matrix	0.9 [23]	5.5 [140]
10 mil Data Matrix	0.4 [10]	6.7 [170]
20.8 mil Data Matrix	0.7 [18]	13.1 [333]

Note: Working ranges may vary depending on barcode quality and reading environment. The above numbers are a combination of both the wide and high density fields. All samples were high quality barcodes and were read along a physical center line at a 10 degree angle. Distances are measured from the front of the reader. Default automatic gain control settings were used with regular office lighting. Accuracy = +/- 10%. Test conditions may affect working ranges.

Code Handheld Barcode Scanners Specifications

	CR270x-200-C298
Power Requirements	5VDC, 5W max Powered from the host device
Sensor	CMOS 1.2 megapixel monochrome
Operating Temperature	-20 to 55°C [-4 to 131°F]
Storage Temperature	-30 to 65°C [-22 to 150°F]
Humidity	5% to 95% non-condensing
Field Selection	High Density (used for small/dense barcodes) Wide Field (used for long barcodes)
Field of View	High Density: 30° horizontal by 20° vertical Wide Field 50° horizontal by 33.5° vertical
Focal Point	~100mm [3.94 in]
Optical Resolution	High Density: 960 x 640 Wide Field: 960 x 640
Pitch	± 65° (from front to back)
Skew	± 60° from plane parallel to symbol (side to side)
Rotational Tolerance	±180°
Symbol Contrast	15% minimum reflectance difference
Target Beam	Single, blue targeting bar
Ambient Light Immunity	Sunlight: Up to 9,000 ft candles [96,890 lux]
Shock	Withstands multiple drops of 6ft [1.8 m] to concrete
IP Rating	IP 65
Agency Approval	CE
Number of Scans Per Charge	50,000
Reader Communication	Bluetooth 5 Low Energy (Class II)

Code Handheld Barcode Scanners

Code Handheld Barcode Scanners Decode Capability

Decode Capability		CR950	CR1100	CR1500	CR5210	CR270x
1D	BC412	✓	✓	✓	✓	✓
	Codabar	✓	✓	✓	✓	✓
	Code 11	✓	✓	✓	✓	✓
	Code 32	✓	✓	✓	✓	✓
	Code 39	✓	✓	✓	✓	✓
	Code 39 Extended	–	✓	–	–	–
	Code 93	✓	✓	✓	✓	✓
	Code 128	✓	✓	✓	✓	✓
	GS1 Databar	✓	✓	✓	✓	✓
	Hong Kong 2 of 5	✓	✓	✓	✓	✓
	IATA 2 of 5	✓	✓	✓	✓	✓
	Interleaved 2 of 5	✓	✓	✓	✓	✓
	Matrix 2 of 5	✓	✓	✓	✓	✓
	MSI Plessey	✓	✓	✓	✓	✓
	NEC 2 of 5	✓	✓	✓	✓	✓
	Pharmacode	–	✓	✓	✓	✓
	Straight 2 of 5	✓	✓	✓	✓	✓
	Telepen	✓	✓	✓	✓	✓
	Trioptic	✓	✓	✓	✓	✓
	UK Plessey	✓	✓	✓	✓	✓
	UPC/EAN/JAN	✓	✓	✓	✓	✓
Stacked 1D	Codablock F	–	✓	✓	✓	✓
	Code 49	–	✓	✓	✓	✓
	GS1 Composite (CC-A/CC-B/CC-C)	✓	✓	✓	✓	✓
	GS1 DataBar Expanded Stack	✓	✓	–	–	–
	MicroPDF	✓	✓	✓	✓	✓
	PDF417	✓	✓	✓	✓	✓
2D	Aztec Code	✓	✓	✓	✓	✓
	Data Matrix	✓	✓	✓	✓	✓
	Grid Matrix	–	✓	✓	✓	✓
	HanXin	–	✓	✓	✓	✓
	Maxicode	–	✓	✓	✓	✓
	Micro QR Code	✓	✓	✓	✓	✓
	QR Code	✓	✓	✓	✓	✓
	QR Model 1	–	✓	✓	✓	✓
Postal Codes	Australian Post	–	✓	✓	✓	✓
	Canada Post	–	✓	✓	✓	✓
	Japan Post	–	✓	✓	✓	✓
	KIX Code	–	✓	✓	✓	✓
	Korea Poast	–	✓	✓	✓	✓
	UK Royal Mail	–	✓	✓	✓	✓
	UPU ID Tags	–	✓	✓	✓	✓
	USPS Intelligent Mail	–	✓	✓	✓	✓
	USPS Planet	–	✓	✓	✓	✓
	USPS Post-net	–	✓	✓	✓	✓

Code Handheld Barcode Scanners

Code Handheld Barcode Reader Accessories				
Part Number	*Price*	*Description*	*Weight (lb [kg])*	*Drawing*
CRA-C503-C298	$-62#l:	8ft coiled RS232 cable with power supply	0.40 [0.18]	N/A
CRA-A274-P1-C298	$06227:	Quad bay battery charger	0.67 [0.30]	N/A
CRA-B27DK-C298	$6228:	Battery for CR270x	0.10 [0.05]	N/A
CRA-C34-C298	$6222:	3ft straight USB cable (USB-A to micro USB)	0.09 [0.04]	N/A
CRA-C500-C298	$;;4t!x:	6ft straight USB cable	0.15 [0.07]	N/A
CRA-C501-C298	$;;4t!y:	8ft coiled RS232 cable	0.35 [0.16]	N/A
CRA-C502-C298	$;;4t!z:	6ft straight RS232 cable	0.20 [0.09]	N/A
CRA-C508-C298	$;;;4t!]:	8ft coiled USB cable	0.25 [0.11]	N/A
CRA-C519-C298	$;;;4t!,:	6ft straight DB9-RJ12 RS232 cable	0.20 [0.09]	N/A
CRA-US3-C298	$;4t?0:	Flexible stand for CR950, CR1100 in dark gray	0.85 [0.39]	PDF
CRA-US9-C298	$;4t?2:	Rigid stand for CR950, CR1100 in dark gray	0.20 [0.09]	PDF
CR2AG-P1-C298	$;4t?3:	Power supply for RS232 readers	0.10 [0.05]	N/A

RS232 Accessories

CRA-C501-C298

CRA-C502-C298

CR2AG-P1-C298

CRA-C519-C298

CRA-C503-C298

USB Cables

CRA-C500-C298

CRA-C508-C298

CRA-C34-C298

Stands

CRA-US3-C298

CRA-US9-C298

Battery and Charger

CRA-B27DK-C298

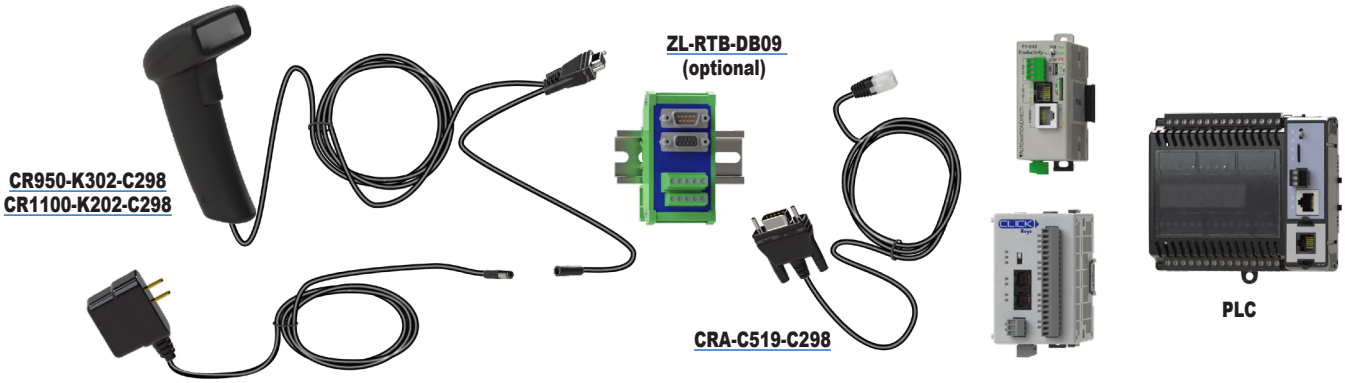
CRA-A274-P1-C298

Code Handheld Barcode Scanners

Compatibility					
Scanner	*C-more EA9*	*C-more CM5*	*Productivity PLC*	*CLICK PLC*	*BRX PLC*
CR950-K301-C298	Yes, with powered USB hub	Yes	No	No	No
CR950-K302-C298	No	No	Yes	Yes	Yes
CR1100-K201-C298	Yes, with powered USB hub	Yes	No	No	No
CR1100-K202-C298	No	No	Yes	Yes	Yes
CR1500-K201-C298	Yes, with powered USB hub	Yes	No	No	No
CR1500-K202-C298	No	No	Yes	Yes	Yes
CR5210-C502-C298	No	No	Yes	Yes	Yes
CR5210-C500-C298	Yes, with powered USB hub	Yes	No	No	No
CR2701-200-C298	Yes**	Yes**	No	No	No
CR2702-200-C298	Yes**	Yes**	No	No	No

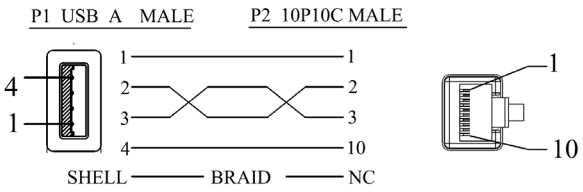
***** Please note that although the CR270x will work with the HMI, the HMI will not provide enough current to charge the scanner. However, the scanner battery can always be charged using an external charger such as the CRA-A274-P1-C298 quad bay battery charger.***

System Assembly Options

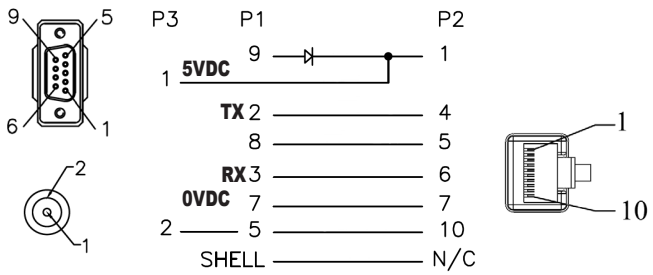


Connection Diagrams

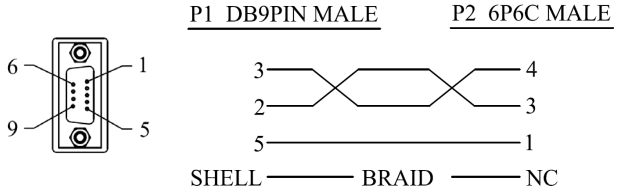
USB Connections
(CRA-C500-C298, CRA-C508-C298)



RS232 Connections
(CRA-C501-C298, CRA-C502-C298)



DB9 to RJ12
(CRA-C519-C298)



Datalogic Rugged Handheld Barcode Scanners

Advanced, cost-effective barcode readers

The Datalogic PowerScan family of barcode readers represents the ultimate in industrial handheld scanners, designed and constructed to withstand the toughest environmental conditions. They are designed to enhance productivity and efficiency through best-in-class scanning performance and reduced total solution cost.

PM9600-SR910RBK10

Features

- Ultra-robust construction – deigned to resist more than 50 drops of 8.2 ft [2.5 m].
- Center-of-gravity design for reduced fatigue of the operator's wrist
- Ergonomic shape
- USB and RS-232 multi-interface
- Easy system integration
- Inductive charging eliminates physical problems with battery contacts and pins.
- Built-in white light illumination
- Image resolution of 1280x800 pixels
- Large field of view – 38 degrees horizontal by 24 degrees vertical

Datalogic Rugged Barcode Handheld Scanners Kits

Part Number	Price	Communication Type	Connection	Includes	Drawing
PM9600-SR910RBK10	$;063f0:	RF (910MHz)	USB	Scanner with removable battery, base station, USB cable, power brick and power cord	PDF
PM9600-SR910RBK20	$;063f1:	RF (910MHz)	RS-232	Scanner with removable battery, base station, RS-232 cable, power brick and power cord	PDF
PBT9600-SRRBK20US	$;063f2:	Bluetooth	RS-232	Scanner with removable battery, base station, RS-232 cable, power brick and power cord	PDF
PBT9600-SRRBK10US	$;063f3:	Bluetooth	USB	Scanner with removable battery, base station, USB cable, power brick and power cord	PDF

Datalogic Rugged Barcode Handheld Scanners and Base Stations

Part Number	Price	Item	Communication Type	Includes	Drawing
PBT9600-SRRB	$;063f4:	Barcode scanner	Bluetooth	Scanner with removable battery	PDF
PM9600-SR910RB	$;063f5:	Barcode scanner	RF (910MHz)	Scanner with removable battery	PDF
BC9630-BT	$;063f6:	Base station	Bluetooth	Base Station (USB and RS-232 compatible)	PDF
BC9630-910	$;063f7:	Base station	RF (910MHz)	Base Station (USB and RS-232 compatible)	PDF

PBT9600-SRRB

BC9630-BT

Datalogic Rugged Handheld Barcode Scanners

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Datalogic Rugged Barcode Handheld Scanners Specifications	
Wireless Communications	
PowerScan PM9600	
Radio Frequency	910MHz
Effective Radiated Power	<50mW
Configuration	Point-to-point / multipoint
Max Readers Per Radio Receiver	16
Radio Range (Open Air)	230m [754ft]
PowerScan PBT9600 (Bluetooth Wireless Technology)	
Radio Frequency	2.4 GHz
Profiles	SSP (Serial Port Profile) and HID (Human Interface Device)
Protocol	Bluetooth 5.0 Certified Class 1, Class 2, Class 3
Radio Range (Open Air)	100m [328ft] Range distances are measured using the base station. Range with connection to other Bluetooth peripherals may vary.
Security	Data encryption, scanner authentication
Decoding Capability	
1D / Linear Codes	Auto discriminates all standard 1D codes including GS1 DataBar™ linear codes
2D Codes	Aztec Code; China Han Xin Code; Data Matrix; MaxiCode; Micro QR Code; QR Code; Dot Code
Postal Codes	Australian Post; British Post; China Post; IMP; Japanese Post, KIX Post; Planet Code, Postnet; Royal Mail Code (RMM4SCC)
Stacked Codes	EAN/JAN Composites; GS1 DataBar Composites; GS1 DataBar Expanded Stacked; GS1 DataBar Stacked; GS1 DataBar Stacked Omnidirectional; MacroPDF; MicroPDF417; PDF417; UPC A/E Composites
Electrical	
Current	Operating 480mA @ 3.7 V Charging (typical) < 15W Cradle BC96xx only: 150mA @ 5V (operative)
Input Voltage	Host powered: 5VDC ±5% External power supply: 10-30 VDC ±5%
Battery	Battery type: Lithium-Ion, 3350mAh Charge time @ 12VDC: 2.5 hours to charge up to 95%, 3.2 hours to charge 100% Reads per charge: 80,000
Environmental	
Ambient Light	0-100,000 lux
Drop Resistance	Withstands 50 drops from 2.5 m [8.2 ft] @ 20°C [68°F] Withstands 50 drops from 2.0 m [6.6 ft] @ -20°C [-4°F]
Trigger Resistance	Withstands 10 million hits
ESD Protection (Air Discharge)	20kV
Humidity Non-Condensing)	0 to 95%
Particulate and Water Sealing	Handheld unit: IP67 and IP65 Cradle unit: IP40
Temperature	Operating: -20 to 50°C [-4 to 122°F] Storage/Transport: -40 to 70°C [-40 to 158°F] Charging: 0 to 40°C [32 to 104°F] Ideal: 0 to 35°C [32 to 95°F]
Interfaces	
Interfaces	RS-232 / USB / Ethernet and Industrial Protocols

Datalogic Rugged Handheld Barcode Scanners

Datalogic Rugged Barcode Handheld Scanners Specifications (continued)	
Physical Characteristics	
Weight	Handheld portion: 425g [15.0 oz]
Reading Performance	
Imager Sensor	1280 x 800 pixels
Light Source	Aiming: 630-680 nm VLD Illumination: White LED reading light
Print Contrast Ratio (Minimum)	15%
Reading Angle	Pitch: ±52° Roll (tilt): 360° Skew (yaw): ±52°
Field of View	38° H, 24° V
Reading Indicators	Beeper (adjustable tone and volume) Datalogic's 3GL™ (Three Green Lights) technology for good-read feedback Datalogic "Green Spot" Dual good-read LEDs Vibration
Resolution (Maximum)	1D codes: 3 mil, 2D codes: 6 mil
Reading Ranges	
SR Models	Code 128 5 mils: 6.4 to 30.9 cm [2.5 to 12.2 in] 20 mils: 4 to 103.7 cm [1.6 to 40.8 in] 40 mils: 5.5 to 175 cm [2.2 to 68.9 in] EAN/UPC 13 mils: 4 to 67.5 cm [1.5 to 26.5 in] DataMatrix 10 mils: 6 to 30 cm [2.5 to 11.8 in]
Safety and Regulatory	
Laser Classification	Caution: Laser radiation Do not stare into beam CDRH Class II; IEC 60825 Class 2
LED Classification	IEC 62471 LED Class: Exempt
Warranty	
Warranty	3-year factory warranty

Datalogic Rugged Handheld Barcode Scanners Accessories

Communication Cables

Datalogic Rugged Barcode Handheld Scanners Accessories – Communication Cables					
Part Number	*Price*	*Cable Type*	*Connection 1*	*Connection 2*	*Cable Length*
CAB-549	$;63fa:	Coiled	RJ50	9-pin female D-sub	8ft [2.43 m]
CAB-548	$;63fb:	Straight	RJ50	9-pin female D-sub	5ft [1.52 m]
CAB-551	$;63fc:	Straight	RJ50	USB-A	6.5 ft [2m]

CAB-549

CAB-548

CAB-551

Battery

Datalogic Rugged Barcode Handheld Scanners Accessories – Battery			
Part Number	*Price*	*Item*	*Battery Power*
RBP-PM96	$;63f9:	Replacement Battery	11.9 Wh

RBP-PM96

Power Cables

Datalogic Rugged Barcode Handheld Scanners Accessories – Power Cables					
Part Number	*Price*	*Item*	*Voltage*	*Voltage Type*	*Fits*
8-0935	$;54!s:	US power cable	12VDC	AC/DC	PowerScan 960X Series base stations BC9630-BT and BC9630-910
6003-0941	$;;54!t:	US power cable	110VAC	AC	Datalogic power supply 8-0935

8-0935

6003-0941

Mount

Datalogic Rugged Barcode Handheld Scanners Accessories – Vehicle Mount		
Part Number	*Price*	*Item*
VMK-P096	$;063f8:	Vehicle mount

VMK-P096

VMK-P096 bracket, shown here with base station and scanner, mounted to a fork truck, lift truck or other machine column.

Datalogic Smart-VS Vision Sensor

959971320

The Smart-VS is a smart vision sensor. It can be set up as easily as a basic photoelectric sensor but provides enhanced functionality. This self-contained vision sensor provides an elegant solution for applications requiring presence and/or orientation object detection. The Smart-VS is built around a powerful multiprocessor platform featuring embedded artificial intelligence technology. The user can step through the simple teach procedure to obtain a GOOD or NO-GOOD (pass or fail) result.

Features

- Machine learning assisted setting
- No vision tools programming experience required
- No inspection threshold adjustment
- Fast and easy set-up
- Deterministic response time 50ms
- Reduced cost of ownership and maintenance
- TEACH button and comprehensive UI with 5 status LEDs
- Electronic focus control
- 50-150 mm operating distance
- Bright and highly visible red LED pointer
- Built-in white polarized light illuminator
- Green/red LED spot for GOOD/NO GOOD part
- Ethernet point-to-point communication available for configuration
- Easy and intuitive WEB server GUI for maintenance and job setting
- Easy photosensor-style output interface
- Cable exit connections can be rotated to accommodate a variety of installation configurations.

Applications

- Processing and packaging machinery
- Transport and handling lines
- Assembly lines
- Food and beverage
- Bottling lines
- Machines for the cosmetic and pharmaceutical sectors

Agency Approvals

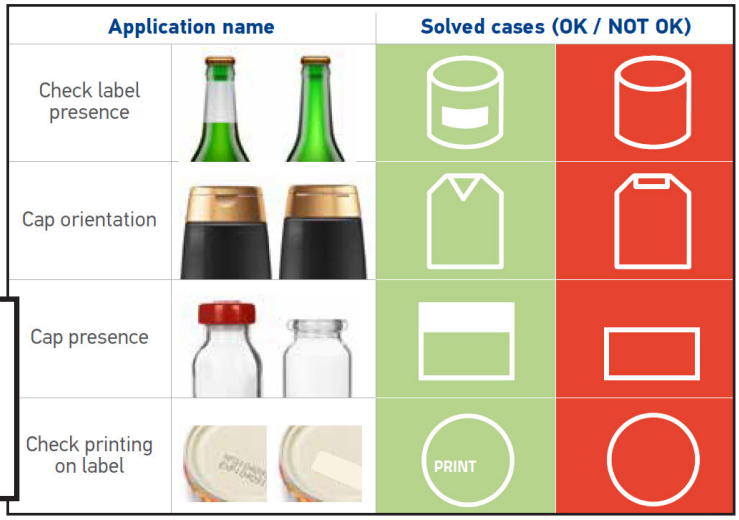
- CE and CSA

Datalogic Smart-VS Smart Vision Sensor Selection Guide						
Part Number	***Price***	***Operating Distance***	***Resolution***	***Illuminator***	***I/O***	***Drawing***
959971320	$;-05klf:	50 to 150 mm [1.97 to 5.91 in]	320 x 240	Polarized white LED	2 inputs and 3 outputs	PDF

The Smart-VS System

The Smart-VS system teaches the sensor GOOD and NO GOOD object conditions. This allows the Smart-VS system to be used in an effective and reliable way for detecting the presence/absence of object features for side orientation of objects, referring to proper object attributes.

This makes the sensor setting independent of the type, material, or color of the object that needs to be detected.



Datalogic Smart-VS Vision Sensor

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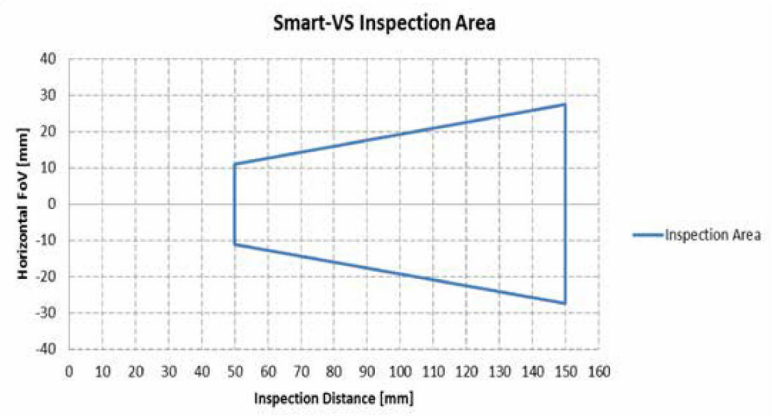
Datalogic Smart-VS Smart Vision Sensor Specifications	
Supply Voltage	10 to 30 VDC
Communication Interface (Ethernet)[1]	10/100 Mbit/s
Inputs	Opto-coupled and polarity insensitive
Maximum Voltage	30VDC
Maximum Input Current Consumption	0.4 to 0.14 A (4.2 W)
Output Type	Push-pull, NPN or PNP. Short circuit protected. Default is push-pull.
Outputs	3 outputs (DATA VALID, GOOD, NO GOOD)
V_{out} (I_{load} = 0mA) Maximum	30VDC
V_{out} (I_{load} = 100mA) Maximum	3VDC
I_{load} Maximum	100mA
Operating Distance	50 to 150 mm [1.97 to 5.91 in]
View Angle	19°
Field Of View Area @ 50 mm	22mm (H) x 16mm (V) [0.87 in (H) x 0.63 in (V)] (Refer to field of view diagram below)
Field Of View Area @ 150 mm	55mm (H) x 41mm (V) [2.17 in (H) x 1.61 in (V)] (Refer to field of view diagram below)
Response Time	50ms from input trigger
Maximum Reference Images (GOOD+NO GOOD)	6 images
Maximum Inspection Rate	20 per second
Active Area Resolution	320x240 pixels
Illuminator	White LED polarized
Weight	173g [6.1 oz]
Material	Aluminum with plastic PMMA protective window
Operating Temperature[2]	-10° to 50°C [14° to 122°F]
Storage Temperature	-20° to 70°C [-4° to 158°F]
Maximum Humidity	90% non-condensing
Vibration Resistance	14mm [0.55 in] @ 2 to 10 Hz; 1.5 mm [0.06 in] @ 13 to 55 Hz; 2 g @ 70 to 500 Hz (2 hours on each axis)
Shock Resistance	30g; 11ms; 3 shocks on each axis
Protection Class[3]	IP65 and IP67
Agency Approvals	CE, CSA

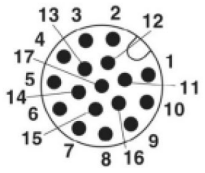
1) The embedded Ethernet interface is intended for configuration only through connection to the device IP. Point-to-point connection is recommended. The IP address is factory set to 192.168.3.100.
2) High ambient temperature applications should use metal mounting bracket for heat dissipation.
3) When correctly connected (fully tightened) to IP67 cables with seals.

Field of View Diagram



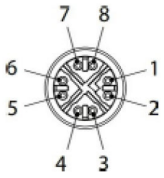
Datalogic Smart-VS Vision Sensor

Connections



M12 17-Pin Power and I/O Connector Pinout			
Pin	***Name***	***Color****	***Function***
1	Vdc	Brown	Power supply input voltage +
2	GND	Blue	Power supply input voltage -
Connector Case	Chassis	–	Connector case provides electrical connection to chassis
6	I1A	Yellow	I1A Trigger Input A (polarity insensitive)
5	I1B	Pink	I1B Trigger Input B (polarity insensitive)
13	I2A	Green	I2A Remote Teach A (polarity insensitive)
3	I2B	White	I2B Remote Teach B (polarity insensitive)
9	O1	Red	Data Valid (default is push-pull)
8	O2	Gray	GOOD Output (default is push-pull)
16	O3	Black	NO GOOD Output (default is push-pull)

**** The wire colors refer to cables part numbers CAB-GD03 and CAB-GD05***



M12 8-Pin Standard Ethernet Network Connector Pinout		
Pin	***Name***	***Function***
1	TX+	Transmit data (positive pin)
2	TX-	Transmit data (negative pin)
3	RX+	Receive data (positive pin)
4	RX-	Receive data (negative pin)
5	NC	Not connected
6	NC	Not connected
7	NC	Not connected
8	NC	Not connected

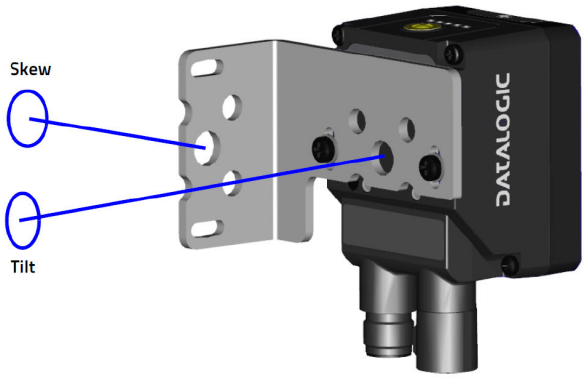
Datalogic Smart-VS Vision Sensor Mounting Bracket

Datalogic Smart-VS Smart Vision Sensor Mounting Bracket Selection Guide			
Part Number	***Price***	***Description***	***Drawing***
BK-22-000	$-5klg:	Replacement mounting bracket, stainless steel	PDF

BK-22-000

Mounting and Positioning the Smart-VS Vision Sensor

Smart-VS mounting brackets are fabricated with slots which allow for easy rotation. This permits precise setting of skew and tilt. When using Smart-VS mounting brackets, you have the ability to rotate the sensor on two axes, as shown in the accompanying diagrams.



Smart-VS Vision Sensor Mounting Options

The Smart-VS Vision Sensor can be attached to the mounting bracket in several ways. Cable exit connections can be rotated to accommodate a variety of installation configurations.

Side mounting with vertical cable exit

Top mounting with vertical cable exit (Horizontal cable exit is also possible)

Side mounting with horizontal cable exit

Datalogic X-Coded Ethernet Cables

Datalogic X-Coded Ethernet Cables Selection Guide		
Part Number	*Price*	
CAB-ETH-X-M01	$-05klc:	Datalogic cable, Ethernet, PVC jacket, shielded, 1m [3.28 ft] cable length, M12 8-pin male X-coded to RJ45
CAB-ETH-X-M03	$-05kld:	Datalogic cable, Ethernet, PVC jacket, shielded, 3m [9.84 ft] cable length, M12 8-pin male X-coded to RJ45
CAB-ETH-X-M05	$-05kle:	Datalogic cable, Ethernet, PVC jacket, shielded, 5m [16.40 ft] cable length, M12 8-pin male X-coded to RJ45

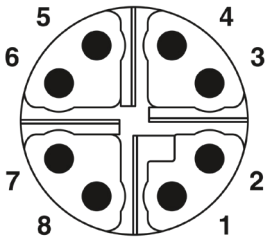
Note: Ethernet cable jacket color may vary.

CAB-ETH-X-M01

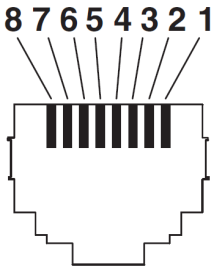
CAB-ETH-X-M03

CAB-ETH-X-M05

Diagrams



Pin assignment M12 male connector, 8-pin, X-coded, male side



Connector pin assignment plug RJ45

Datalogic 17-Pin M12 Cables

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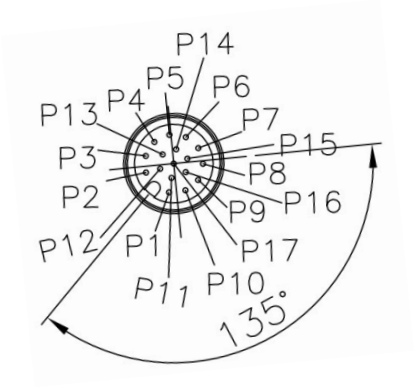
Datalogic 17-Pin M12 Cables Selection Guide		
Part Number	***Price***	
CAB-GD03	$-5kla:	Datalogic cable, M12 axial female to pigtail, 17-pin, PVC, 9.8 ft [3m] cable length.
CAB-GD05	$-05klb:	Datalogic cable, M12 axial female to pigtail, 17-pin, PVC, 16.4 ft [5m] cable length.

CAB-GD03

CAB-GD05

Diagrams



Wire Run List		
AWG	***CONN 1***	***Color***
26	1	Brown
	2	Blue
	3	White
	4	Not connected
	5	Pink
	6	Yellow
	7	Not connected
	8	Gray
	9	Red
	10	Not connected
	11	Not connected
	12	Not connected
	13	Green
	14	Not connected
	15	Not connected
	16	Black
	17	Not connected

ifm Vision Assistant Overview

The ifm Vision Assistant software is a free and highly versatile configuration tool that will help you get the most from your ifm vision system.

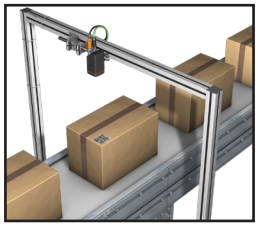
ifm Wizards simplify set-up

About 90% of applications that can be addressed with an ifm camera can be set up using the built-in wizards. These wizards walk the user through the necessary settings.

This step-by-step approach will minimize the learning curve for someone who is just getting into the vision world. For example, the wizard utilizes the system's autofocus capabilities to help determine exposure settings which optimize contrast.

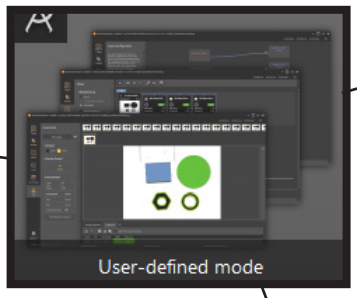
For more advanced users, ifm's Vision Assistant software also has an advanced user-defined mode designed to allow seasoned vision experts to get the very most from these systems.

O2I Wizards



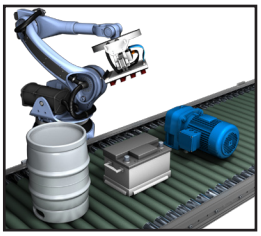
Logistics sorting
Single- or multi-code setup (can also provide barcode quality metrics)

Date code verification
Using built-in OCR (Object Character Recognition)



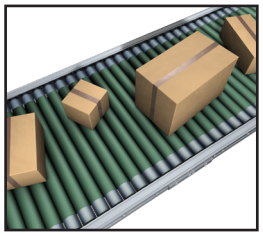
User-defined mode
Allows advanced users to develop custom rule-based applications

O3D Wizards



Robot pick and place
Detection of parts returns robotic coordinates

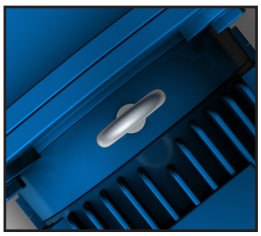
I the carton or case complete?
Color is irrelevant



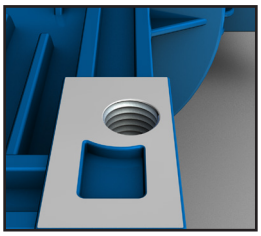
Dimensioning
Logistics – for sorting based on size

Level of solid products
Can determine percentage filled overall instead of just a single point

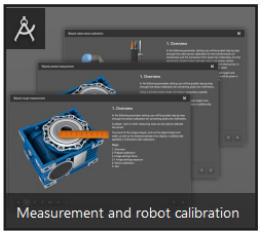
O2D Wizards



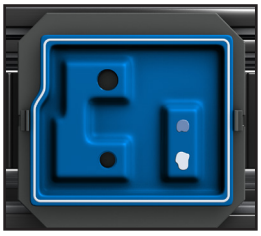
Detection of parts
Searches for a specific shape to see if the shape is in the image



Presence of threads
Searches the image to see if a BLOB is present



Rough or precise measuring



Object width/quality
By analyzing a BLOB

ifm Vision Assistant Overview

Added control

The software also controls things like focus, exposure time, gain, control of internal and external lighting and other settings.

For example, ifm's O2D and O2I cameras have four built-in lights (two polarized and two non-polarized), and with the O2D RGBW cameras you can test red, green, blue, white and even polarized lighting strategies to find the best fit for your application.

As seen by human eyes under white light

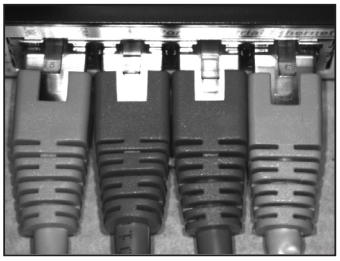
Objects may appear differently depending on the color of the light with which they're illuminated.

For example, here's how a set of differently colored plugs appears to human eyes when illuminated by white light.

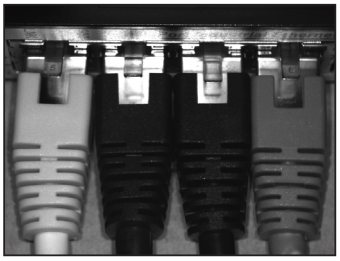
As seen by ifm Vision Assistant under white, red, green or blue light

The ifm Vision Assistant allows objects to be illuminated by white light as well as by monochromatic light. The choice of light color may aid in visualization of various elements of the object in question (for instance, a barcode printed on colored packaging).

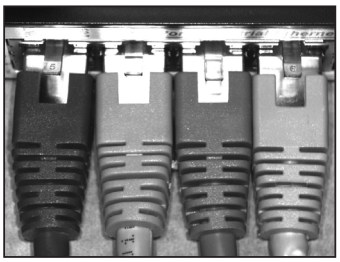
By way of illustration, here is how the same objects shown above might appear to the ifm Vision Assistant when illuminated under white, red, green or blue light. Note how the relative contrast between colors changes with different types of illumination.



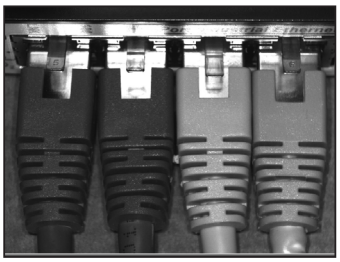
White light



Red light



Green light



Blue light

Simulation features

Additionally, Vision Assistant offers a simulator feature. To access the simulator, first open the software. Once on the home screen "Ctrl+M" will open the "manual connection" dialog box, where the user can select the type of device to test (for example "O2I5XX SimuLater"). This mode allows the user to explore the functions and tools that the software has to offer.

Please note that the simulator does not have the ability to upload an example image and build the rules from that image.

ifm efector
Machine Mount 1D/2D Barcode Scanner

O2I500

The ifm efector machine mount 1D/2D barcode scanner provides simple, capable, and reliable image-based barcode reading. The O2I barcode reader is fully self-contained, including the imager, evaluation unit, illumination, and outputs. The evaluation algorithm provides 4x higher resolution for reliable reading results, 10x faster evaluation for high-speed applications, and 10x faster setup to optimize production availability.

Features

- Convenient autofocus
- Alignment laser
- Four built-in lights (two non-polarized and two polarized)
- Two configurable outputs
- Onboard logic engine
- IP65
- Local device backup and cloning
- Optical Character Recognition (OCR)

Applications

- Barcode presence
- Barcode placement
- Barcode quality
- Identification and verification of text (via OCR)

ifm efector Machine Mount 1D/2D Barcode Scanner Selection Guide

Part Number	Price	Scanner Capability	Lens Type	Light Emission	Port Protocols	Lens Material	Dimensional Drawing
O2I500	$;00667x:	1D and 2D	Standard	Visible red	TCP/IP and EtherNet/IP	Gorilla glass	PDF
O2I501	$;00667y:			Infrared			PDF
O2I502	$;00667z:		Wide angle	Visible red			PDF
O2I503	$;;00667]:			Infrared			PDF

One-Button Teach Configuration

Simple applications for the O2I can be programmed by the single touch button located on the back of the O2I device.

Trigger and network settings are configured via a data matrix code generated by a smartphone app (iOS and Android).

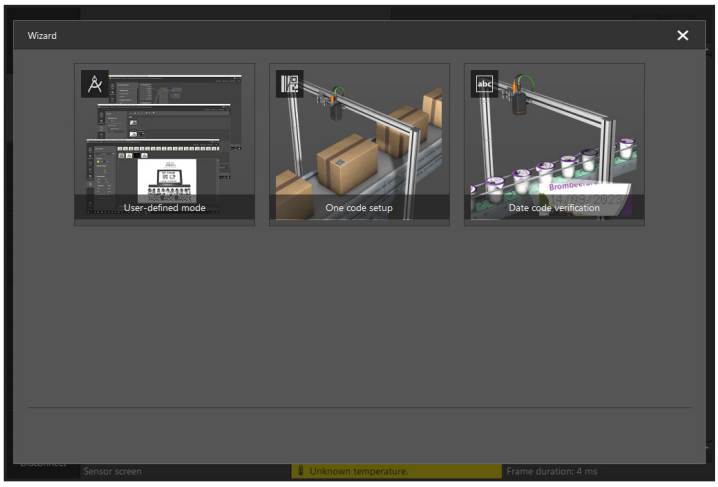
Android QR Code

iOS QR Code

O2I500 rear view showing touch button and LEDs.

Full-Featured Vision Assistant Configuration

ifm's free Vision Assistant configuration software has easy-to-use wizards to read a single code or to do date code verification via Optical Character Recognition (OCR). The software also allows the user to define the parameters for each specific application. The camera also has built-in logic to simplify the integration of the camera into the system.



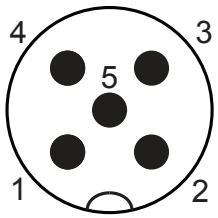
ifm efector
Machine Mount 1D/2D Barcode Scanner

ifm efector Machine Mount 1D/2D Barcode Scanners Technical Specifications

Product Characteristics					
Image Resolution	(pixels)	1280 x 960			
Maximum Reading Rate	(Hz)	40			
Electrical Data					
Operating Voltage	(V)	18-30 VDC			
Current Consumption	(mA)	<400 @ 24VDC			
Reverse Polarity Protection		Yes			
Wavelength	(nm)	Red: 617 (O2I500 and O2I502) Infrared: 850 (O2I501 and O2I503)			
Image Sensor		CMOS image sensor (black/white)			
Inputs					
Trigger		External: 24V PNP/NPN (IEC 61131-2 Type 3) TCP/IP EtherNet/IP Continuous			
Outputs					
Number of Digital Outputs		2 (configurable)			
Output Function		24V PNP/NPN			
Maximum Current Load Per Output	(mA)	100			
Monitoring Range					
Field of View	(mm [in])	For Standard Lens (O2I500 and O2I501)		For Wide-Angle Lens (O2I502 and O2I503)	
		Operating Distance:	Field of View:	Operating Distance:	Field of View:
		85 [3.35]	28 x 21 [1.10 x 0.83]	35 [1.38]	25 x 19 [0.98 x 0.75]
		300 [11.81]	92 x 69 [3.62 x 2.72]	300 [11.81]	184 x 138 [7.24 x 5.43]
		500 [19.69]	152 x 114 [5.98 x 4.49]	500 [19.69]	304 x 228 [11.97 x 8.98]
		1000 [39.37]	302 x 227 [11.89 x 8.94]	1000 [39.37]	604 x 453 [23.78 x 17.83]
Operating Distance	(mm)	>85 [3.35]		>35 [1.38]	
Image Resolution	(pixels)	1280 x 960			
Autofocus Type		Mechanical autofocus			
Readable Codes		1D: Interleaved 2-of-5; Industrial 2-of-5; Code 39; Code 93; Code 128; Pharmacode; Codabar; EAN8; EAN8 Add-On 2; EAN8 Add-On 5; EAN13; EAN13 Add-On 2; EAN13 Add-On 5; UPC-A; UPC-A Add-On 2; UPC-A Add-On 5; UPC-E; UPC-E Add-On 2; UPC-E Add-On 5; GS1 DataBar Omnidirectional; GS1 DataBar Truncated 2D:GS1 DataBar Stacked; GS1 DataBar Stacked Omnidirectional; GS1 DataBar Limited; GS1 DataBar Expanded; GS1 DataBar Expanded Stacked; GS1-128; MSI Barcode; Datamatrix (ECC200); PDF-417; QR; Micro-QR; Aztec Code; GS1 ECC200; GS1 QR Code; GS1 Aztec Code			
Maximum Inclination to the Image Plane	(°)	45			
Interfaces					
Communication Interface		Ethernet			
Transmission Standard		10Base-T; 100Base-TX			
Transmission Rate		10 Mbps; 100 Mbps			
Protocol		TCP/IP; EtherNet/IP			
Factory Settings		IP address: 192.168.0.69 Subnet mask: 255.255.255.0 (Class C) Gateway IP address: 192.168.0.201			
Operating Conditions					
Ambient Temperature		-10 to 50°C [14 to 122°F]			
Storage Temperature		-40 to 70°C [-40 to 150°F]			
IP Rating		IP65			
Tests/Approvals					
Notes on Laser Protection		Caution: Laser light, laser class: 1			
Mechanical Data					
Weight	***(g [lb])***	601 [1.32]			
Material		Housing: Diecast zinc powder coated; Front lens: Gorillaglas; LED window: PC; Pushbuttons: POM			

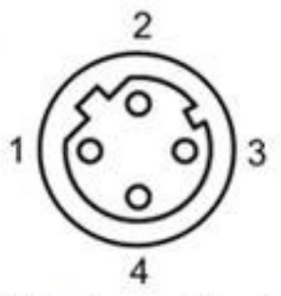
ifm efector
Machine Mount 1D/2D Barcode Scanner

Electrical Connections – Supply



M12 5-Pin Male Connector	
1	+24VDC
2	Trigger input+
3	0V-
4	Switching output 1, configurable
5	Switching output 2, configurable/ trigger output with external illumination

Electrical Connections – Ethernet



M12 4-Pin Male (D-coded Ethernet)	
1	TxD+, transmit data +
2	RxD+, receive data +
3	TxD-, transmit data –
4	RxD-, receive data –

Accessories

O2I Accessories Selection Guide			
Part Number	***Price***	***Description***	***Drawing***
E2D500	$667_:	Right-angle bracket for 12mm rod	PDF

E2D500

E21112

316L Stainless Steel Rod Selection Guide				
Part Number	***Price***	***Diameter (mm [in])***	***Length (mm [in])***	***Drawing***
E21112	$-66iq:	12 [0.5]	200 [7.9]	PDF
E21113	$-66is:	12 [0.5]	300 [11.8]	PDF

ifm efector
Machine Vision 2D Camera

O2D500

The ifm efector 2D machine vision sensor provides simple, capable and reliable image-based detection. Whether contour detection or BLOB analysis, the O2D family of vision sensors excels at solving most error-proofing and inspection applications throughout the manufacturing plant for a fraction of the cost of other vision systems and sensors.

Features

- Convenient autofocus
- Four built-in lights (two non-polarized and two polarized)
- Up to five configurable outputs
- Onboard logic engine
- IP65
- Anchor tracking
- Multi-image analysis at various exposure rates
- Contour and BLOB detection
- Imager resolution: 1.2MP

Applications

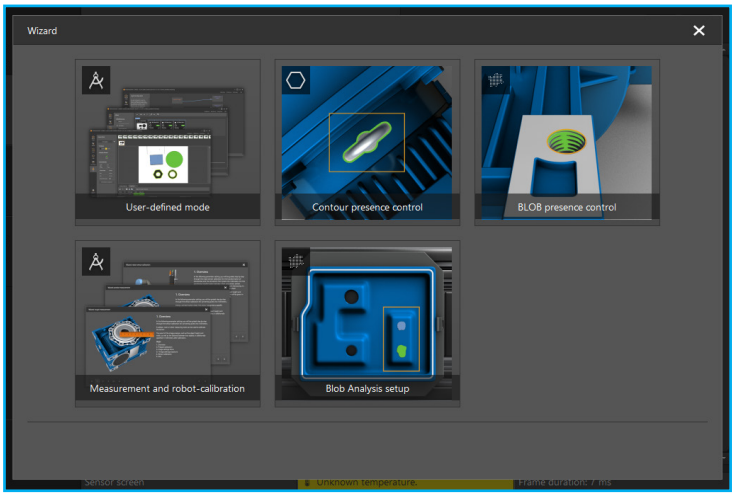
- Metal injection molding quality
- Bottle filling operation quality
- Packaging box quality
- Filter quality
- Tapped hole detection

ifm efector Machine Vision 2D Camera Selection Guide

Part Number	Price	Lens Type	Light Emission	Port Protocols	Lens Material	Dimensional Drawing
O2D500	$;00667q:	Standard	RGBW (red/green/blue/white)	TCP/IP and EtherNet/IP	Gorilla glass	PDF
O2D520	$;;00667t:		Infrared			PDF
O2D502	$;00667s:	Wide angle	RGBW (red/green/blue/white)			PDF
O2D522	$;00667u:		Infrared			PDF

Full-Featured Vision Assistant Configuration

The free ifm Vision Assistant configuration software contains several tools to make integration more seamless. The tools in the library include pattern, form, object, location, measurement, diameter,and roundness, just to name a few. The powerful camera features a 35 frames-per-second target speed. Please note that camera speed is dependent on how much processing must be done by the camera.



Screenshot of ifm's Vision Assistant software. The software contains several wizards to assist in efficient integration of the camera into the automation system and PLC to quickly get you up and running.

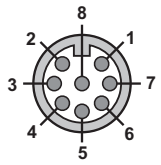
ifm efector
Machine Vision 2D Camera

ifm efector Machine Vision 2D Camera Technical Specifications					
Product Characteristics					
Image Resolution	(pixels)	1280 x 960			
Maximum Reading Rate	(Hz)	40			
Electrical Data					
Operating Voltage	(V)	18-30 VDC			
Current Consumption	(mA)	<400 (24VDC; with switched outputs: <900mA)			
Reverse Polarity Protection		Yes			
Wavelength	(nm)	625, 525, and 423			
Image Sensor		CMOS image sensor (black/white)			
Inputs					
Trigger		External: 24V PNP/NPN (IEC 61131-2 Type 3) TCP/IP EtherNet/IP Continuous			
Outputs					
Output Function		PNP/NPN (configurable)			
Maximum Current Load Per Output	(mA)	100			
Monitoring Range					
Field of View	(mm [in])	For Standard Lens (O2D500 and O2D520)		For Wide Angle Lens (O2D502 and O2D522)	
		Operating Distance:	Field of View:	Operating Distance:	Field of View:
		85 [3.35]	28 x 21 [1.10 x 0.83]	35 [1.38]	25 x 19 [0.98 x 0.75]
		300 [11.81]	92 x 69 [3.62 x 2.72]	300 [11.81]	184 x 138 [7.24 x 5.43]
		500 [19.69]	152 x 114 [5.98 x 4.49]	500 [19.69]	304 x 228 [11.97 x 8.98]
		1000 [39.37]	302 x 227 [11.89 x 8.94]	1000 [39.37]	604 x 453 [23.78 x 17.83]
		1500 [59.06]	453 x 340 [17.83 x 13.39]	1500 [59.06]	904 x 678 [35.59 x 26.69]
		2000 [78.74]	603 x 452 [23.74 x 17.80]	2000 [78.74]	1204 x 903 [47.40 x 35.55]
		2500 [98.43]	753 x 564 [29.65 x 22.20]	2500 [98.43]	1504 x 1128 [59.21 x 44.41]
Operating Distance	(mm [in])	>85 [3.35]		>35 [1.38]	
Image Resolution	(pixels)	1280 x 960			
Autofocus Type		Mechanical autofocus			
Interfaces					
Communication Interface		Ethernet			
Transmission Standard		10Base-T; 100Base-TX			
Transmission Rate		10 Mbps; 100 Mbps			
Protocol		TCP/IP; EtherNet/IP			
Factory Settings		IP address: 192.168.0.69 Subnet mask: 255.255.255.0 (Class C) Gateway IP address: 192.168.0.201			
Operating Conditions					
Ambient Temperature		-10 to 50°C [14 to 122°F]			
Storage Temperature		-40 to 70°C [-40 to 150°F]			
IP Rating		IP65			
Mechanical Data					
Weight	g [lb]	612.4 [1.35]			
Material		Housing: Diecast zinc powder coated; Front lens: Gorillaglas; LED window: PC; Pushbuttons: POM			

ifm efector
Machine Vision 2D Camera

Electrical Connections – Supply

Connection Colors

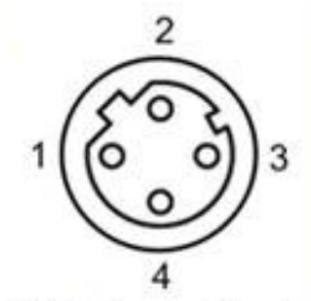


Pin View from Switch
M12 Male

M12 8-Pin Male Connector				
Pin	***292 Cable****	***295 Cable****	***Signal***	***Description***
1	White	Brown	+24V	Power supply
2	Brown	White	Trigger	Trigger input
3	Green	Blue	GND	Ground
4	Yellow	Black	OUT5	Switching output 5
5	Gray	Gray	OUT3	Switching output 3
6	Pink	Pink	OUT4	Switching output 4
7	Blue	Violet	OUT2/IN2	Switching input or output 2
8	Red	Orange	OUT1/IN1	Switching input or output 1

Notes:
* **AutomationDirect sells M12 8-pole cables with two different color patterns (7000-170x1-292xxxx and 7000-170x1-295xxxx).**

Electrical Connections – Ethernet



M12 4-Pin Male (D-coded Ethernet)	
1	TxD+, transmit data +
2	RxD+, receive data +
3	TxD-, transmit data –
4	RxD-, receive data –

Accessories

O2D Accessories Selection Guide			
Part Number	***Price***	***Description***	***Drawing***
E2D500	$667_:	Right-angle bracket for 12mm rod	PDF

E2D500

E21112

316L Stainless Steel Rod Selection Guide				
Part Number	***Price***	***Diameter (mm [in])***	***Length (mm [in])***	***Drawing***
E21112	$-66iq:	12 [0.5]	200 [7.9]	PDF
E21113	$-66is:	12 [0.5]	300 [11.8]	PDF

ifm efector
Machine Mount 3D Vision Sensor

O3D302

The ifm efector 3D Smart Sensor utilizes the revolutionary PMD Time of Flight Imager to quickly and accurately measure the distance of 23,232 points within the field of view. The imager measures the distance between the sensor and the nearest surface point by point using the time-of-flight principle. The sensor illuminates the scene with an internal infrared light source and calculates the distance by means of the light reflected from the surface.

Features

- Color and lighting independent
- Digital switching between 32 recipes
- Three configurable outputs
- Onboard logic engine
- IP65

Applications

- Volume determination for storage and conveyor technology
- Non-contact dimensioning of rectangular objects such as cardboard packages or parcels
- Measurement of height, width and length to calculate strap length and volume
- Detection of size, orientation and positioning of the objects for automated storage space planning
- Robot navigation

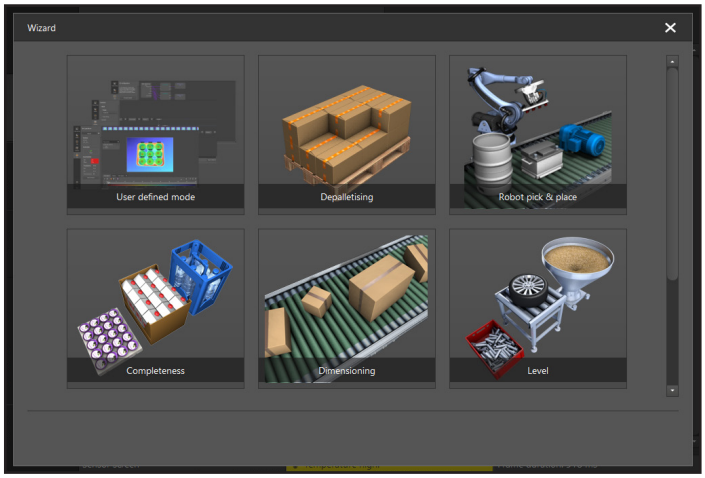
ifm efector Machine Mount 3D Vision Sensor Selection Guide

Part Number	Price	Scanner Capability	Lens Type	Light Emission	Port Protocols	Lens Material	Dimensional Drawing
O3D302	$;00667v:	3D – Time of Flight	Standard	Infrared	TCP/IP and EtherNet/IP	Gorilla glass	PDF
O3D304	$;;00667[:		Wide angle	Infrared			PDF

Note: For continuous use, a heat sink (E3D302) is strongly recommended.

Full-Featured Vision Assistant Configuration

The free ifm Vision Assistant configuration software contains several tools to make integration more seamless. The software also comes with several wizards including Robot Pick and Place, Completeness, Dimensioning, and Level.



Screenshot of ifm's Vision Assistant Software. The software contains several wizards to assist in quick integration of the 3D sensor.

Please note that there is a wizard called "Depalletising." However, due to the large number of factors which may impact the implementation of this wizard, at this time AutomationDirect does not support this application.

ifm efector
Machine Mount 3D Vision Sensor

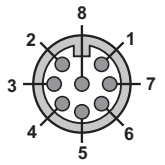
ifm efector Machine Mount 3D Vision Sensor Technical Specifications					
Electrical Data					
Operating Voltage	(V)	20.4 to 28.8 VDC, to EN 61131-2			
Current Consumption	(mA)	<2400 peak current pulsed, typ. mean value 420; max mean value 1600			
Power consumption	(W)	10 (typical value)			
Inputs					
Trigger		External: 24V PNP/NPN (IEC 61131-2 Type 3) TCP/IP EtherNet/IP Continuous			
Outputs					
Maximum Current Load Per Output	(mA)	100			
Output		Digital outputs: 3 (configurable), 24 V PNP/NPN (IEC 61131-2) Analog outputs: 1 output (configurable as current or voltage output)			
Current Output	(mA)	4 - 20			
Max Load	(Ω)	500			
Min Load	(Ω)	230			
Voltage Output	(V)	0 - 10			
Min Load	(Ω)	10,000			
Detection Range					
Operating Distance	(mm [in])	300 - 8000 [11.81 - 314.96], with reflectivity of 18% and object size of 200mm x 200mm [7.87 in x 7.87 in]			
Max Measuring Range		Typically up to 5000mm, but depending on setting and reflectivity can be up to 30m			
Resolution	(pixels)	176 x 132			
Angle of Aperture	(°)	O3D302: 60 x 45 nominal value without lens distortion correction O3D304 70 x51, nominal value without lens distortion correction			
Interfaces					
Parameter Setting Interface		Ethernet TCP/IP: 10Base-T / 100Base-TX			
Process Interface		Ethernet TCP/IP: Ethernet/IP			
IP Address		192.168.0.69			
Subnet Mask		255.255.255.000			
Gateway IP Address		192.168.0.201			
Environment					
Ambient Temperature		-10 to 50°C [14 to 122°F]			
Storage Temperature		-40 to 85°C [-40 to 185°F]			
IP Rating		IP65			
Other Technical Data					
Integrated Lighting		Infrared LED (850nm), invisible radiation of light-emitting diodes			
Other Data					
Field of View Size With Lens Distortion Correction		For Standard Lens (O3D302)		For Wide-Angle Lens (O3D304)	
		Measuring Range/ Distance (m [ft])	Length x Width (m [ft])	Measuring Range/ Distance (m [ft])	Length x Width (m [ft])
		0.50 [1.64]	0.37 x 0.50 [1.21 x 1.64]	0.50 [1.64]	0.40 x 0.55 [1.31 x 1.80]
		1.00 [3.28]	0.75 x 1.00 [2.46 x 3.28]	1.00 [3.28]	0.80 x 1.10 [2.62 x 3.61]
		2.00 [6.56]	1.50 x 2.00 [4.92 x 6.56]	2.00 [6.56]	1.60 x 2.20 [5.25 x 7.22]
		3.00 [9.84]	2.25 x 3.00 [7.38 x 9.84]	3.00 [9.84]	2.40 x 3.30 [7.87 x 10.83]
		4.00 [13.12]	3.00 x 4.00 [9.84 x 13.12]	4.00 [13.12]	3.20 x 4.40 [10.50 x 14.44]
		5.00 [16.40]	3.75 x 5.00 [12.30 x 16.40]	5.00 [16.40]	4.00 x 5.00 [13.12 x 16.40]

For application specific accuracy information, please refer to the datasheet

ifm efector
Machine Mount 3D Vision Sensor

Electrical Connections – Supply

Connection Colors



Pin View from Switch

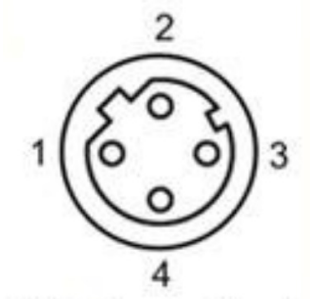
M12 Male

M12 8-PIN MALE CONNECTOR				
Pin	***292 Cable****	***295 Cable****	***Signal***	***Description***
1	White	Brown	+24V	Power supply
2	Brown	White	Trigger	Trigger input
3	Green	Blue	GND	Ground
4	Yellow	Black	OUT	Switching Output 1 (digital or analog)
5	Gray	Gray	OUT3	Switching Output 3 Ready
6	Pink	Pink	OUT2	Switching Output 2 (digital)
7	Blue	Violet	IN1	Switching Input 1
8	Red	Orange	IN2	Switching Input 2

Notes:

*** AutomationDirect sells M12 8-pole cables with two different color patterns (7000-170x1-292xxxx and 7000-170x1-295xxxx).**

Electrical Connections – Ethernet



M12 4-Pin Male (D-coded Ethernet)	
1	TxD+, transmit data +
2	RxD+, receive data +
3	TxD-, transmit data –
4	RxD-, receive data –

Accessories

O3D Accessories Selection Guide			
Part Number	***Price***	***Description***	***Drawing***
E3D302	$;667!:	Heat sink	PDF
E3D301	$667#:	Right-angle bracket for 14mm rod	PDF

E3D302

E3D301

E21228

316L Stainless Steel Rod Selection Guide				
Part Number	***Price***	***Diameter (mm [in])***	***Length (mm [in])***	***Drawing***
E21228	$;-66it:	14mm [0.6]	200 [7.9]	PDF
E21229	$-66iu:	14mm [0.6]	300 [11.8]	PDF
E21232	$-66iv:	14mm [0.6]	400 [15.7]	PDF

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

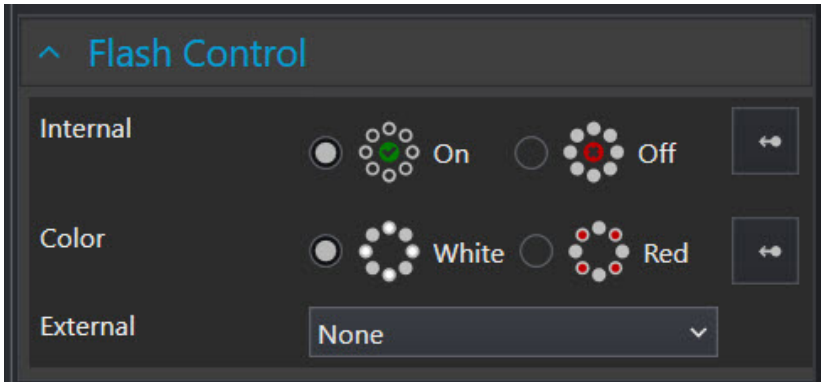
EtherNet/IP™

PROFINET

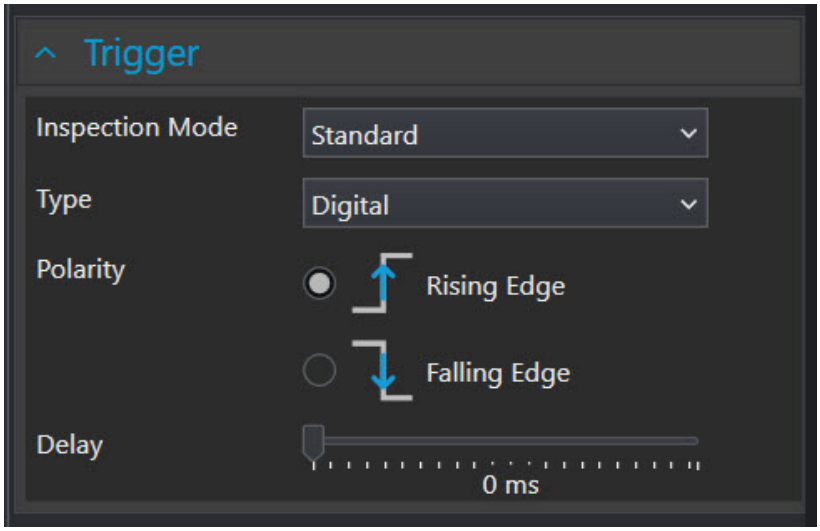
TCP/IP
Digital I/O
FTP/SFTP

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.

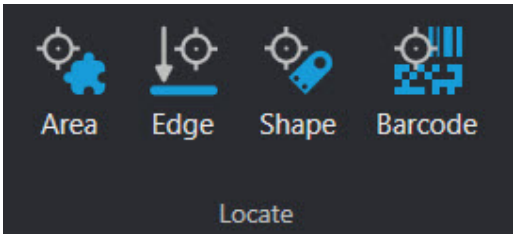


You could use a photoelectric, proximity, or other sensor to send a digital signal to trigger the camera, or you could use an Ethernet/IP, Profinet, or TCP/IP command.

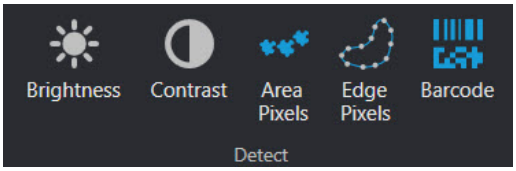


nVision-i Tools

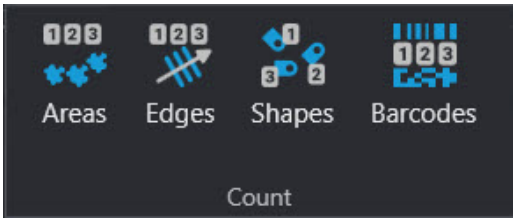
Locate



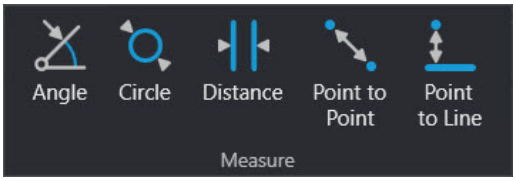
Detect



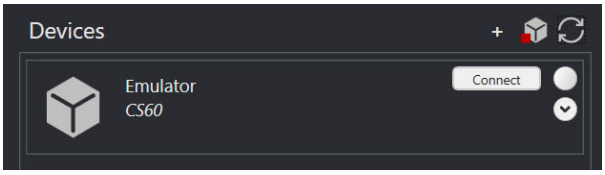
Count



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

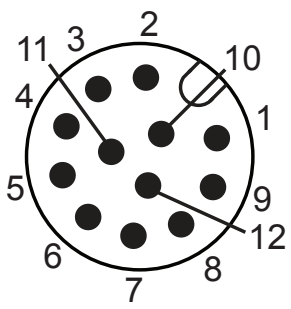
- Defect identification
- Hole detection
- Orientation confirmation
- Presence/absence
- Shape recognition
- Count and measure
- 1D and 2D code reading
- Quality assurance for a wide range of applications

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						
CS60-BM28-EP15/300	$-06ihb:	S-mount	✓	✓	✓			30fps	736x480	1/4 in	3 (NPN or PNP)	5 (NPN or PNP)	PDF
CS60-BM28-EP15/400	$;--006ihi:	S-mount	✓	✓	✓	✓		30fps	736x480	1/4 in	3 (NPN or PNP)	5 (NPN or PNP)	PDF
CS60-BM28-EP15/300ID	$;-006ihp:	S-mount	✓	✓	✓		✓	30fps	736x480	1/4 in	3 (NPN or PNP)	5 (NPN or PNP)	PDF
CS60-BM28-EP15/400ID	$;-006ihx:	S-mount	✓	✓	✓	✓	✓	30fps	736x480	1/4 in	3 (NPN or PNP)	5 (NPN or PNP)	PDF
CS60-BM38-EP15/300	$;-006ihh:	S-mount	✓	✓	✓			30fps	1440x1080	1/2.9 in	3 (NPN or PNP)	5 (NPN or PNP)	PDF
CS60-BM38-EP15/400	$;-006ih6:	S-mount	✓	✓	✓	✓		30fps	1440x1080	1/2.9 in	3 (NPN or PNP)	5 (NPN or PNP)	PDF
CS60-BM38-EP15/300ID	$;-006ih7:	S-mount	✓	✓	✓		✓	30fps	1440x1080	1/2.9 in	3 (NPN or PNP)	5 (NPN or PNP)	PDF
CS60-BM38-EP15/400ID	$;-006ih8:	S-mount	✓	✓	✓	✓	✓	30fps	1440x1080	1/2.9 in	3 (NPN or PNP)	5 (NPN or PNP)	PDF

Electrical Connections – Supply

12-Pin A-Coded*

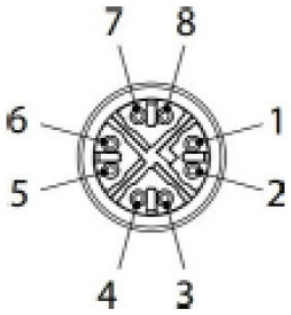


Pin	Color	Description
1	Brown	Input 0
2	Blue	Input 1
3	White	Output 2
4	Green	Output 3
5	Pink	Ready Output
6	Yellow	Common
7	Black	+24VDC
8	Gray	Ground
9	Red	Not Connected
10	Violet	Trigger In
11	Grey/Pink	Output 0
12	Red/Blue	Output 1

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

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+

di-soric Machine Vision 2D Camera

di-soric Machine Vision 2D Camera Technical Specifications

		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
Product Characteristics									
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
O-S1-S-036-40	$-6ihs:	3.6 mm	Fixed f/4.0	Wide angle	S-mount	1/2.5 in	PDF
O-S1-S-036-80	$;-6iht:	3.6 mm	Fixed f/8.0	Wide angle	S-mount	1/2.5 in	PDF
O-S1-S-080-40 *	$-6ihu:	8mm	Fixed f/4.0	Standard	S-mount	1/3 in	PDF
O-S1-S-080-80	$-6ihv:	8mm	Fixed f/8.0	Standard	S-mount	1/3 in	PDF
O-S1-S-160-40	$-6ihy:	16mm	Fixed f/4.0	Standard	S-mount	1/3 in	PDF
O-S1-S-160-80	$-6ihz:	16mm	Fixed f/8.0	Standard	S-mount	1/3 in	PDF
O-S1-S-250-40	$;-6ih]:	25mm	Fixed f/4.0	Standard	S-mount	1/2 in	PDF
O-S1-S-250-80	$;-6ih[:	25mm	Fixed f/8.0	Standard	S-mount	1/2 in	PDF

** 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]

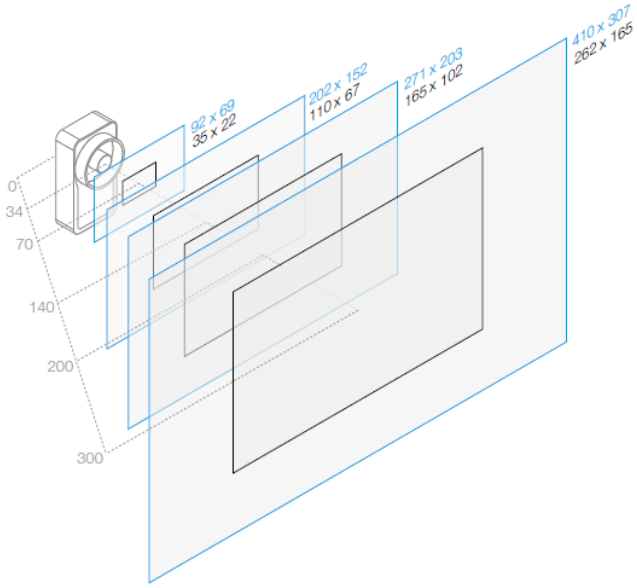
With O-S1-S-250-XX Lens		
	CS60-BM28 models	*CS60-BM38 models*
Operating Distance (mm [in])	Field of View (mm [in])	
150 [5.9]	12x8 [0.5x0.3]	25x19 [1.0x0.3]
300 [11.8]	28x21 [1.1x0.8]	55x41 [2.2x1.6]
400 [15.7]	39x26 [1.5x1.0]	74x55 [2.9x2.2]
500 [19.7]	52x38 [2.0x1.5]	94x71 [3.7x2.8]

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).

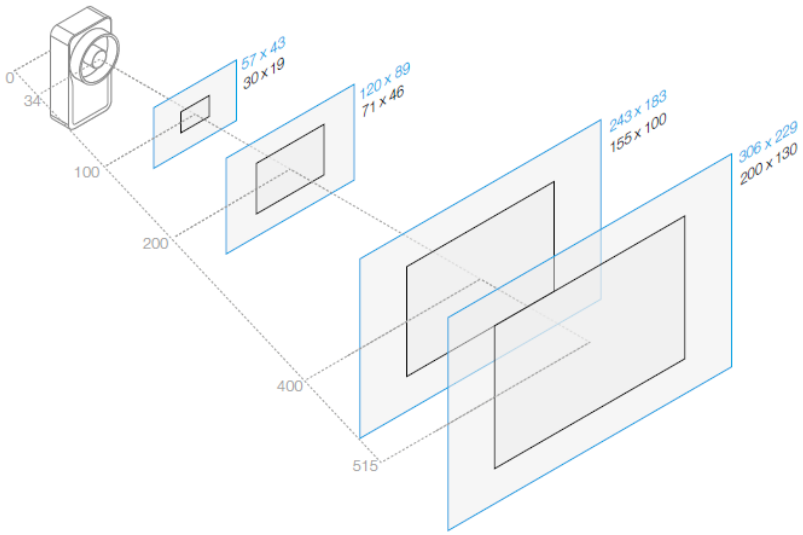
Operating distance: Back of camera body to work piece.

Field of view, 3.6mm lens[1]



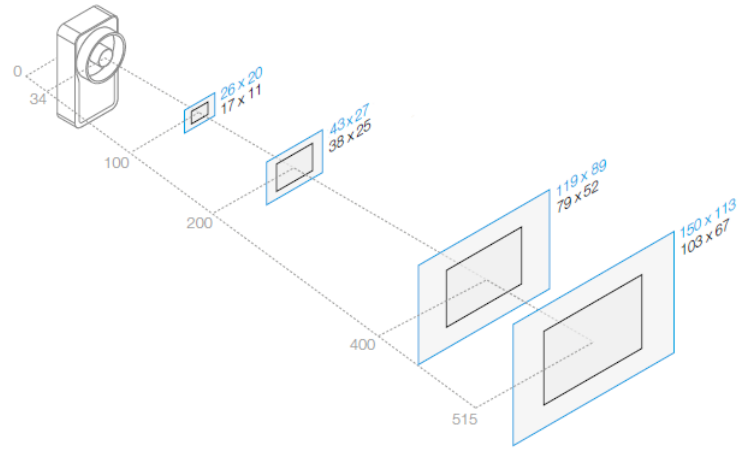
1.58 MP, 1440 x 1080 pixels
0.3 MP, 736 x 480 pixels
Operating distance
All specifications in mm

Field of view, 8mm lens



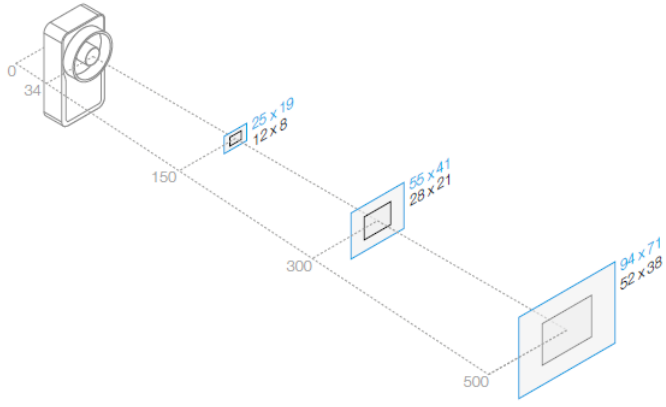
[1] At 3.6 mm, FOV limited at 1.58 MP if lens cover is used. No IP67 protection with complete FOV.

Field of view, 16mm lens



1.58 MP, 1440 x 1080 pixels
0.3 MP, 736 x 480 pixels
Operating distance
All specifications in mm

Field of view, 25mm lens



[2] 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.

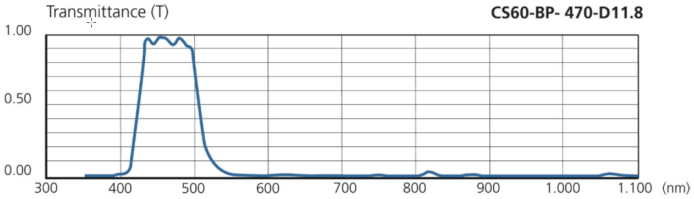
Bandpass Filters: These filters allow you to ensure repeatable lighting during inspection by blocking out unwanted light. They are designed to press-fit inside the lens protector.

di-soric Bandpass Filter Selection Guide

Part Number	Price	Description	Type	Angle of Incidence	Mounting	Drawing
CS60-BP-470-D11.8	$-06ih9:	Filter	Blue bandpass (470nm)	0 to 15 degrees	Press fit (inside lens protector)	PDF
CS60-BP-635-D11.8	$-06ihc:	Filter	Red bandpass (635nm)	0 to 15 degrees	Press fit (inside lens protector)	PDF
CS60-BP-850-D11.8	$-6iha:	Filter	Infrared bandpass (850nm)	0 to 15 degrees	Press fit (inside lens protector)	PDF

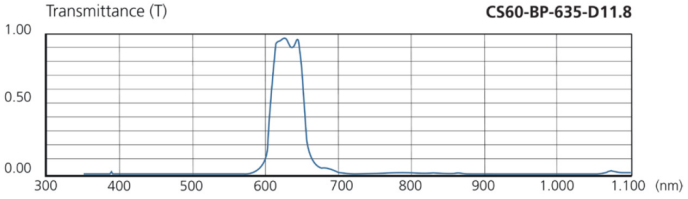
Filter Bandpass Graphs

Blue Bandpass



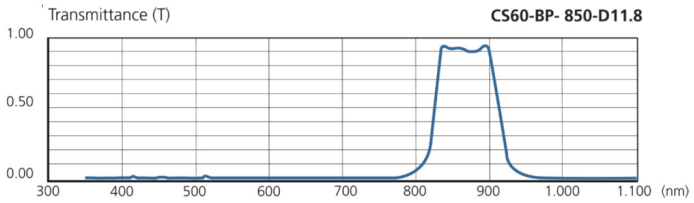
CS60-BP-470-D11.8

Red Bandpass



CS60-BP-635-D11.8

Infrared Bandpass



CS60-BP-850-D11.8

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
CS60-WINDOW-DIFFUS	$-06ihd:	Lens protector/filter	Diffuser	45x17 [1.77x0.67]	Press fit (friction fit with O-ring)	PDF
CS60-WINDOW-POLAR	$-06ihe:	Lens protector/filter	Polarizer	45x17 [1.77x0.67]	Press fit (friction fit with O-ring)	PDF
CS60-WINDOW *	$;-6ihf:	Lens protector	–	45x17 [1.77x0.67]	Press fit (friction fit with O-ring)	PDF
CS60-WINDOW-FOKUS	$-06ihg:	Focus adjustment aid	–	45x17 [1.77x0.67]	Temporary (no O-ring)	PDF

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
SH-G-CSR	$--6ihl:	Mounting plate	–	–	Aluminum	–	di-soric CS60 cameras and HS-KL-12-20-V mounting bracket	PDF
HS-KL-12-20-V	$-6ihn:	Mounting bracket	Right-angle	–	Stainless steel	12mm rod	SH-G-CSR mounting plate	PDF
HS-VS-CS60-MP-KK-M3	$-06iho:	Mounting bracket	Ball joint	45 degrees vertical 360 degrees horizonta	Aluminum	–	di-soric CS60 cameras	PDF

E21112

316L Stainless Steel Rod Selection Guide

Part Number	Price	Diameter (mm [in])	Length (mm [in])	Drawing
E21112	$-66iq:	12 [0.5]	200 [7.9]	PDF
E21113	$-66is:	12 [0.5]	300 [11.8]	PDF

di-soric Machine Vision Cables

VKHM-Z-5/12-A

VKHM-Z-10/12-A

CS60-Y-1/12-A

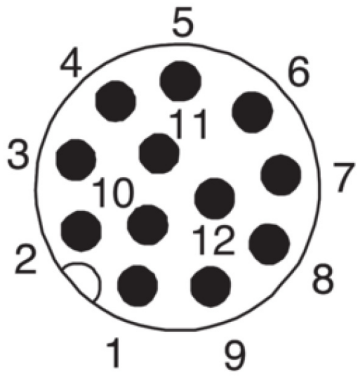
The **VKHM-Z-5/12-A** (with a length of 5m [16.4 ft]) and **VKHM-Z-10/12-A** (with a length of 10m [32.8 ft]) are combination I/O and power cables designed for use with di-soric machine vision cameras.

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*
VKHM-Z-5/12-A	$--6ihj:	12-pin M12 quick-disconnect	Pigtail	N/A	Shielded	16.4 ft [5m]
VKHM-Z-10/12-A	$-06ihk:	12-pin M12 quick-disconnect	Pigtail	N/A	Shielded	32.8 ft [10m]
CS60-Y-1/12-A	$-06ihq:	12-pin M12 quick-disconnect	12-pin M12 quick-disconnect	4-pin M12 quick-disconnect	Shielded	3.7 ft [1.1 m]

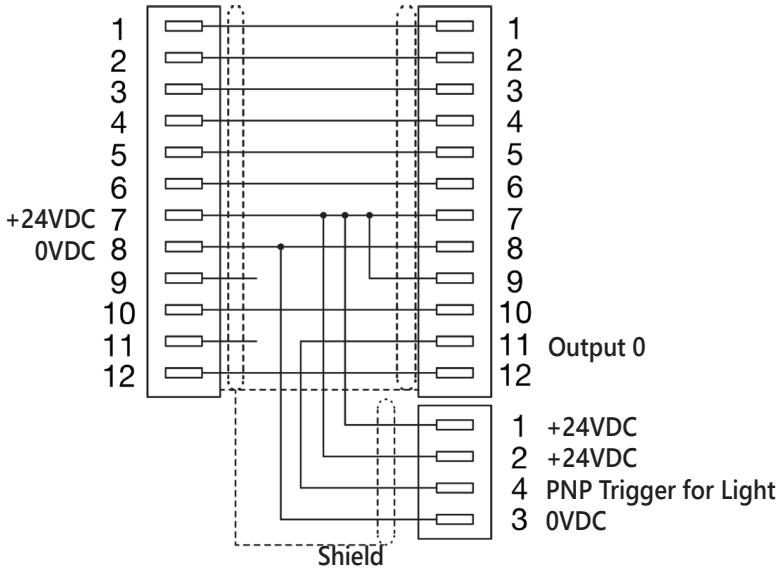
Cable Pinouts

12-Pin A-Coded*



Pin	Color
1	Brown
2	Blue
3	White
4	Green
5	Pink
6	Yellow
7	Black
8	Gray
9	Red
10	Violet
11	Grey/Pink
12	Red/Blue

VKHM-Z-5/12-A and VKHM-Z-10/12-A



CS60-Y-1/12-A

Machine Vision Lighting Overview

Generic lighting products are designed to provide basic illumination. However, lights designed for use as part of machine vision systems are designed with high-quality LEDs to provide consistent and uniform light across the desired field of view. Here are some considerations that should be kept in mind when designing an optimized machine vision lighting system.

Goals for Machine Vision Lighting

Contrast

Maximizing contrast is the ultimate goal for any machine vision lighting system. If high contrast can be obtained, then detection is going to be a lot easier. In fact, maximizing contrast is the reason that most camera vision applications are monochrome. Contrast in monochrome images makes image processing easier.

To achieve the best contrast, the user must have a balance between homogeneity and brightness.

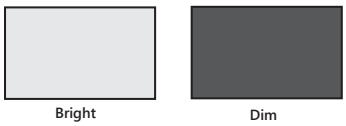
Homogeneity

Homogeneity can be thought of as uniformity. The light needs to illuminate the whole field of view uniformly. Hot spots or dark spots remove contrast from specific regions of the field of view and can adversely impact vision accuracy, while a homogenous (uniform) field of illumination can greatly enhance accuracy.

Brightness

Brightness, which is essential in creating contrast, is important in machine vision systems.

By increasing the brightness, system designers can create more robust systems using shorter exposure times. As an added benefit, this will also reduce motion blur.



It is true that if you put more current through an LED, it will get brighter. But one of the worst things for an LED's lifespan is over-current. Even though more current means a brighter LED, that brightness comes at a cost, for the brighter the LED gets the more heat is generated and the more its lifespan is reduced. In other words, the lifespan of an LED is directly related to the current through the LED.

The manufacturers of our machine vision lights have taken great care in selecting the brightest and highest quality LEDs. They have also carefully engineered these lights to maximize light output and LED lifespan in order to deliver a product that will work consistently well for a long period of time. For instance, in order to achieve higher brightness, some of our lights can be strobed with higher current. In these lights, built-in microprocessors manage strobe duration to maximize brightness without adversely impacting life expectancy of the LEDs.

Dealing With Ambient Light

One of the hardest things to design out of a machine vision application is interference with your controlled lighting coming from unwanted ambient light in the location where the system will be used. Ambient light varies greatly from location to location, so designers must keep potential ambient light impacts in mind when designing machine vision lighting systems.

A common misconception is that ambient light comes only from overhead. However, the truth is that ambient light can come from several sources. Among the conditions which can impact ambient lighting are sunlight through a window, the reflection off of a reflective surface, or even a shadow.

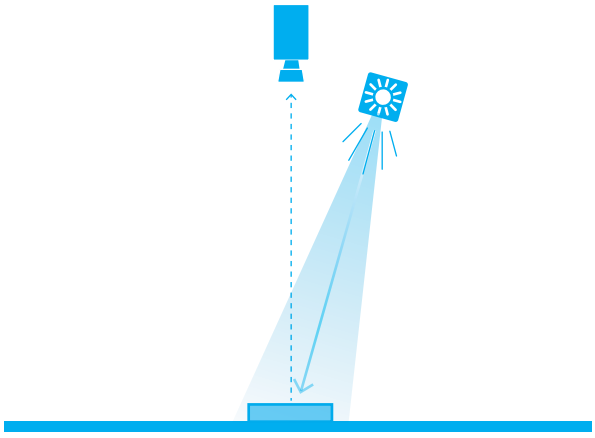
There are situations in which building a shroud around the inspection area is the most appropriate way to deal with ambient light. In other situations, the best way to deal with it is to increase the brightness of the light source.

Another solution to deal with ambient light is to use a specific color (wavelength) of light along with a corresponding filter to only allow that color of light to pass through to the camera. For example, when using a red light (625nm), you can use a 625nm bandpass filter to block out unwanted ambient light of other wavelengths.

Machine Vision Lighting Overview, continued

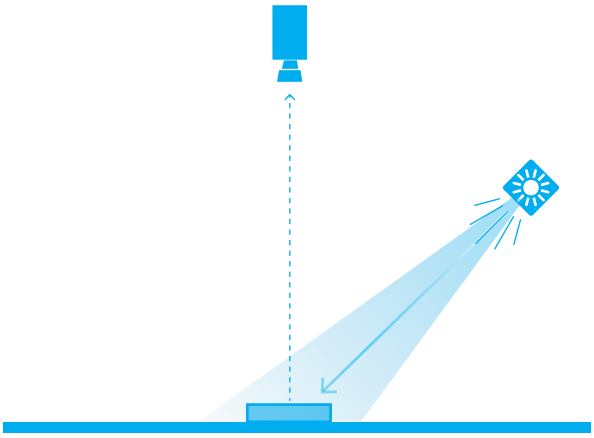
Lighting Principles

Effective machine vision lighting relies on several factors, including what is known as the "angle of incidence." Angle of incidence is defined as the angle at which the light strikes the object being illuminated. This angle is measured from an imaginary line between the camera and the light source, The examples below illustrate how different lighting angles can be used in various applications.



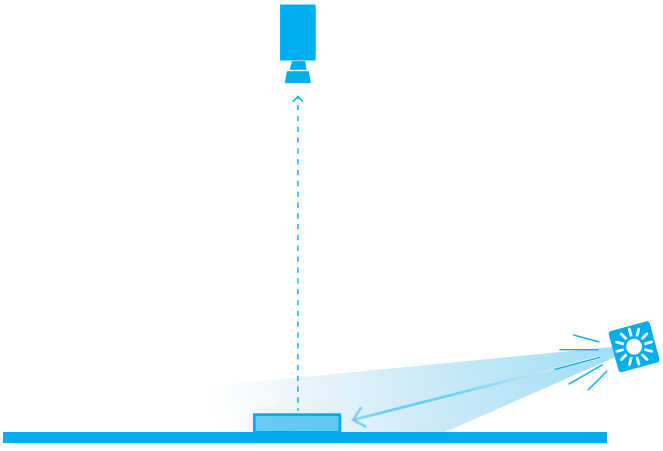
Bright field

- Usually, the angle of incidence is between 0 and 30 degrees.
- Bright field is the easiest type of lighting principle for humans to understand, because this is how we generally see the world. However, this type of lighting system may not be well suited for use where shiny parts are involved.
- Diffusers or polarizers might be needed to decrease the unintended direct reflections.



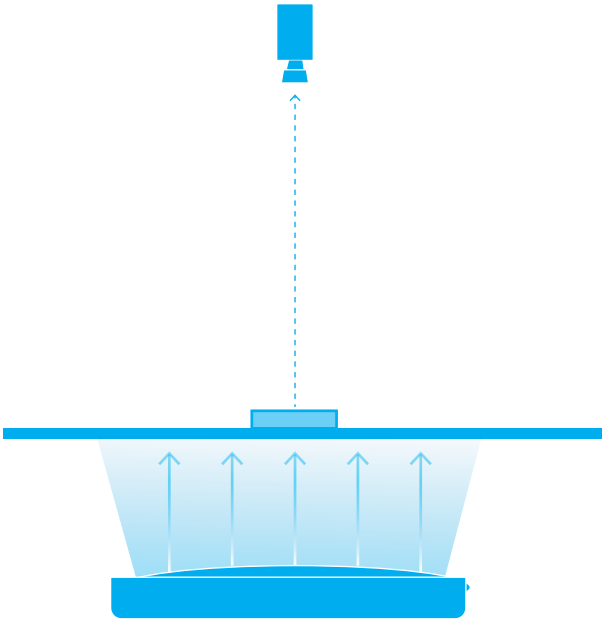
Low angle

- Usually, the angle of incidence is between 30 and 80 degrees.
- The lighting source is placed between the dark field and the bright field so that the user can take advantage of both illumination methods.
- Good for engravings



Dark field

- Usually, the angle of incidence is between 80 and 90 degrees
- This lighting configuration will generally bring high contrast to the edges. For parts that are not shiny, a narrow beam angle is usually best. For shiny parts, a diffused light source usually works best.
- Applications include edge detection and measurement.



Backlight

- The light source is placed behind the object.
- When using this method, it is important that the light is bigger than the field of view.
- Backlighting light sources should be highly diffused and offer high homogeneity.
- Backlighting makes it possible to see a silhouette.

Lumher Vision Lighting Bar Light (PD Series)

PD02PD5CY

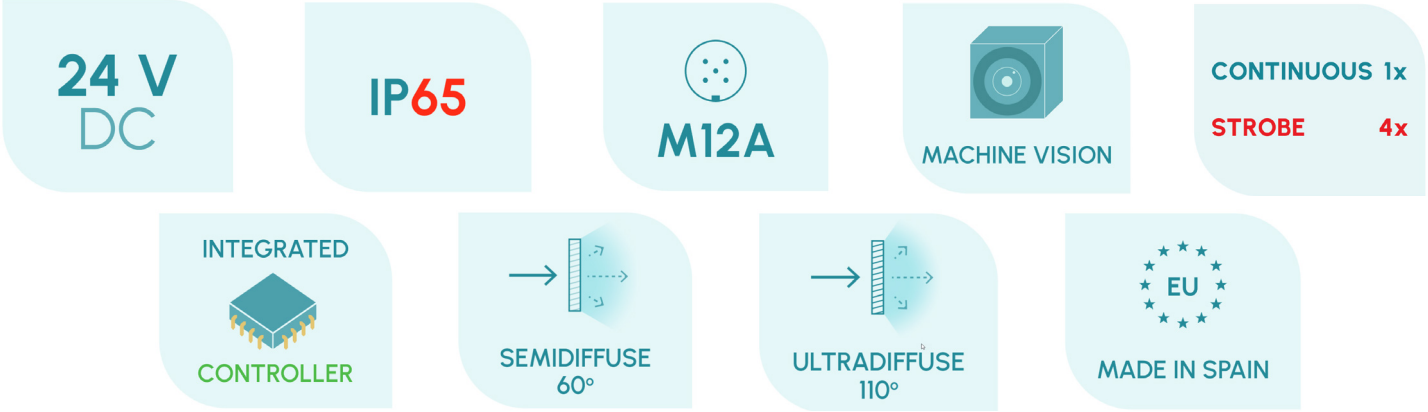
Lumher's PD Series of machine vision bar LED lights provides high-powered and uniform illumination over the entire length of the bar light, ensuring uniform lighting conditions for machine vision systems.

Features

- IP65
- Integrated controller
- Continuous only or strobe-capable models available
- Available in white, red or infrared
- Semi-diffused or ultra-diffused illumination options available

Lumher PD Series Vision Lighting Bar Light Selection Guide

Part Number	Price	Light Emission	LED Length (mm [in])	Diffuser	Mode of Operation	Drawings
PD01PD5CY	$;06h]8:	White (5000K)	90 [3.54]	Semi-diffused (±30°)	Continuous only	PDF
PD02PD5CY	$;06h]9:	White (5000K)	180 [7.09]	Semi-diffused (±30°)	Continuous only	PDF
PD04PD5CY	$;06h]a:	White (5000K)	360 [14.17]	Semi-diffused (±30°)	Continuous only	PDF
PD05PD5CY	$;06h]b:	White (5000K)	450 [17.72]	Semi-diffused (±30°)	Continuous only	PDF
PD07PD5CY	$;06h]c:	White (5000K)	630 [24.80]	Semi-diffused (±30°)	Continuous only	PDF
PD01ZD5CY	$;06h]d:	White (5000K)	90 [3.54]	Semi-diffused (±30°)	Strobe-capable	PDF
PD02ZD5CY	$;-06h]j:	White (5000K)	180 [7.09]	Semi-diffused (±30°)	Strobe-capable	PDF
PD04ZD5CY	$;06h]q:	White (5000K)	360 [14.17]	Semi-diffused (±30°)	Strobe-capable	PDF
PD05ZD5CY	$;06h]y:	White (5000K)	450 [17.72]	Semi-diffused (±30°)	Strobe-capable	PDF
PD07ZD5CY	$;;06h]!:	White (5000K)	630 [24.80]	Semi-diffused (±30°)	Strobe-capable	PDF
PD01ZD5UY	$;06h]e:	White (5000K)	90 [3.54]	Ultra-diffused (±55°)	Strobe-capable	PDF
PD02ZD5UY	$;;06h]f:	White (5000K)	180 [7.09]	Ultra-diffused (±55°)	Strobe-capable	PDF
PD04ZD5UY	$;06h]g:	White (5000K)	360 [14.17]	Ultra-diffused (±55°)	Strobe-capable	PDF
PD05ZD5UY	$;06h]h:	White (5000K)	450 [17.72]	Ultra-diffused (±55°)	Strobe-capable	PDF
PD07ZD5UY	$;-06h]i:	White (5000K)	630 [24.80]	Ultra-diffused (±55°)	Strobe-capable	PDF
PD04ZR5CY	$;06h]k:	Red (625nm)	360 [14.17]	Semi-diffused (±30°)	Strobe-capable	PDF
PD05ZR5CY	$;-06h]l:	Red (625nm)	450 [17.72]	Semi-diffused (±30°)	Strobe-capable	PDF
PD01PF5CY	$;06h[2:	Infrared (850nm)	90 [3.54]	Semi-diffused (±30°)	Continuous only	PDF
PD02PF5CY	$;06h[3:	Infrared (850nm)	180 [7.09]	Semi-diffused (±30°)	Continuous only	PDF
PD04PF5CY	$;06h[4:	Infrared (850nm)	360 [14.17]	Semi-diffused (±30°)	Continuous only	PDF
PD05PF5CY	$;06h[5:	Infrared (850nm)	450 [17.72]	Semi-diffused (±30°)	Continuous only	PDF
PD07PF5CY	$;06h[6:	Infrared (850nm)	630 [24.80]	Semi-diffused (±30°)	Continuous only	PDF



Lumher Vision Lighting Bar Light (PD Series)

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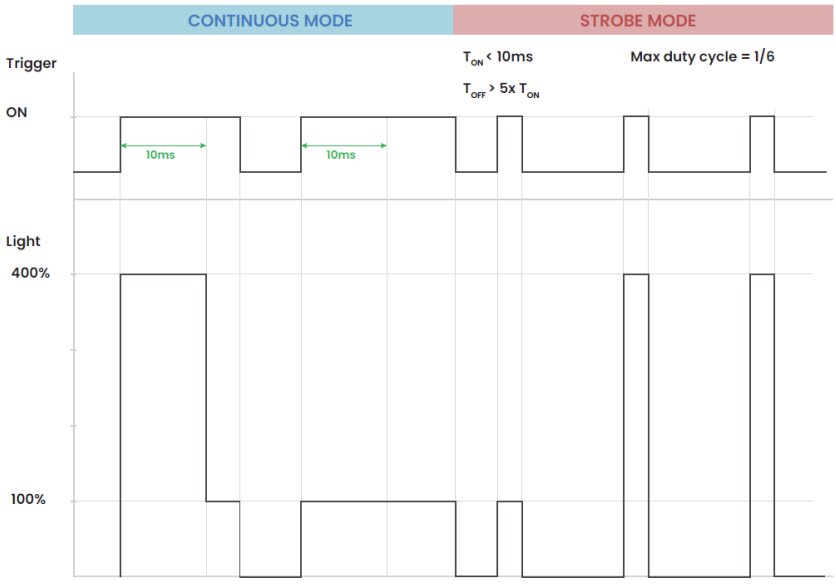
Lumher PD Series Vision Lighting Bar Light Specifications		
	Continuous Mode	***Strobe Mode***
Strobe Input	–	PNP: More than 22V for ON; Less than 1V for OFF NPN: Less than 1V for ON; More than 23V for OFF
Overdrive	No	Yes
Strobe Conditions (ON time, duty cycle)	–	For first 10ms, 4X normal brightness; then normal brightness. To re-engage strobe, LEDs must be off for at least 50ms.
Maximum Rising Time	3µs	
Maximum Falling Time	3µs	
Connection	M12 A-coded 4-pole connector	
Consumption	White: 1.9 W per 90mm [3.54 in] Red: 1.9 W per 90mm [3.54 in] Infrared: 1.0 W per 90mm [3.54 in]	White: 7.6 W per 90mm [3.54 in] Red: 7.6 W per 90mm [3.54 in]
Minimum Functioning Voltage	22.8 VDC	
Normal Functioning Voltage	24VDC ±5%	
Maximum Functioning Voltage	25.2 VDC	
Maximum Consumption Strobe Signal	–	1.5 mA
Maximum Strobe Duty Cycle	–	16%
Operating Temperature	-10°C to 40°C [14°F to 104°F]	
Operating Maximum Humidity	80% without condensation	
Weight	49g [0.11 lb] plus 48g [0.11 lb] per 90mm [3.54 in]	
Materials	Body: Anodized aluminum Side cover: Anodized Aluminum Diffuser: Polycarbonate	
Storage Temperature	0°C to 60°C [32°F to 140°F]	
Lifespan of LEDs (ON time)	6.8 years	
IP Protection	IP65	

Connections

M12 A-Coded Connections		
Pin Number and Wire Color	***Continuous-Only Models***	***Strobe-Capable Models***
Pin 1 – Brown	+24VDC	+24VDC
Pin 2 – White	Not Connected	Trigger NPN
Pin 3 – Blue	0VDC	0VDC
Pin 4 – Black	Not connected	Trigger PNP

M12 A-Coded Male Connector

Timing Chart



Lumher Vision Lighting High-Power Bar Light (FD Series)

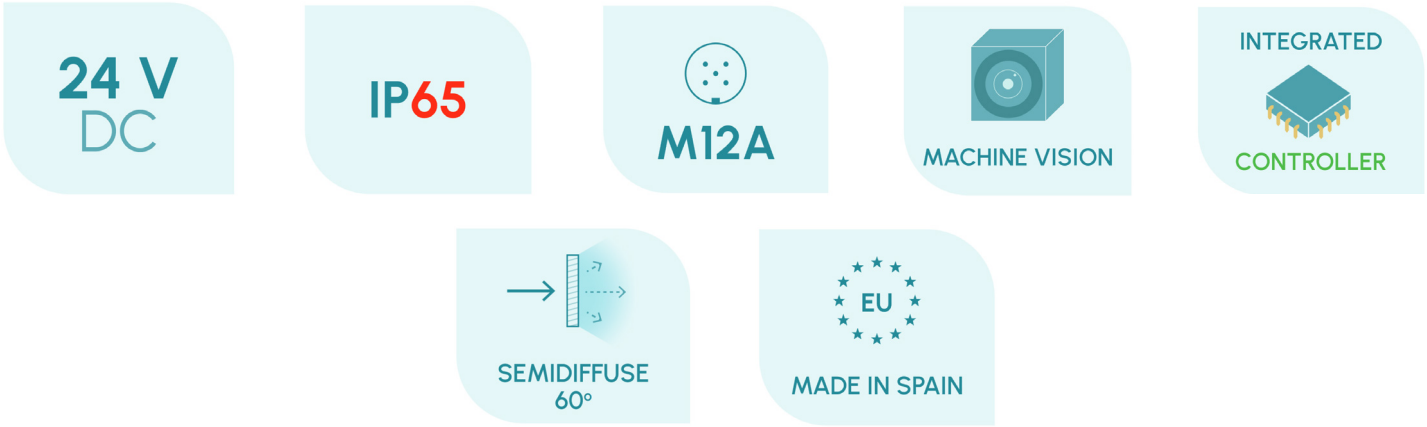
FD04PD5CY

Lumher's FD Series has a larger dissipation surface and emits twice the light output of the PD series. The linear FD series is an excellent choice for demanding applications where maximum illumination is required

Features

- IP65
- Integrated controller
- Built-in current protection
- Continuous high-brightness mode

Lumher FD Series Vision Lighting High-Power Bar Light Selection Guide						
Part Number	*Price*	*Light Emission*	*LED Length (mm [in])*	*Diffuser*	*Mode of Operation*	*Drawings*
FD01PD5CY	$;06h]n:	White (5000K)	90 [3.54]	Semi-diffused (±30°)	Continuous only	PDF
FD02PD5CY	$;06h]o:	White (5000K)	180 [7.09]	Semi-diffused (±30°)	Continuous only	PDF
FD04PD5CY	$;06h]p:	White (5000K)	360 [14.17]	Semi-diffused (±30°)	Continuous only	PDF
FD05PD5CY	$;06h]s:	White (5000K)	450 [17.72]	Semi-diffused (±30°)	Continuous only	PDF
FD07PD5CY	$;;06h]t:	White (5000K)	630 [24.80]	Semi-diffused (±30°)	Continuous only	PDF



Lumher Vision Lighting High-Power Bar Light (FD Series)

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Lumher FD Series Vision Lighting High-Power Bar Light Specifications	
	Continuous Mode
Strobe Input	–
Overdrive	No
Strobe Conditions (ON time, duty cycle)	–
Maximum Rising Time	3µs
Maximum Falling Time	3µs
Connection	M12 A-coded 4-pole connector
Consumption	White: 3.8 W per 90mm [3.54 in]
Minimum Functioning Voltage	22.8 VDC
Normal Functioning Voltage	24VDC ±5%
Maximum Functioning Voltage	25.2 VDC
Maximum Consumption Strobe Signal	–
Maximum Strobe Duty Cycle	–
Operating Temperature	-10°C to 40°C [14°F to 104°F]
Operating Maximum Humidity	80% without condensation
Weight	64g [0.14 lb] plus 192g [0.42 lb] per 90mm [3.54 in]
Materials	Body: Anodized aluminum Side cover: Anodized Aluminum Diffuser: Polycarbonate
Storage Temperature	0°C to 60°C [32°F to 140°F]
Lifespan of LEDs (ON time)	6.8 years
IP Protection	IP65

Connections

M12 A-Coded Connections	
Pin Number and Wire Color	***Continuous-Only Models***
Pin 1 – Brown	+24VDC
Pin 2 – White	Not Connected
Pin 3 – Blue	0VDC
Pin 4 – Black	Not connected

M12 A-Coded Male Connector

Lumher Backlight Lighting (BD Series)

BD2PD5CY

Lumher's BD (or backlight) Series combines mechanical design, robustness and homogeneity to achieve optimum results in your machine vision projects.

These backlights provide flicker-free illumination while preserving the luminous flux throughout the life of the product.

Optional mounting accessories allow these backlights to be installed at an angle of either 0° or 90°.

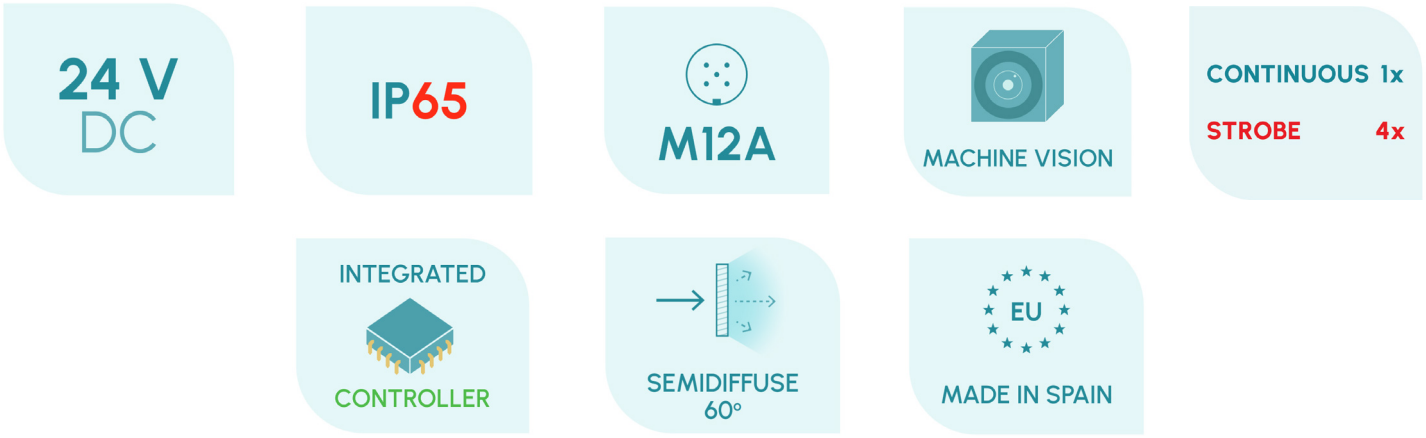
The product is made of anodized aluminium with IP65 watertightness and is available in two sizes.

Features

- Robust aluminum body
- IP65
- Integrated controller
- Continuous only or strobe-capable models available

Lumher BD Series Backlight Lighting Selection Guide

Part Number	Price	Light Emission	Illumination Area (mm [in])	Diffuser	Mode of Operation	Drawings
BD1PD5CY	$;06h]_:	White (5000K)	100 x 100 [3.94 x 3.94]	Semi-diffused (±30°)	Continuous only	PDF
BD2PD5CY	$;06h]#:	White (5000K)	100 x 190 [3.94 x 7.48]	Semi-diffused (±30°)	Continuous only	PDF
BD1ZD5CY	$;06h]?:	White (5000K)	100 x 100 [3.94 x 3.94]	Semi-diffused (±30°)	Strobe-capable	PDF
BD2ZD5CY	$;;;006h],:	White (5000K)	100 x 190 [3.94 x 7.48]	Semi-diffused (±30°)	Strobe-capable	PDF



Lumher Backlight Lighting (BD Series)

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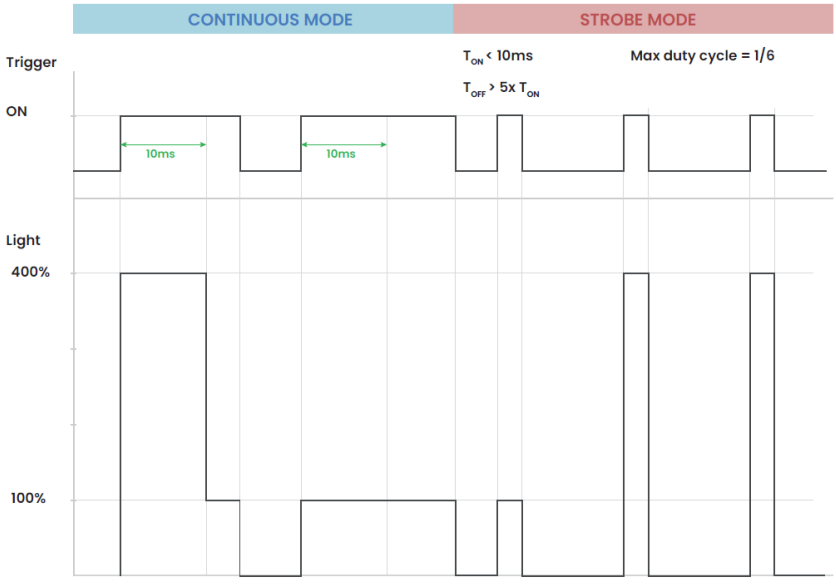
Lumher BD Series Backlight Lighting Specifications		
	Continuous Mode	***Strobe Mode***
Strobe Input	–	PNP: More than 22V for ON; Less than 1V for OFF NPN: Less than 1V for ON; More than 23V for OFF
Overdrive	No	Yes
Strobe Conditions (ON time, duty cycle)	–	For first 10ms, 4X normal brightness; then normal brightness. To re-engage strobe, LEDs must be off for at least 50ms.
Maximum Rising Time	3µs	
Maximum Falling Time	3µs	
Connection	M12 A-coded 4-pole connector	
Consumption	BD1 models: White: 7W BD2 models: White: 14W	BD1 models: White: 28W BD2 models: White: 56W
Minimum Functioning Voltage	22.8 VDC	
Normal Functioning Voltage	24VDC ±5%	
Maximum Functioning Voltage	25.2 VDC	
Maximum Consumption Strobe Signal	–	1.5 mA
Maximum Strobe Duty Cycle	–	16%
Operating Temperature	-10°C to 40°C [14°F to 104°F]	
Operating Maximum Humidity	80% without condensation	
Weight	BD1 models: 500g [1.10 lb] BD2 models: 796g [1.75 lb]	
Materials	Body: Anodized aluminum Side cover: Anodized Aluminum Diffuser: Polycarbonate	
Storage Temperature	0°C to 60°C [32°F to 140°F]	
Lifespan of LEDs (ON time)	6.8 years	
IP Protection	IP65	

Connections

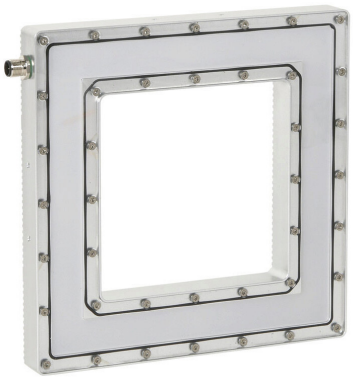
M12 A-Coded Connections		
Pin Number and Wire Color	***Continuous-Only Models***	***Strobe-Capable Models***
Pin 1 – Brown	+24VDC	+24VDC
Pin 2 – White	Not Connected	Trigger NPN
Pin 3 – Blue	0VDC	0VDC
Pin 4 – Black	Not connected	Trigger PNP

M12 A-Coded Male Connector

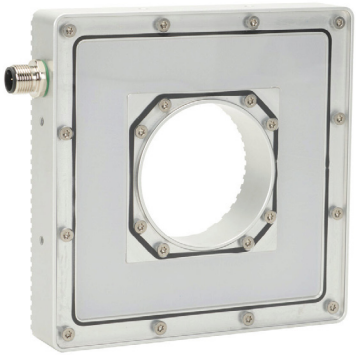
Timing Chart



Lumher Ring Lighting (RD Series)



RD2PD5CY



RD1PD5CY

Lumher's RD Series of ring lights provides an exceptionally durable and robust solution when direct illumination is required. The RD Series lights are built in a one-piece anodized aluminum frame. Thanks to the compact and versatile form factors of the lights, the illumination they provide facilitates precise object detection, tracking, and inspection. This makes them ideal for applications requiring reliable and comprehensive visual analysis in industrial and automation environments.

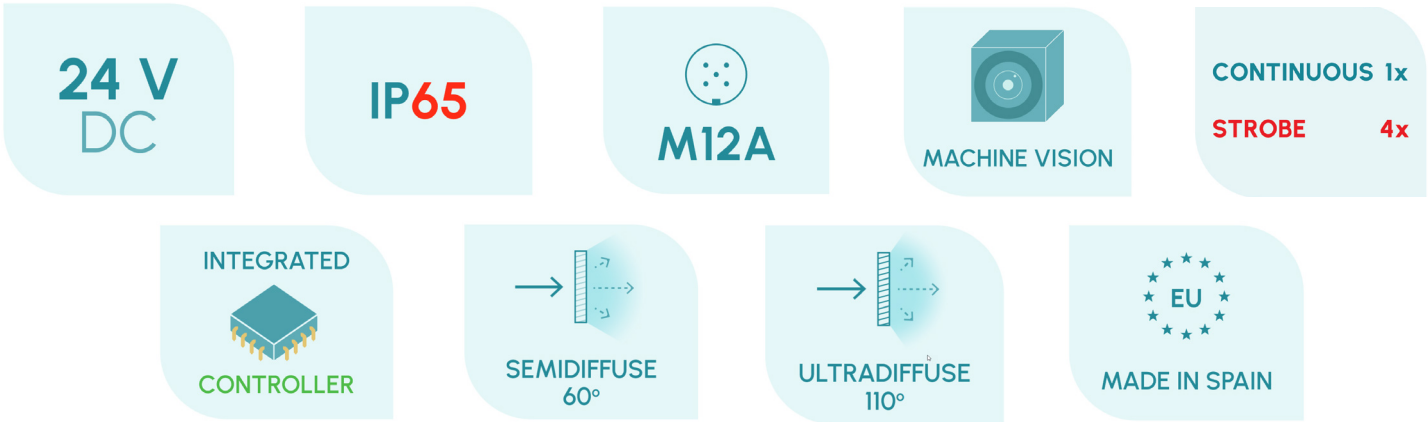
This type of light fixture is widely used in robotics, where (because the robot is in motion) it is recommended that lighting devices have the smallest possible dimensions to avoid possible mechanical interference. Such lighting is also recommended for certain production lines, where limited space calls for the use of compact lighting.

Features

- Robust aluminum body
- IP65
- Integrated controller
- Available in compact or extended size
- Continuous only or strobe-capable models available
- Semi-diffused or ultra-diffused illumination options available

Lumher RD Series Ring Lighting Selection Guide

Part Number	Price	Light Emission	Inside Dimension (mm [in])	Diffuser	Mode of Operation	Drawings
RD1PD5CY	$;06h]u:	White (5000K)	59 [2.32] diameter	Semi-diffused (±30°)	Continuous only	PDF
RD2PD5CY	$;06h]v:	White (5000K)	135 x 135 [5.31 x 5.31]	Semi-diffused (±30°)	Continuous only	PDF
RD1ZD5CY	$;06h]x:	White (5000K)	59 [2.32] diameter	Semi-diffused (±30°)	Strobe-capable	PDF
RD2ZD5CY	$;;006h]z:	White (5000K)	135 x 135 [5.31 x 5.31]	Semi-diffused (±30°)	Strobe-capable	PDF
RD1ZD5UY	$;;06h]]:	White (5000K)	59 [2.32] diameter	Ultra-diffused (±55°)	Strobe-capable	PDF
RD2ZD5UY	$;;;006h][:	White (5000K)	135 x 135 [5.31 x 5.31]	Ultra-diffused (±55°)	Strobe-capable	PDF
RD1PF5CY	$;06h[7:	Infrared (850nm)	59 [2.32] diameter	Semi-diffused (±30°)	Continuous only	PDF
RD2PF5CY	$;06h[c:	Infrared (850nm)	135 x 135 [5.31 x 5.31]	Semi-diffused (±30°)	Continuous only	PDF



Lumher Ring Lighting (RD Series)

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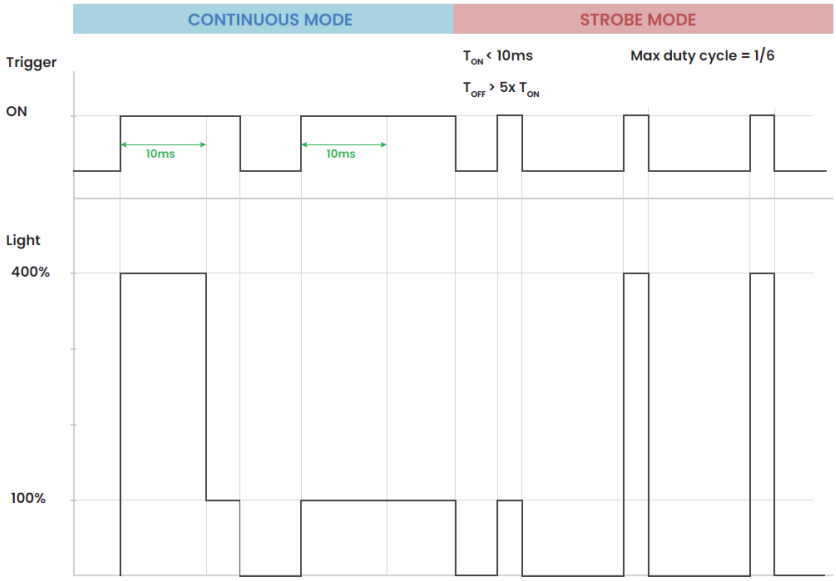
Lumher RD Series Ring Lighting Specifications		
	Continuous Mode	***Strobe Mode***
Strobe Input	–	PNP: More than 22V for ON; Less than 1V for OFF NPN: Less than 1V for ON; More than 23V for OFF
Overdrive	No	Yes
Strobe Conditions (ON time, duty cycle)	–	For first 10ms, 4X normal brightness; then normal brightness. To re-engage strobe, LEDs must be off for at least 50ms.
Maximum Rising Time	3µs	
Maximum Falling Time	3µs	
Connection	M12 A-coded 4-pole connector	
Consumption	RD1 models: White: 7.6 W RD2 models: White: 15.2 W RD1 models: Infrared: 4.0 W RD2 models: Infrared: 8.0 W	RD1 models: White: 30.4 W RD2 models: White: 60.8 W
Minimum Functioning Voltage	22.8 VDC	
Normal Functioning Voltage	24VDC ±5%	
Maximum Functioning Voltage	25.2 VDC	
Maximum Consumption Strobe Signal	–	1.5 mA
Maximum Strobe Duty Cycle	–	16%
Operating Temperature	-10°C to 40°C [14°F to 104°F]	
Operating Maximum Humidity	80% without condensation	
Weight	RD1: 0.615 kg [1.36 lb] RD2: 1.276 kg [2.81 lb]	
Materials	Body: Anodized aluminum Side cover: Anodized Aluminum Diffuser: Polycarbonate	
Storage Temperature	0°C to 60°C [32°F to 140°F]	
Lifespan of LEDs (ON time)	6.8 years	
IP Protection	IP65	

Connections

M12 A-Coded Connections		
Pin Number and Wire Color	***Continuous-Only Models***	***Strobe-Capable Models***
Pin 1 – Brown	+24VDC	+24VDC
Pin 2 – White	Not Connected	Trigger NPN
Pin 3 – Blue	0VDC	0VDC
Pin 4 – Black	Not connected	Trigger PNP

M12 A-Coded Male Connector

Timing Chart



Lumher Spot Lighting (BS Series)

BS1ZD5QY

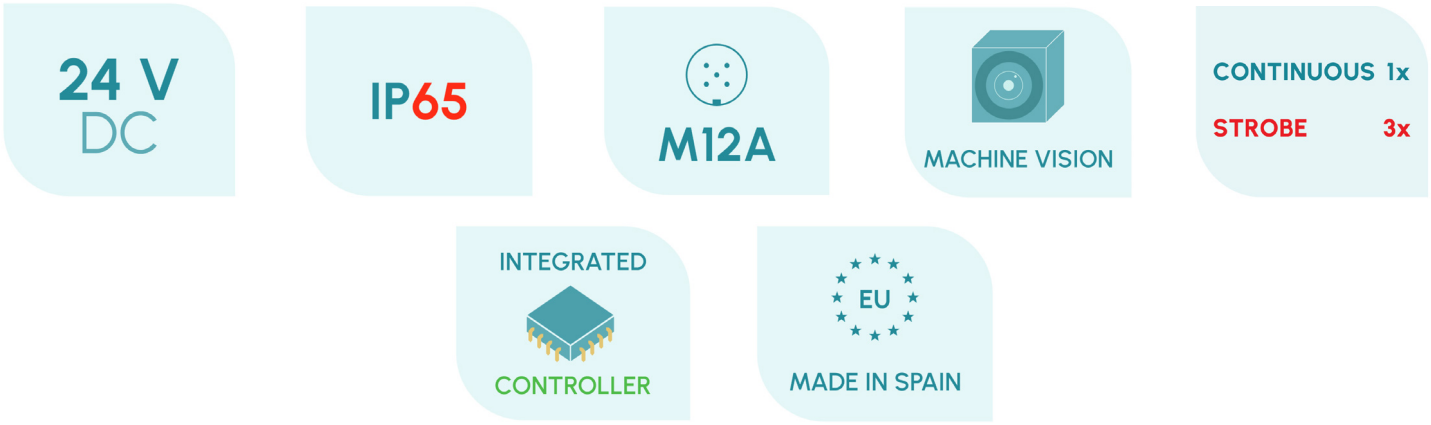
Lumher's BS Series provides an exceptionally durable and robust solution when focused or directional lighting is required. These lights are especially recommended for projects where the target surface is at a considerable distance from the camera. Fabricated from anodized aluminum, these lights provide IP65 protection.

Features

- Robust aluminum body
- IP65
- Integrated controller
- Continuous only or strobe-capable models available

Lumher BS Series Spot Lighting Selection Guide

Part Number	Price	Light Emission	Housing Size (mm [in])	Diffuser	Mode of Operation	Drawings
BS1PD5QY	$;06h[0:	White (5000K)	125 x 125 x 25 [4.92 x 4.92 x 0.98]	Spot (±3°)	Continuous only	PDF
BS1ZD5QY	$;06h[1:	White (5000K)	125 x 125 x 25 [4.92 x 4.92 x 0.98]	Spot (±3°)	Strobe-capable	PDF



Lumher Spot Lighting (BS Series)

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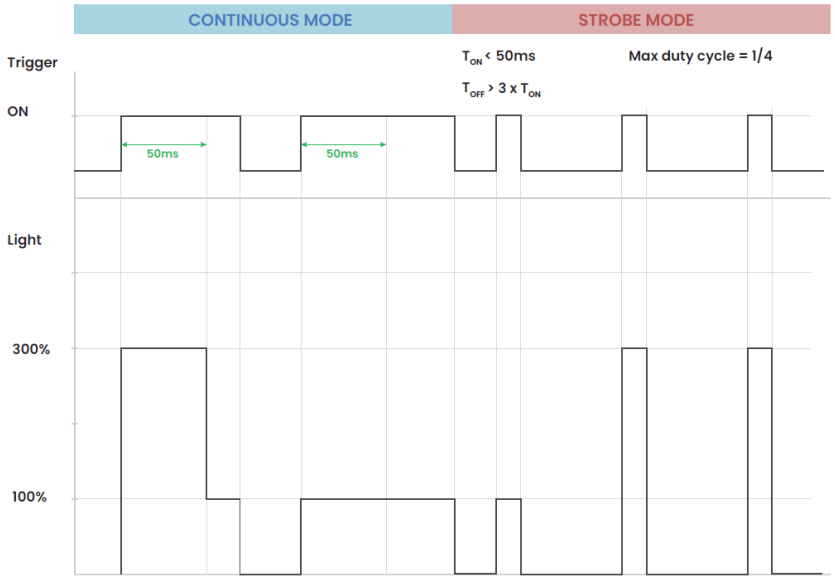
Lumher BS Series Spot Lighting Specifications		
	Continuous Mode	***Strobe Mode***
Strobe Input	–	PNP: More than 22V for ON; Less than 1V for OFF NPN: Less than 1V for ON; More than 23V for OFF
Overdrive	No	Yes
Strobe Conditions (ON time, duty cycle)	–	For first 50ms, 3X normal brightness; then normal brightness. To re-engage strobe, LEDs must be off for at least 150ms.
Maximum Rising Time	3µs	
Maximum Falling Time	3µs	
Connection	M12 A-coded 4-pole connector	
Consumption	11.5 W	48.0 W
Minimum Functioning Voltage	22.8 VDC	
Normal Functioning Voltage	24VDC ±5%	
Maximum Functioning Voltage	25.2 VDC	
Maximum Consumption Strobe Signal	–	1.5 mA
Maximum Strobe Duty Cycle	–	25%
Operating Temperature	-10°C to 40°C [14°F to 104°F]	
Operating Maximum Humidity	80% without condensation	
Weight	0.5 kg [1.1 lb]	
Materials	Body: Anodized aluminum Side cover: Anodized Aluminum Diffuser: Polycarbonate	
Storage Temperature	0°C to 60°C [32°F to 140°F]	
Lifespan of LEDs (ON time)	6.8 years	
IP Protection	IP65	

Connections

M12 A-Coded Connections		
Pin Number and Wire Color	***Continuous-Only Models***	***Strobe-Capable Models***
Pin 1 – Brown	+24VDC	+24VDC
Pin 2 – White	Not Connected	Trigger NPN
Pin 3 – Blue	0VDC	0VDC
Pin 4 – Black	Not connected	Trigger PNP

M12 A-Coded Male Connector

Timing Chart



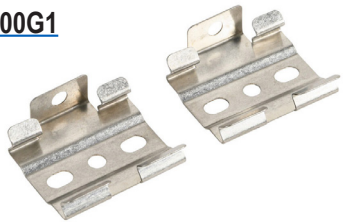
Lumher Mounting Accessories For PD-Series Lights

The PD series bar lights offer a wide variety of anchoring options. A number of different mounting bracket options are available, including stainless steel and plastic (ABS) models. These include fixed anchors with multiple installation positions as well as rotating anchors for greater flexibility.

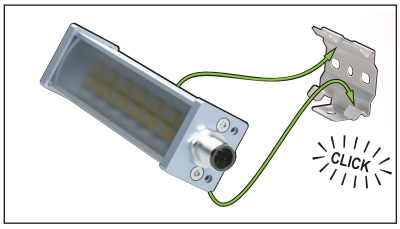
Lumher PD Series Fixed Mounting Bracket Selection Guide

Part Number	Price	Adjustment Type	Setting Angles	Material	Mounting	Drawings
P00G1	$;6h[8:	Fixed	0° or 90°	Stainless steel	Customer-supplied screws	PDF
P00G2	$;6h[9:	Fixed	0° or 90°	Plastic	Customer-supplied screws	PDF
P00G3	$;6h[a:	Fixed	0°, 15°, 30°, 60°, 75°, or 90°	Plastic	Customer-supplied screws	PDF
P00G4	$;6h[b:	Fixed	0°	Plastic	Magnetic	PDF

P00G1

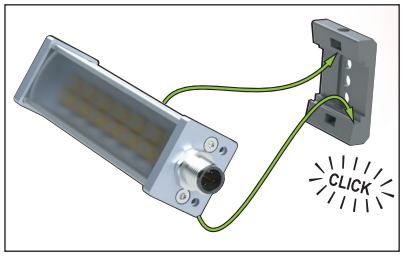


Mounting



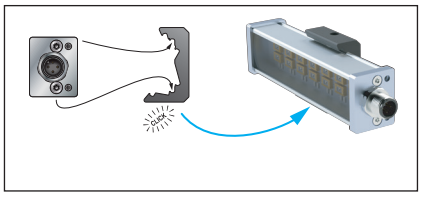
P00G2

Mounting

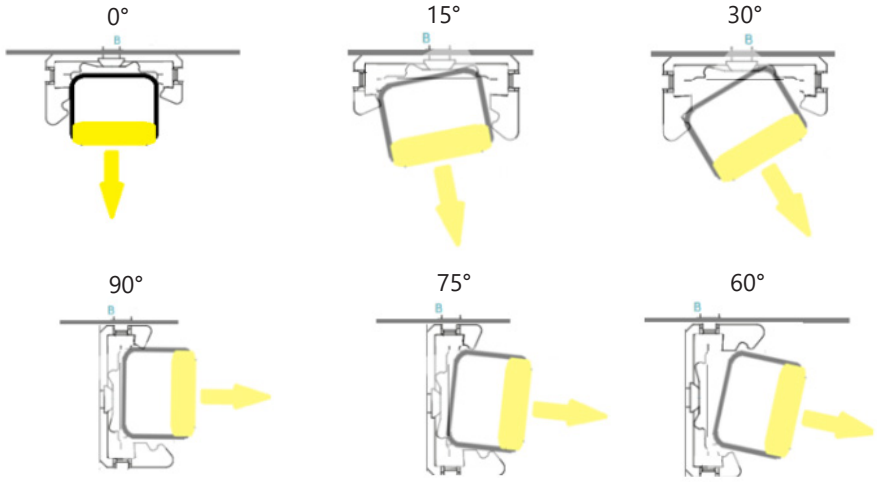


P00G3

Mounting Procedure

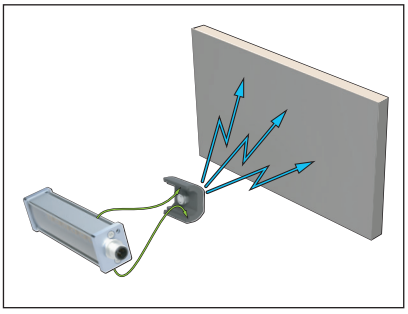


Mounting Options for Various Setting Angles



Magnetic mounting

P00G4



Lumher Mounting Accessories For PD-Series Lights

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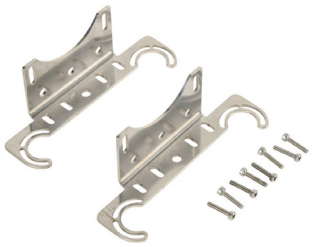
The PD series bar lights offer a wide variety of anchoring options. A number of different mounting bracket options are available, including stainless steel and plastic (ABS) models. These include fixed anchors with multiple installation positions as well as rotating anchors for greater flexibility.

Lumher PD Series Adjustable Mounting Bracket Selection Guide

Part Number	Price	Adjustment Type	Mounting Capacity	Relative Orientation of Lights	Material	Mounting (Lights)	Mounting (Brackets)	Drawings
P00R1	$;6h[d:	Adjustable	Single	–	Stainless steel	Supplied screws (included)	Customer-supplied screws or M6D16	PDF
P00R2	$;6h[e:	Adjustable	Dual	Axial	Stainless steel		Customer-supplied screws	PDF
P00R3	$;;6h[f:	Adjustable	Dual	60°	Stainless steel		Customer-supplied screws	PDF
P00R4	$;6h[g:	Adjustable	Dual	90°	Stainless steel		Customer-supplied screws or M6D16	PDF

P00R1

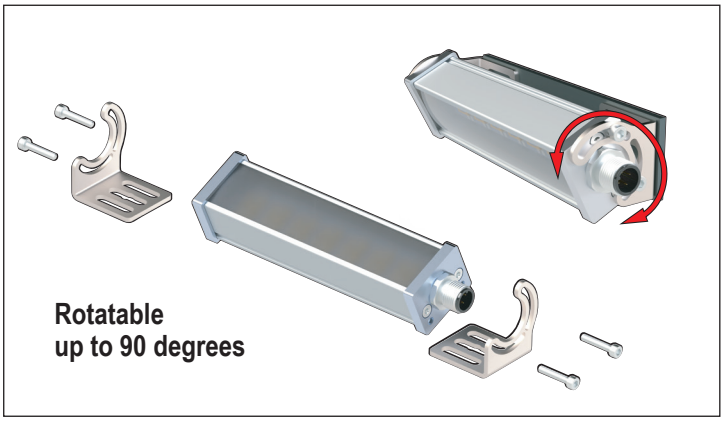


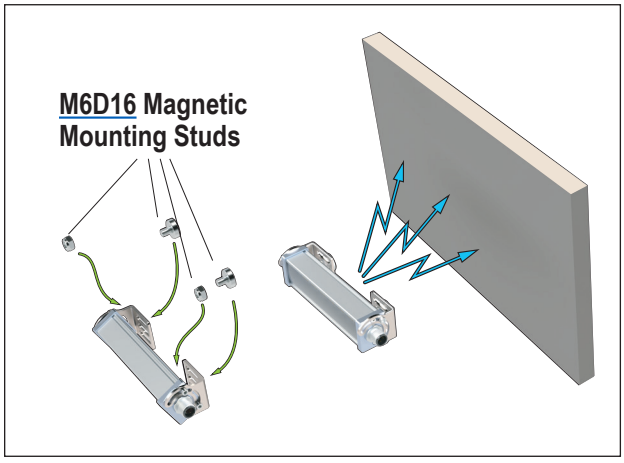
P00R2

P00R3

P00R4

Mounting Bracket Assembly Options





Lumher Magnetic Mounting Option Selection Guide

Part Number	Price	Material	Description	Fits	Drawings
M6D16	$;6h[h:	Stainless steel	Magnet with M6 stud and lock nut	F00R1 P00R1, P00R4	PDF

M6D16

Lumher Mounting Accessories For FD-Series Lights

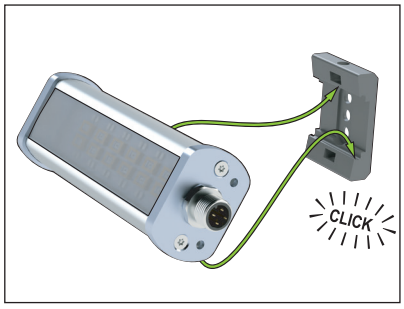
The FD series bar lights offer a wide variety of anchoring options. A number of different mounting bracket options are available, including stainless steel and plastic (ABS) models. These include fixed anchors with multiple installation positions as well as rotating anchors for greater flexibility.

Contaval Lumher FD Series Mounting Bracket Selection Guide

Part Number	Price	Adjustment	Setting Angles	Material	Mounting	Drawings
F00G2	$;-6h[j:	Fixed	0°	Plastic	For mounting lights: Clip into brackets For mounting brackets: Use customer-supplied screws or M6D16	PDF
F00G4	$;6h[k:	Fixed	0°	Plastic	For mounting lights: Clip into brackets For mounting brackets: Magnetic	PDF
F00R1	$;-6h[l:	Adjustable	Up to 90°	Stainless steel	For mounting lights: Use supplied screws For mounting brackets: Use customer-supplied screws or M6D16	PDF

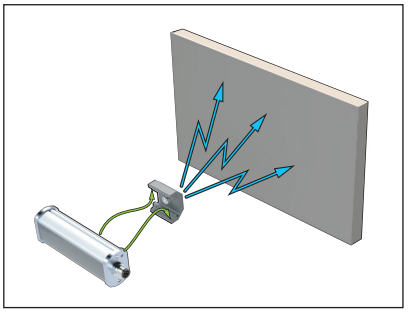
F00G2

Mounting

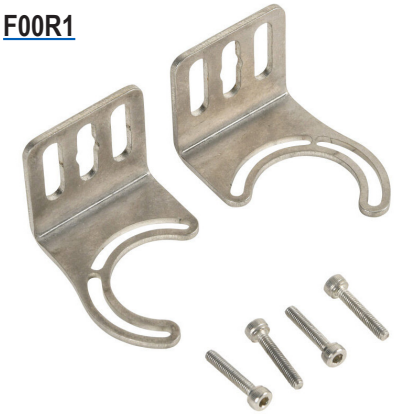


F00G4

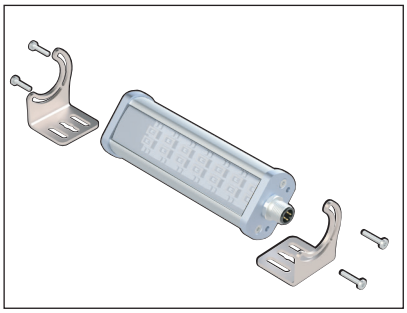
Magnetic mounting



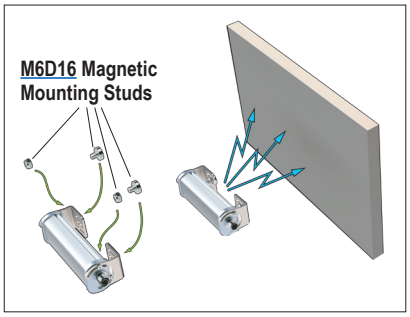
F00R1



Adjustable mounting



OR



Lumher Magnetic Mounting Option Selection Guide

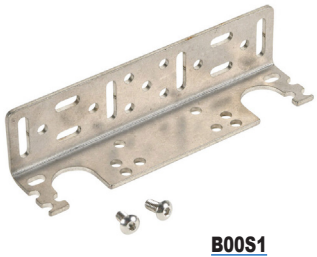
Part Number	Price	Material	Description	Fits	Drawings
M6D16	$;6h[h:	Stainless steel	Magnet with M6 stud and lock nut	F00R1 P00R1, P00R4	PDF

M6D16

Lumher Mounting Accessories For RD, BS and BD Series Lights

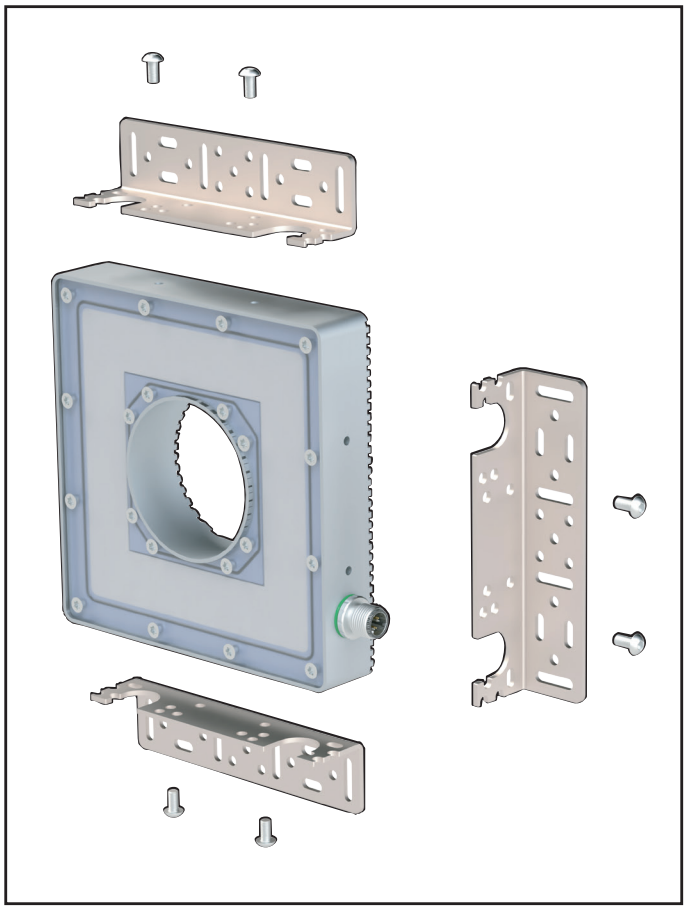
lumher

Lumher RD, BS and BD Series Mounting Bracket Selection Guide				
Part Number	*Price*	*Material*	*Mounting*	*Drawings*
B00S1	$;-6h[i:	Stainless steel	For mounting lights: Use supplied screws For mounting brackets: Use customer-supplied screws	PDF

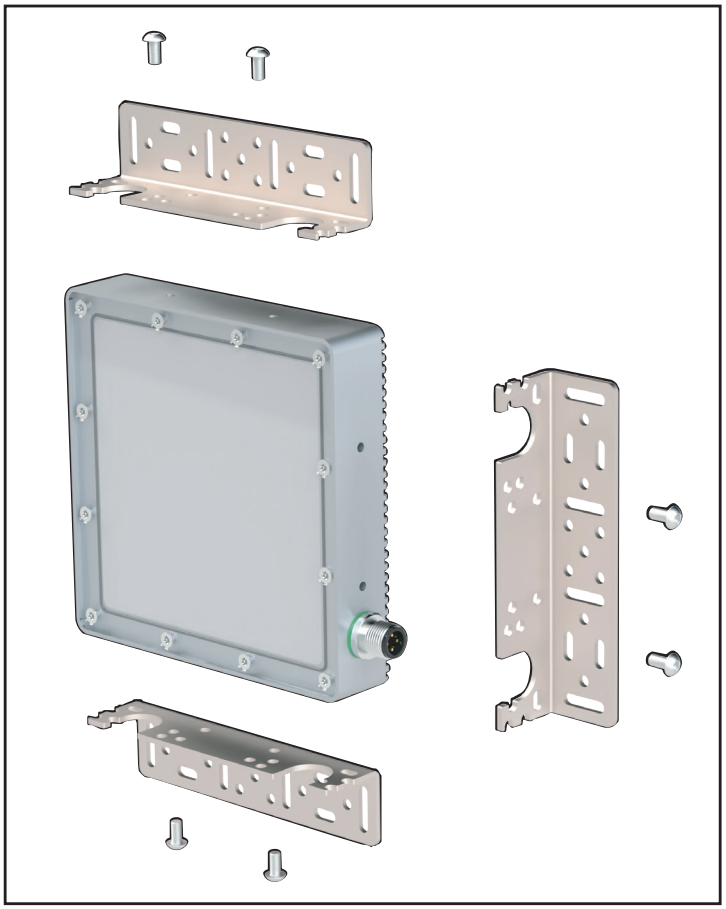


B00S1

Mounting Assembly for B00S1 With RD Series Light



Mounting Assembly for B00S1 With BS or BD Series Light



WenglorTPL Vision Lighting M-EBAR Lights

WenglorTPL M-EBAR (Modular Essential Bar) Lights, which feature high-power LEDs, come in various sizes and are available with either white or infrared lights to help create the best contrast for image processing. These linear lights are extremely versatile and can be used to create different types of lighting (for example, bright field, dark field, or dome effect) suited to various automation and robotics applications. Designed with flexibility in mind, WenglorTPL bar lights simplify the product selection process and make for easy integration.

WenglorTPL's award-winning Modular Essential Bar Light illumination provides universal solutions for pick-and-place, logistics, packaging and traceability applications. These bar lights can be combined with WenglorTPL's Angle Changers to suit almost any machine vision application.

Features

- **Illumination angle can be customized to suit almost any application with the addition of angle changers**
- Ultra narrow lens delivers ±7° illumination
- Robust aluminum body
- IP65
- Non-removable M4 nut included on back of bar
- Built-in overdrive protection safeguards against damage from overcurrent

OPT2401

WenglorTPL White M-EBAR Selection Guide

Part Number	Price	Color of Light	Light Temperature	Length of Light	Overdrive	Mode of Operation	Drawings
OPT2400	$;05[10:	White	5800K	125mm [4.92 in]	Yes	Continuous or strobe	PDF
OPT2401	$;05[11:			250mm [9.84 in]			PDF
OPT2402	$;05[12:			375mm [14.76 in]			PDF
OPT2403	$;05[13:			500mm [19.69 in]			PDF

OPT2406

WenglorTPL Infrared M-EBAR Selection Guide

Part Number	Price	Color of Light	Wavelength	Length of Light	Overdrive	Mode of Operation	Drawings
OPT2404	$;05[14:	Infrared	850nm	125mm [4.92 in]	Yes	Continuous or strobe	PDF
OPT2405	$;05[17:			250mm [9.84 in]			PDF
OPT2406	$;05[18:			375mm [14.76 in]			PDF
OPT2407	$;05[19:			500mm [19.69 in]			PDF

WenglorTPL Vision Bar Clamp Selection Guide

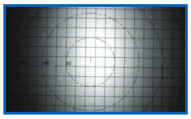
Part Number	Price	Description	Material	Drawing
OPT2432	$;5[20:	Bar clamp	Aluminum	PDF

OPT2432

Angle Changers

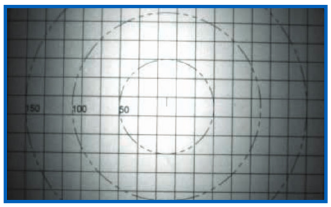
WenglorTPL bar lights can be used as-is in a wide range of applications. However, the addition of an angle changer accessory can greatly enhance the versatility of the overall lighting system by changing the angle of the illumination and thus allowing a single light to be used in multiple applications.

Angle changers are easy to install on the Wenglor bar lights and do not have any impact on the IP rating. Installation takes just seconds and is simply a matter of clipping them into the light's aluminum frame.

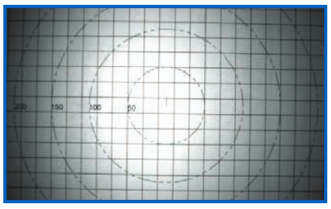


M-EBAR without angle changer

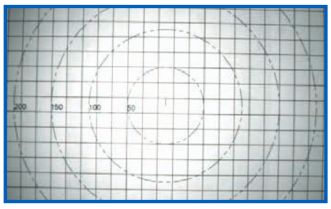
Result when using different angle changers



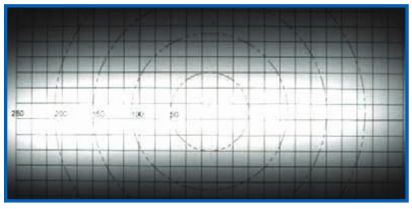
With Narrow Angle Changer



With Medium Angle Changer



With Wide Angle Changer



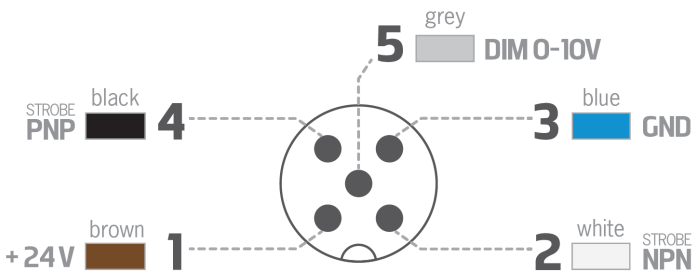
With Line Light Angle Changer

WenglorTPL Vision Lighting
M-EBAR Lights

wenglor TPL

M-EBAR General Specifications				
	125mm [4.92 in]	*250mm [9.84 in]*	*375mm [14.76 in]*	*500mm [19.69 in]*
Electronics				
Functioning Mode	Continuous or strobe			
Strobe Input	PNP: From 5 to 24V for 100% ON. From 0 to 1V for 100% OFF NPN: Less than 1V for 100% ON. Above 2V for 100% OFF. Max 20V			
Overdrive	Yes			
Strobe Conditions (ON time, duty cycle)	LEDs are supplied with 240% maximum current. After 30ms, LED are supplied at 100% level.			
Maximum Rising Time	15µs			
Maximum Falling Time	15µs			
Connection	M12 5-pole connector			
Consumption CW Mode	0.3 A	0.6 A	0.9 A	1.2 A
Consumption Strobe Mode	1.2 A	2.4 A	3.6A	4.8 A
Minimum Functioning Voltage	20V at the light input			
Normal Functioning Voltage	24V at the light input (±10%)			
Maximum Functioning Voltage	30V at the light input			
Maximum Consumption Strobe and Dimming Signal	10mA			
Maximum Strobe Duty Cycle	20%			
Dimming	Pin 5 (M12 5-pole connector): 0-10 V = 100-30% respectively			
Operating Temperature	-10°C to 40°C [14°F to 104°F]			
Operating Maximum Humidity	80% without condensation			
Maximum Temperature Variation in 24 Hours	10°C [18°F] over 24 hours			
Optics				
Color	White (5800k) Infrared (850nm)			
Mechanics				
Weight	0.8 lb [380g]	1.4 lb [630g]	2.1 lb [950g]	2.6 lb [1.20 kg]
Materials	Aluminum and fiberglass-reinforced ABS			
Mounting	2 M4 nuts (non-removable) installed in T slot in rear of bar light			4 M4 nuts (non-removable) installed in T slot in rear of bar light
Environment				
Storage Temperature	-20°C to 60°C / 80% humidity without condensation No thermal shock (maximum temperature variation 10C in 24 hours)			
IP Protection	IP65			

Connections



Strobe PNP	
1	+24V
2	Not connected
3	Ground
4	PNP-signal
5	Dim 0-10 V

Strobe NPN	
1	+24V
2	NPN-signal
3	Ground
4	Not connected
5	Dim 0-10 V

Continuous Mode			
1	+24V		+24V
2	Not connected		Ground
3	Ground	OR	Ground
4	+24V		Not connected
5	Dim 0-10 V		Dim 0-10 V

WenglorTPL Vision Lighting Angle Changers for M-EBAR

wenglor TPL

WenglorTPL Angle Changers are inserts for the modular essential bar light that make it easy for you to change illumination angles as needed to meet changing application demands.

OPT2408 OPT2409-2 OPT2410-4

Features

- Quickly and easily change illumination angles as your project evolves.
- No need to dismantle the product to adjust the illumination angle. All you need to do is to swap Angle Changers.
- Angle Changers do not have an impact on the IP rating of the bar light.
- Allows for rapid feasibility testing.
- Quickly and easily identify the best illumination solution with different angle changer combinations.

WenglorTPL M-EBAR Angle Changers Selection Guide

Part Number	Price	Angle Type	Angle	Quantity in Package	Drawings
OPT2408	$;5[15:	Narrow	±10°	1	PDF
OPT2408-2	$;5[16:			2	PDF
OPT2408-4	$;05[1a:			4	PDF
OPT2409	$;5[1b:	Medium	±17°	1	PDF
OPT2409-2	$;5[1c:			2	PDF
OPT2409-4	$;05[1d:			4	PDF
OPT2410	$;5[1e:	Wide	±25°	1	PDF
OPT2410-2	$;;5[1f:			2	PDF
OPT2410-4	$;05[1g:			4	PDF
OPT2411	$;5[1h:	Line light	±9° x ±16°	1	PDF
OPT2412	$;-5[1i:	Polarized narrow	±10°	1	PDF
OPT2413	$;-5[1j:	Polarized medium	±17°	1	PDF
OPT2414	$;5[1k:	Polarized wide	±25°	1	PDF
OPT2415	$;-5[1l:	Polarized line light	±9° x ±16°	1	PDF
OPT2416	$;5[1n:	Polarized	None	1	PDF
OPT2417	$;5[1o:	Transparent	None	1	PDF
OPT2417-2	$;5[1p:			2	PDF
OPT2417-4	$;5[1q:			4	PDF

Number of Angle Changers Needed

Length of Bar Light	Quantity of Angle Changers Required
125mm [4.92 in]	1
250mm [9.84 in]	2
375mm [14.76 in]	3
500mm [19.69 in]	4

Angle Changer Installation

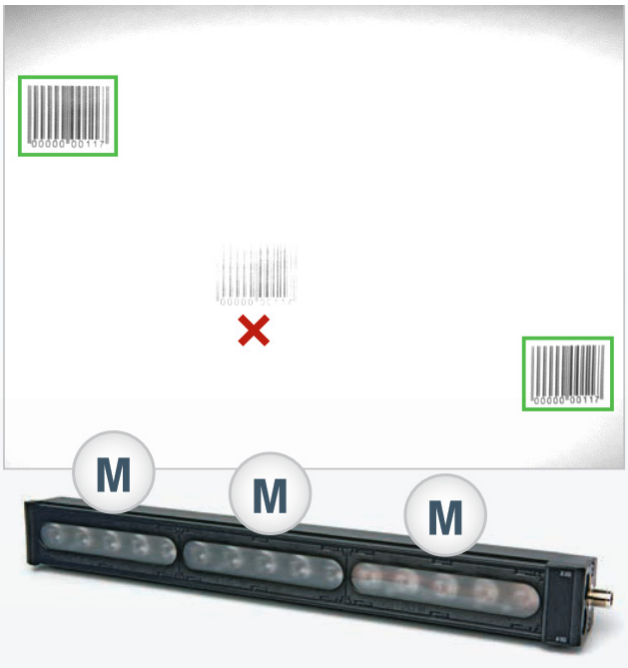
WenglorTPL Vision Lighting Angle Change Inserts For M-EBAR

wenglor TPL

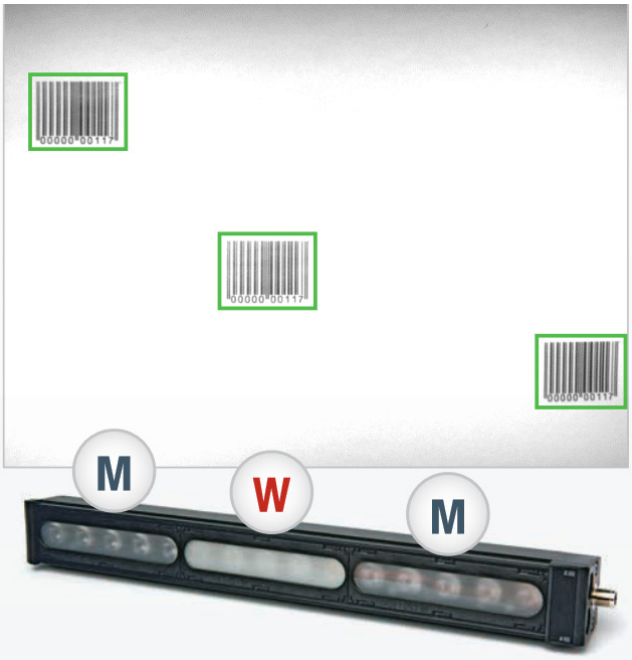
Application Example

Hot spots are often a problem in machine vision lighting, and WenglorTPL Angle Changers provide an excellent solution to help you deal with hot spots by utilizing different angle changers on the same bar light.

OPT2402 light bar with 3 medium-angle Angle Changers (OPT2409)



OPT2402 light bar with 2 medium-angle Angle Changers (OPT2409) and 1 wide-angle Angle Changer (OPT2410)

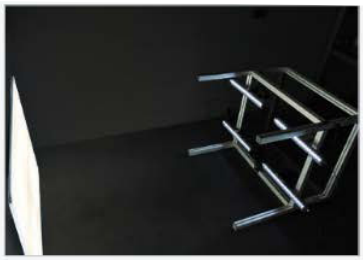


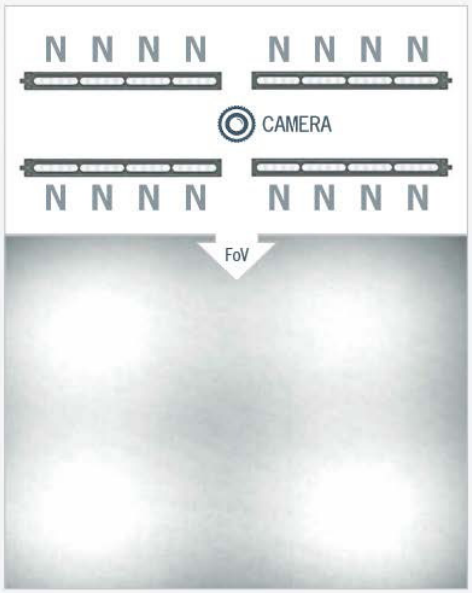
Example

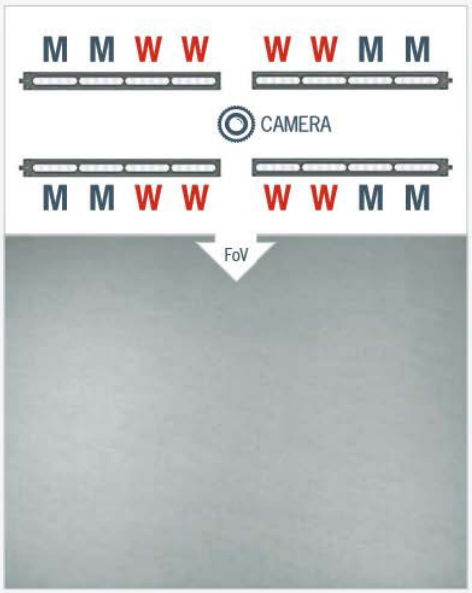
- 2000mm working distance
- 1300 x 900 field of view
- Four OPT2403 light bars with angle changers

Angle changers marked at each 125mm as Narrow, Medium or Wide by N, M, or W

Schematic views show a plan of the system from behind the camera







WenglorTPL Vision Lighting Modular Ring Light, Dome, and Low-Angle Accessories

wenglor TPL

The WenglorTPL Modular Ring Light offers bi-color LED illumination. Models are available in two sets of colors (only one color can be used at a time) and in two different sizes. All have been designed with tough production environments in mind with IP65 as standard and overdrive embedded.

To further enhance the Modular Ring Light's versatility, users have the ability to select colors and quadrants via the simple controls on the device or via I/O from a connected PLC.

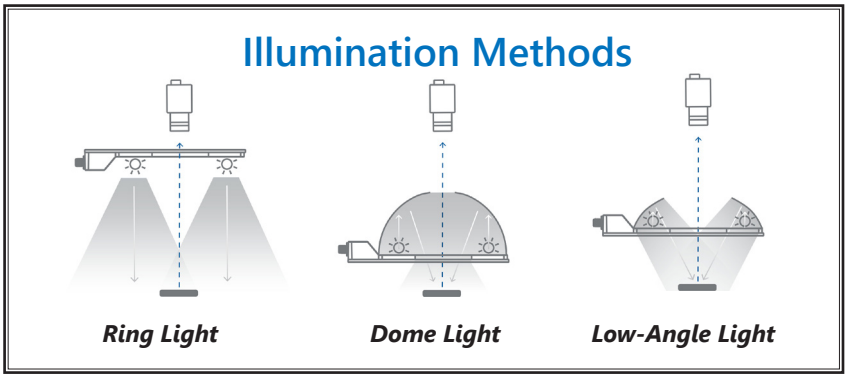
OPT2425

OPT2427

WenglorTPL Modular Ring Light Selection Guide

Part Number	Price	Colors	Size* (mm [in])	Overdrive	Mode of Operation	Drawings
OPT2424	$;05[1z:	Red / Cyan	80 [3.15]	Yes	Continuous or strobe	PDF
OPT2425	$;;05[1]:	White / Infared	80 [3.15]			PDF
OPT2426	$;;;005[1[:	Red / Cyan	130 [5.12]			PDF
OPT2427	$;;;005[1,:	White / Infared	130 [5.12]			PDF

** Approximate diameter to inner ring of LEDs*



Ring Light Accessories

WenglorTPL ring light accessories transform a ring light into a dome light or a low-angle light. These accessories attach to the appropriate sized modular ring light by use of built-in magnets. They are then secured using the provided screws.

For dome light applications, the aperture size for the dome light may need to be reduced to decrease the dark spot on the field of view. The WenglorTPL dome accessory comes with multiple aperture covers to maximize flexibility.

WenglorTPL Ring Light Accessory Selection Guide

Part Number	Price	Item	Corresponding Ring Light Size* (mm [in])	Drawings
OPT2428	$;5[1_:	Dome	80 [3.15]	PDF
OPT2429	$;05[1#:	Dome	130 [5.12]	PDF
OPT2430	$;;5[1!:	Low-angle dome	80 [3.15]	PDF
OPT2431	$;05[1?:	Low-angle dome	130 [5.12]	PDF

** Approximate diameter to inner ring of LEDs on corresponding ring light*

OPT2428

OPT2430

WenglorTPL Mounting Bracket Selection Guide

Part Number	Price	Description	Material	Drawings
OPT2434	$;5[22:	Mounting bracket	Aluminium	PDF

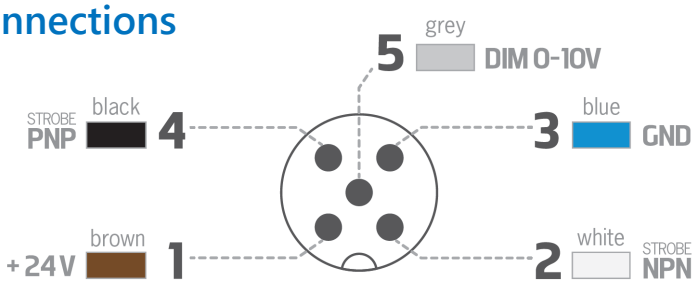
OPT2434

WenglorTPL Vision Lighting Modular Ring Light

wenglor TPL

Modular Ring Light General Specifications		
	80mm [3.15 in]	*130mm [5.12 in]*
Electronics		
Power Supply	24VDC ±10%	
Functioning Mode	Continuous, strobe, overdrive, dimming, sector control, LED color	
Rising Time	10µs	
Falling Time	10µs	
Wiring	5-pin M12 male connector for power Optional: 8-pin M12 male connector for remote control	
Maximum Consumption, Red-Cyan	9W average / 51W peak	11W average, 82W peak
Maximum Consumption, White-IR	10W average / 42W peak	13W average / 62W peak
Optics		
Color	Red (625nm) - Cyan (505nm) - White (5000K) - Infrared (860nm)	
Number of LEDs	96	144
Mechanical		
Height	Lighting portion: 11mm Wiring portion, with connectors: 31mm	
Weight	360g [0.8 lb]	550g [1.2 lb]
Material	Aluminum and ABS	
Mounting	2 x M5 screws (included with OPT2434 bracket)	
Environment		
Operating Temperature	-10°C to 40°C / 80% humidity without condensation No thermal shock (maximum temperature variation 10C in 24 hours)	
Storage Temperature	-20°C to 60°C / 80% humidity without condensation No thermal shock (maximum temperature variation 10C in 24 hours)	
IP Protection	IP65	

Connections



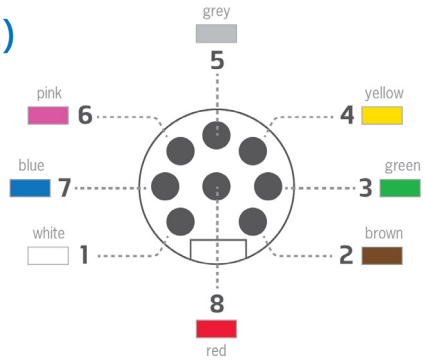
Strobe PNP	
1	+24V
2	+24V*
3	Ground
4	PNP
5	Dim 0-10 V

Strobe NPN	
1	+24V
2	NPN
3	Ground
4	Ground
5	Dim 0-10 V

* Using this connection increases EMC immunity. This connection is not required.

Continuous Mode			
1	+24V		+24V
2			Ground
3	Ground	OR	Ground
4	+24V		
5	Dim 0-10 V		Dim 0-10 V

Optional Remote Connection I/O (8-pin M12)



NOTE: The colors used in this connection chart are for 292 series 8-pin cables.

Remote I/O	
1	Overdrive
2	LED color selection
3	Ground
4	Sector 1 ON
5	Sector 2 ON
6	Sector 3 ON
7	Sector 4 ON
8	Deactivate Keyboard

WenglorTPL Vision Lighting High-Powered Back Light

OPT2420

The WenglorTPL Vision Back light is a high-powered solution for all backlighting applications and quality control tasks, including detection of presence/absence, analysing edge defects, liquid fill level measurement and silhouetting.

The WenglorTPL Vision Back Light has exceptionally narrow borders (only 4mm wide), making the useful illumination area of the light easy to integrate into your system. The unit's LEDs are mounted with highly efficient lenses, engineered to distribute the highest brightness and uniformity balance available for machine vision backlights.

The Back Light also features integrated current control, making it easy to wire, install and use.

WenglorTPL Vision Back Lighting Selection Guide

Part Number	Price	Color of Light	Light Temperature	Area of Light	Overdrive	Mode of Operation	Drawings
OPT2418	$;05[1s:	White	5700K	200 x 200mm [7.87 x 7.87 in]	No	Continuous or strobe	PDF
OPT2420	$;;005[1u:			300 x 300mm [11.81 x 11.81 in]			PDF
OPT2422	$;;005[1x:			400 x 400mm [15.75 x 15.75 in]			PDF

WenglorTPL Vision Infrared Back Lighting Selection Guide

Part Number	Price	Color of Light	Wavelength	Area of Light	Overdrive	Mode of Operation	Drawings
OPT2419	$;;05[1t:	Infrared	850nm	200 x 200mm [7.87 x 7.87 in]	No	Continuous or strobe	PDF
OPT2421	$;;005[1v:			300 x 300mm [11.81 x 11.81 in]			PDF
OPT2423	$;;005[1y:			400 x 400mm [15.75 x 15.75 in]			PDF

WenglorTPL Vision Lighting Bracket Selection Guide

Part Number	Price	Description	Material	Qty in Package	Drawing
OPT2433	$;5[21:	Mounting bracket	Aluminium	4	PDF

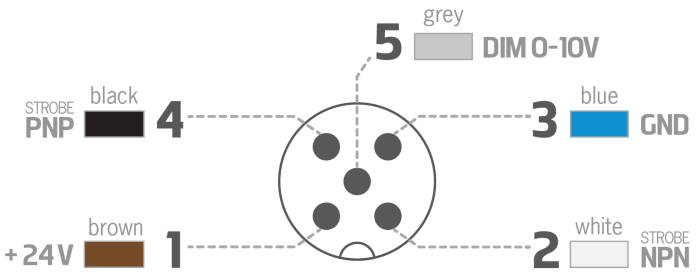
OPT2433

WenglorTPL Vision Lighting High-Powered Back Light

wenglor TPL

Back Light General Specifications	
Electronics	
Power Supply	24VDC ±10%
Functioning Mode	Continuous or strobe
Strobe Input	PNP: From 5 to 24V for 100% ON. From 0 to 1V for 100% OFF NPN: Less than 1V for 100% ON. Above 2V for 100% OFF. Max 20V
Overdrive	No
Strobe Conditions (ON time, duty cycle)	No restriction
Dimming	Pin 5 (M12 5-pole connector): 0-10 V = 100-30% respectively
Maximum Rising Time	15µs
Maximum Falling Time	10µs
Control	Conector M12 5 poles
Consumption	White: 21.6 W (OPT2418), 48.6 W (OPT2420), 86.4 W (OPT2422) Infrared: 27.5 W (OPT2419), 61.9 W (OPT2421), 110 W (OPT2423)
Minimum Functioning Voltage	20V at the light input
Normal Functioning Voltage	24V at the light output (±10%)
Maximum Functioning Voltage	30V at the light input
Maximum Consumption Strobe Signal On Largest Product (400x400 mm)	250mA
Maximum Consumption Dimming Signal On Largest Product (400x400 mm)	150mA
Optics	
Color	White (5700K) Infrared (850nm)
Mechanics	
Thickness	45mm
Weight	23.2 kg/m^2 ±15%
Materials	Aluminum and loaded ABS
Diffuser	White PMMA
Mounting	4 M4 nuts (supplied) to insert in the groove or 4 M4x20 screws (not supplied) applied to the corner slots
Environment	
Operating Temperature	-10°C to 40°C / 80% humidity without condensation No thermal shock (maximum temperature variation 10C in 24 hours)
Storage Temperature	-20°C to 60°C / 80% humidity without condensation No thermal shock (maximum temperature variation 10C in 24 hours)
IP Protection	IP40

Connections



Strobe PNP	
1	+24V
2	Not connected
3	Ground
4	PNP
5	Dim 0-10 V

Strobe NPN	
1	+24V
2	NPN
3	Ground
4	Not connected
5	Dim 0-10 V

Continuous Mode			
1	+24V		+24V
2	Not connected		Ground
3	Ground	OR	Ground
4	+24V		Not connected
5	Dim 0-10 V		Dim 0-10 V

WenglorTPL Vision Lighting Flat Dome Light

OPT2435

WenglorTPL Vision's Flat Dome Light is a high-power flat dome illumination solution for machine vision applications such as Pick and Place or Logistics. The LEDs are mounted with highly efficient lenses, engineered to distribute the highest brightness and uniformity balance available for machine vision applications.

The Flat Dome Light also also features integrated current control, making it easy to wire, install and use. The central opening allows for simple placement of cameras using lenses up to 65mm [2.56 in] in diameter.

WenglorTPL Vision White Illumination Flat Dome Light Selection Guide

Part Number	Price	Color of Light Emmission	Temperature	Area of Light	Overdrive	Mode of Operation	Drawings
OPT2435	$;;005[23:	White	5700K	200 x 200mm	No	Continuous or strobe	PDF
OPT2437	$;;005[25:			300 x 300mm			PDF

WenglorTPL Vision Infrared Illumination Flat Dome Light Selection Guide

Part Number	Price	Color of Light Emmission	Wavelength	Area of Light	Overdrive	Mode of Operation	Drawings
OPT2436	$;;005[24:	Infared	850nm	200 x 200 mm	No	Continuous or Strobe	PDF
OPT2438	$;;005[26:			300x300 mm			PDF

Part Number	Price	Description	Material	QTY in Package	Drawings
OPT2433	$;5[21:	Mounting Bracket	Aluminium	4	PDF

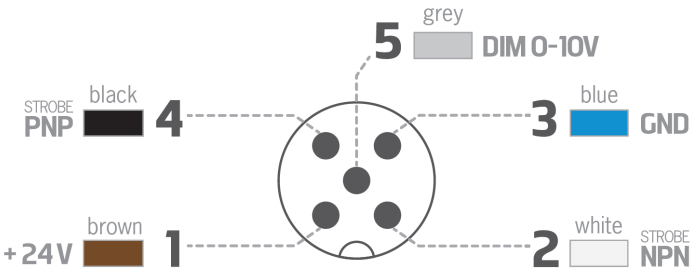
OPT2433

WenglorTPL Vision Lighting Flat Dome Light

wenglor TPL

Flat Dome Light General Specifications	
Electronics	
Power Supply	24VDC ±10%
Functioning Mode	Continuous or strobe
Strobe Input	PNP: From 5 to 24V for 100% ON. From 0 to 1V for 100% OFF NPN: Less than 1V for 100% ON. Above 2V for 100% OFF. Max 20V
Overdrive	No
Strobe Conditions (ON time, duty cycle)	No restriction
Dimming	Pin 5 (M12 5-pole connector): 0-10 V = 100-30% respectively
Maximum Rising Time	15us
Maximum Falling Time	10us
Control	Conector M12 5 poles
Consumption	White: 21.6 W (OPT2435), 48.6 W (OPT2437) Infrared: 27.5 W (OPT2436), 61.9 W (OPT2438)
Minimum Functioning Voltage	20V at the light input
Normal Functioning Voltage	24V at the light output (±10%)
Maximum Functioning Voltage	30V at the light input
Maximum Consumption Strobe Signal On Largest Product (400x400 mm)	250mA
Maximum Consumption Dimming Signal On Largest Product (400x400 mm)	150mA
Optics	
Color	White (5700k) Infrared (850nm)
Mechanics	
Thickness	45mm
Internal Diameter	65mm
Weight	23.8 kg/m² ±15%
Materials	Aluminum and loaded ABS
Diffuser	White PMMA
Mounting	4 M4 nuts (supplied) to insert in the groove or 4 M4x20 screws (not supplied) applied to the corner slots
Environment	
Operating Temperature	-10°C to 40°C / 80% humidity without condensation No thermal shock (maximum temperature variation 10°C in 24 hours)
Storage Temperature	-20°C to 60°C / 80% humidity without condensation No thermal shock (maximum temperature variation 10°C in 24 hours)
IP Protection	IP40

Connections



Strobe PNP	
1	+24V
2	Not connected
3	Ground
4	PNP
5	Dim 0-10 V

Strobe NPN	
1	+24V
2	NPN
3	Ground
4	Not connected
5	Dim 0-10 V

Continuous Mode		
1	+24V	+24V
2	Not connected	Ground
3	Ground	OR Ground
4	+24V	Not connected
5	Dim 0-10 V	Dim 0-10 V

Swivellink Mounting System Standard Series (Imperial/English Units)

Swivellink Mounts are a better way to mount vision cameras, lights, and sensors. Because of the flexibility and range of Swivellink's patented design, you can fine-tune each installation to just about any position required. Components are made from aluminum alloy for light weight and structural rigidity. Both Metric and Imperial/English versions are available; however, they are not interchangeable.

This page describes Swivellink's AFSB components, which are blue in color and are in Imperial/English units.

Consider the following when selecting your components:

- Amount of weight the mount will be holding
- The overall length of the mount
- The area you have to work with

Carrying capacity varies with overall length and system configuration. The Standard Series can hold up 30lb [13.6 kg] at 1ft [0.3 m] with all screws torqued to 50 in•lb [5.65 N•m].

AFSB-1-15

Swivellink Bases (Imperial/English) Selection Guide*

Part Number	Price	Description	Weight (oz [g])	Drawing
AFSB-1	$;;5]y!:	Round ball base	5.28 [149.7]	PDF
AFSB-1-15	$;5]y?:	Narrow ball base	5.28 [149.7]	PDF

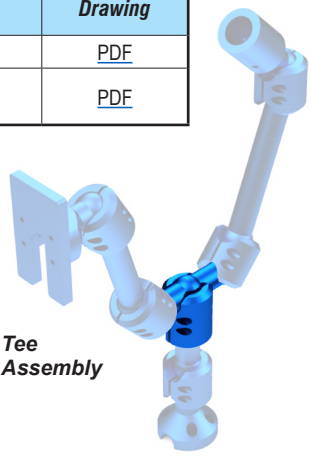
* These bases fit SureFrame 10 and 15 Series T-slotted rail.

AFSB-1

AFSB-2

Swivellink Knuckle (Imperial/English) Selection Guide

Part Number	Price	Description	Weight (oz [g])	Drawing
AFSB-2	$;;5]y,:	Knuckle	5.49 [155.6]	PDF
AFSB-2-2XS	$;64fd:	Standard to XS Series coupler	1.95 [55.3]	PDF



Tee Assembly

Swivellink Tee (Imperial/English) Selection Guide

Part Number	Price	Description	Length (in [mm])	Weight (oz [g])	Drawing
AFSB-3T	$;5]z1:	Tee link	4 [101.6]	2.19 [62.1]	PDF
AFSB-290	$;5]z0:	Tee knuckle	NA	5.15 [146.1]	PDF

AFSB-3-2

Swivellink Links (Imperial/English) Selection Guide

Part Number	Price	Description	Length (in [mm])	Weight (oz [g])	Drawing
AFSB-3-2	$;5]z2:	Ball link	2 [50.8]	1.47 [41.7]	PDF
AFSB-3-4	$;5]z3:		4 [101.6]	2.05 [58.1]	PDF
AFSB-3-6	$;5]z4:		6 [152.4]	2.62 [74.4]	PDF
AFSB-3-8	$;5]z5:		8 [203.2]	3.20 [90.7]	PDF
AFSB-3-12	$;5]z6:		12 [304.8]	3.78 [107.0]	PDF

Swivellink Handle Kit (Imperial/English) Selection Guide

Part Number	Price	Description	Weight (oz [g])	Drawing
AFSB-CLAMP-HANDLE	$;5]zg:	Clamp handle kit	1.44 [40.8]	PDF

AFSB-CLAMP-HANDLE

Swivellink Mounting System Standard Series (Metric Units)

Swivellink® INTELLIGENTLY DESIGNED

Swivellink Mounts are a better way to mount vision cameras, lights, and sensors. Because of the flexibility and range of Swivellink's patented design, you can fine-tune each installation to just about any position required. Components are made from aluminum alloy for light weight and structural rigidity. Both Metric and Imperial/English versions are available; however, they are not interchangeable.

This page describes Swivellink's SLM components, which are gray in color and are in Metric units.

Consider the following when selecting your components:

- Amount of weight the mount will be holding
- The overall length of the mount
- The area you have to work with

Carrying capacity varies with overall length and system configuration. The Standard Series can hold up 13.6 kg [30lb] at 0.3 m [1ft] with all screws torqued to 5.65 N•m [50 in•lb].

SLM-1-40

Swivellink Bases (Metric) Selection Guide*

Part Number	Price	Description	Weight (g [oz])	Drawing
SLM-1	$;5]zh:	Round ball base	149.7 [5.28]	PDF
SLM-1-40	$;5]#5:	Narrow ball base	149.7 [5.28]	PDF

* These bases fit SureFrame 40 Series and 45 Series T-slotted rail.

SLM-1

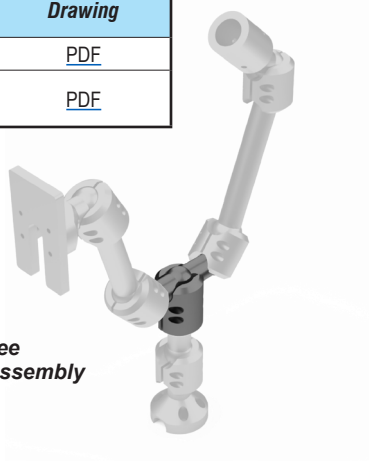
SLM-2

Swivellink Knuckle (Metric) Selection Guide

Part Number	Price	Description	Weight (g [oz])	Drawing
SLM-2	$;-5]zi:	Knuckle	155.6 [5.49]	PDF
SLM-2-2XS	$;;64ft:	Standard to XS Series coupler	55.3 [1.95]	PDF

Swivellink Tee (Metric) Selection Guide

Part Number	Price	Description	Length (mm [in])	Weight (g [oz])	Drawing
SLM-3T	$;5]zk:	Tee link	100 [3.94]	62.1 [2.19]	PDF
SLM-290	$;-5]zj:	Tee knuckle	NA	146.1 [5.15]	PDF



Tee Assembly

SLM-3-50

Swivellink Links (Metric) Selection Guide

Part Number	Price	Description	Length (mm [in])	Weight (g [oz])	Drawing
SLM-3-50	$;-5]zl:	Ball link	50 [1.97]	41.7 [1.47]	PDF
SLM-3-100	$;5]zn:		100 [3.94]	58.1 [2.05]	PDF
SLM-3-150	$;5]zo:		150 [5.91]	74.4 [2.62]	PDF
SLM-3-200	$;5]zp:		200 [7.87]	90.7 [3.20]	PDF
SLM-3-300	$;5]zq:		300 [11.81]	107.0 [3.78]	PDF

Swivellink Handle Kit (Metric) Selection Guide

Part Number	Price	Description	Weight (g [oz])	Drawing
SLM-CLAMP-HANDLE	$;5]z_:	Clamp handle kit	40.8 [1.44]	PDF

SLM-CLAMP-HANDLE

Swivellink Mounting System Standard Series Accessories

Blank Mounting Plates

AFSB-6

SLM-6

The AFSB-6 (Imperial/English) and SLM-6 (metric) mounting plates allow users to customize mounting holes for their specific application.

Swivellink Generic Mounting Accessories Blank Mounting Plate Selection Guide

Part Number	Price	Description	Fits To	Weight (oz [g])	Drawing
AFSB-6	$;5]z8:	Blank mounting plate	AFSB-1 and AFSB-1-15	6.11 [173.3]	PDF
SLM-6	$;:5]zt:		SLM-1 and SLM-1-40	6.11 [173.3]	PDF

Barrel Sensor Mounts

The barrel sensor mount accessories allow use with standard threaded barrel sensors of 18mm and 30mm diameter.

Swivellink Generic Mounting Accessories Knuckle Selection Guide

Part Number	Price	Description	For Use With	Weight (oz [g])	Drawing
AFSB-7	$;5]ze:	Mounting for 30mm barrel sensor	AFSB-2 and AFSB-290	5.84 [165.6]	PDF
AFSB-8	$;:5]zf:	Mounting for 18mm barrel sensor	AFSB-2 and AFSB-290	5.26 [149.2]	PDF
SLM-7	$;:5]z]:	Mounting for 30mm barrel sensor	SLM-2 and SLM-290	5.84 [165.6]	PDF
SLM-8	$;:5]z[:	Mounting for 18mm barrel sensor	SLM-2 and SLM-290	5.26 [149.2]	PDF

AFSB-7

AFSB-8

SLM-7

SLM-8

Swivellink Mounting System Standard Series Mounting Plates

Mounting Plates for Cognex, Dalsa and Keyence

AFSB-5

SLM-5

Swivellink Versatile Mounting Plates Selection Guide					
Part Number	***Price***	***Type***	***Fits to***	***Weight (oz [g])***	***Drawing***
AFSB-5	$;5]z7:	Versatile mounting plate	AFSB-1 and AFSB-1-15	5.38 [152.4]	PDF
SLM-5	$;5]zs:		SLM-1 and SLM-1-40	5.38 [152.4]	PDF

AFSB-5 and SLM-5 Versatile Mounting Plates Device Compatibility	
Brand	***Mounting Plate/Adapter***
Cognex	Dataman 70 Mounting Plate
Cognex	Dataman 100 Mounting Plate
Cognex	Dataman 200 Mounting Plate
Cognex	Dataman 260 Mounting Plate
Cognex	Dataman 280 Mounting Plate
Cognex	Insight 5000 Series Mounting Plate
Cognex	Insight 9902L Series Mounting Plate
Cognex	Insight 9912 Series Mounting Plate
Dalsa	Boa Vision Mounting Plate
Keyence	IV-150 Vision Mounting Plate
Keyence	IV-2000 Vision Mounting Plate
Keyence	IV-500 Vision Mounting Plate

Note: Device compatibility was verified at time of launch.

Mounting Plates for Cognex

Swivellink Mounting Plates Selection Guide					
Part Number	***Price***	***Type***	***Fits to***	***Weight (oz [g])***	***Drawing***
AFSB-521-C-DI	$;5]z9:	Mounting plate	AFSB-1 and AFSB-1-15	5.30 [150.1]	PDF
SLM-521-C-DI	$;5]zu:		SLM-1 and SLM-1-40	5.30 [150.1]	PDF

AFSB-521-C-DI and SLM-521-C-DI Mounting Plates Device Compatibility	
Brand	***Mounting Plate/Adapter***
Cognex	Dataman 300 Mounting Plate
Cognex	Insight 7000 Series Mounting Plate

Note: Device compatibility was verified at time of launch.

AFSB-521-C-DI

SLM-521-C-DI

Swivellink Mounting System Standard Series Mounting Plates

Mounting Plates for WenglorTPL and Keyence

AFSB-550-K-CVIV

SLM-550-K-CVIV

Swivellink Mounting Plates Selection Guide					
Part Number	*Price*	*Type*	*Fits to*	*Weight (oz [g])*	*Drawing*
AFSB-550-K-CVIV	$;5]zb:	Mounting plate	AFSB-1 and AFSB-1-15	6.37 [180.5]	PDF
SLM-550-K-CVIV	$;5]zx:		SLM-1 and SLM-1-40	6.37 [180.5]	PDF

AFSB-550-K-CVIV and SLM-550-K-CVIV Mounting Plates Device Compatibility	
Brand	*Mounting Plate/Adapter*
WenglorTPL	OPT2400 through OPT2407
Keyence	IV-150 Vision Mounting Plate
Keyence	IV-2000 Vision Mounting Plate
Keyence	IV-500 Vision Mounting Plate
Keyence	IV-H2000MA Series Mounting Plate
Keyence	IV-H500CA Vision Mounting Plate
Keyence	IV-H500MA Vision Mounting Plate

Note: Device compatibility was verified at time of launch.

Mounting Plates for Smart Vision Lights (Brick Lights)

Swivellink Mounting Plates Selection Guide					
Part Number	*Price*	*Type*	*Fits to*	*Weight (oz [g])*	*Drawing*
AFSB-620-S75	$;5]zc:	Mounting plate	AFSB-1 and AFSB-1-15	8.5 [240.9]	PDF
SLM-620-S75	$;5]zy:		SLM-1 and SLM-1-40	8.5 [240.9]	PDF

AFSB-620-S75 and SLM-620-S75 Mounting Plates Device Compatibility	
Brand	*Mounting Plate/Adapter*
Smart Vision Lights	ODS75 Brick Light Mounting Plate
Smart Vision Lights	ODSB75 Brick Light Mounting Plate
Smart Vision Lights	ODSW75 Brick Light Mounting Plate
Smart Vision Lights	S75 Brick Light Mounting Plate
Smart Vision Lights	SB75 Brick Light Mounting Plate
Smart Vision Lights	SC75 Brick Light Mounting Plate
Smart Vision Lights	SW75 Brick Light Mounting Plate

Note: Device compatibility was verified at time of launch.

AFSB-620-S75

SLM-620-S75

Swivellink Mounting System Standard Series Mounting Plates

Mounting Plates for Smart Vision Lights (Bar Lights)

AFSB-621-L300

SLM-621-L300

Swivellink Mounting Plates Selection Guide

Part Number	Price	Type	Fits to	Weight (oz [g])	Drawing
AFSB-621-L300	$;5]zd:	Mounting plate	AFSB-1 and AFSB-1-15	14.86 [421.4]	PDF
SLM-621-L300	$;5]zz:	Mounting plate	SLM-1 and SLM-1-40	14.86 [421.4]	PDF

AFSB-621-L300 and SLM-621-L300 Mounting Plates Device Compatibility

Brand	Mounting Plate/Adapter
Smart Vision Lights	L300 Bar Light Mounting Plate
Smart Vision Lights	LB300 Bar Light Mounting Plate
Smart Vision Lights	LC300 Bar Light Mounting Plate

Note: Device compatibility was verified at time of launch.

Mounting Plates for Cognex Insight

Swivellink Mounting Plates Selection Guide

Part Number	Price	Type	Fits to	Weight (oz [g])	Drawing
AFSB-523-C-I2000	$;5]za:	Mounting plate	AFSB-1 and AFSB-1-15	3.57 [101.2]	PDF
SLM-523-C-I2000	$;5]zv:		SLM-1 and SLM-1-40	3.57 [101.2]	PDF

AFSB-523-C-I2000 and SLM-523-C-I2000 Mounting Plates Device Compatibility

Brand	Mounting Plate/Adapter
Cognex	Insight 2000 Series Mounting Plate
Cognex	Insight 8000 Series Mounting Plate

Note: Device compatibility was verified at time of launch.

AFSB-523-C-I2000

SLM-523-C-I2000

Swivellink Mounting System Standard Series Mounting Plates

Mounting Plates for Banner, Dalsa, IFM and Wenglor

SLM-540-IFM

Swivellink Mounting Plates Selection Guide					
Part Number	*Price*	*Type*	*Fits to*	*Weight (oz [g])*	*Drawing*
SLM-540-IFM	$;64f_:	Mounting plate	SLM-1 and SLM-1-40	5.38 [152.4]	PDF

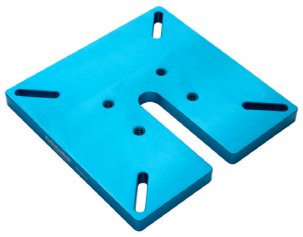
AFSB-621-L300 and SLM-621-L300 Mounting Plates Device Compatibility	
Brand	*Mounting Plate/Adapter*
IFM	01D Barcode Reader
IFM	02D Vision Camera
IFM	03D 3-Dimensional Camera
Banner	Q5X Mounting Plate
Dalsa	Boa 2 Vision Mounting Plate
Wenglor	Weqube Vision Camera

Note: Device compatibility was verified at time of launch.

Mounting Plates for VESA

Swivellink Mounting Plates Selection Guide					
Part Number	*Price*	*Type*	*Fits to*	*Weight (oz [g])*	*Drawing*
AFSB-9	$;64fg:	VESA mounting plate	AFSB-1 and AFSB-1-15	11.86 [336.1]	PDF
SLM-9	$;64f#:		SLM-1 and SLM-1-40	11.86 [336.1]	PDF

Note: Carrying capacity varies with overall length and system configuration. The Standard Series can hold up 30lb [13.6 kg] at 1ft [0.3 m] with all screws torqued to 50 in•lb [5.65 N•m].



AFSB-9

SLM-9

Swivellink Mounting System Standard Series Mounting Plates

Clamp-On Base

AFSB-CB

SLM-CB

Swivellink Mounting Plates Selection Guide						
Part Number	*Price*	*Type*	*Fits to*	*Range of Grip*	*Weight (oz [g])*	*Drawing*
AFSB-CB	$;64fh:	Clamp-on base	AFSB-1 and AFSB-1-15	0.5 to 1.25 in [12.7 to 31.8 mm]	11.65 [330.2]	PDF
SLM-CB	$;;064f!:		SLM-1 and SLM-1-40	0.63 to 1.38 in [16 to 35 mm]	11.65 [330.2]	PDF

Swivellink Mounting System XS Series (Imperial/English Units)

Swivellink Mounts are a better way to mount vision cameras, lights, and sensors. Because of the flexibility and range of Swivellink's patented design, you can fine-tune each installation to just about any position required. Components are made from aluminum alloy for light weight and structural rigidity. Both Metric and Imperial/English versions are available; however, they are not interchangeable.

This page describes Swivellink's AFSB components, which are blue in color and are in Imperial/English units.

Consider the following when selecting your components:

- Amount of weight the mount will be holding
- The overall length of the mount
- The area you have to work with

Carrying capacity varies with overall length and system configuration. The XS Series can hold up 3lb [1.36 kg] at 1ft [0.3m] with all screws torqued to 50 in•lb [5.65 N•m].

AFSB-1XS

Swivellink Bases (Imperial/English) Selection Guide

Part Number	Price	Description	Weight (oz [g])	Drawing
AFSB-1XS	$;64fa:	Round ball base	0.67 [19.1]	PDF

Recommended Screw Sizes for Attaching to SureFrame (T-Slot Nuts Also Required)

Part Number	Qty	10 Series		15 Series		30 Series		40 Series		45 Series	
		Screw	Part Number	Screw	Part Number	Screw	Part Number	Screw	Part Number	Screw	Part Number
AFSB-1XS	2	Socket head socket cap screw 10-32, 1/2 in	162995	Button head socket cap screw 10-32, 5/8 in	161047	Socket head cap screw M5-0.8, 12mm	161091	Socket head cap screw M5-0.8, 16mm	Not available from ADC	Socket head cap screw M5-0.8, 16mm	Not available from ADC

AFSB-2XS

Swivellink Knuckle (Imperial/English) Selection Guide

Part Number	Price	Description	Weight (oz [g])	Drawing
AFSB-2XS	$;64fb:	Knuckle	1.46 [41.3]	PDF
AFSB-2-2XS	$;64fd:	Standard to XS Series coupler	1.95 [55.3]	

AFSB-3XST

Swivellink Tee (Imperial/English) Selection Guide

Part Number	Price	Description	Length (in [mm])	Weight (oz [g])	Drawing
AFSB-3XST	$;64fe:	Tee link	3 [76.2]	0.77 [21.8]	PDF
AFSB-2XS90	$;64fc:	Tee knuckle	NA	1.71 [48.5]	PDF

AFSB-2XS90

AFSB-3-2XS

Swivellink Links (Imperial/English) Selection Guide

Part Number	Price	Description	Length (in [mm])	Weight (oz [g])	Drawing
AFSB-3-2XS	$;64f5:	Ball link	2 [50.8]	0.54 [15.4]	PDF
AFSB-3-4XS	$;64f6:		4 [101.6]	0.83 [23.6]	PDF

Swivellink Handle Kit (Imperial/English) Selection Guide

Part Number	Price	Description	Weight (oz [g])	Drawing
AFSB-CLAMP-HANDLE	$;5]zg:	Clamp handle kit	1.44 [40.8]	PDF

AFSB-CLAMP-HANDLE

Swivellink Mounting System XS Series (Metric Units)

Swivellink® INTELLIGENTLY DESIGNED

Swivellink Mounts are a better way to mount vision cameras, lights, and sensors. Because of the flexibility and range of Swivellink's patented design, you can fine-tune each installation to just about any position required. Components are made from aluminum alloy for light weight and structural rigidity. Both Metric and Imperial/English versions are available; however, they are not interchangeable.

This page describes Swivellink's SLM components, which are gray in color and are in Metric units.

Consider the following when selecting your components:

- Amount of weight the mount will be holding
- The overall length of the mount
- The area you have to work with

Carrying capacity varies with overall length and system configuration. The Standard Series can hold up 1.36 kg [3lb] at 0.3 m [1ft] with all screws torqued to 5.65 N•m [50 in•lb].

SLM-1XS

Swivellink Bases (Metric) Selection Guide

Part Number	Price	Description	Weight (g [oz])	Drawing
SLM-1XS	$;64fp:	Round ball base	19.1 [0.67]	PDF

Recommended Screw Sizes for Attaching to SureFrame (T-Slot Nuts Also Required)

Part Number	Qty	10 Series		15 Series		30 Series		40 Series		45 Series	
		Screw	Part Number	Screw	Part Number	Screw	Part Number	Screw	Part Number	Screw	Part Number
SLM-1XS	2	Socket head socket cap screw 10-32, 1/2 in	162995	Button head socket cap screw 10-32, 5/8 in	161047	Socket head cap screw M5-0.8, 12mm	161091	Socket head cap screw M5-0.8, 16mm	Not available from ADC	Socket head cap screw M5-0.8, 16mm	Not available from ADC

SLM-2-2XS

Swivellink Knuckle (Metric) Selection Guide

Part Number	Price	Description	Weight (g [oz])	Drawing
SLM-2XS	$;64fq:	Knuckle	41.3 [1.46]	PDF
SLM-2-2XS	$;;64ft:	Standard to XS Series coupler	55.3 [1.95]	PDF

Swivellink Tee (Metric) Selection Guide

Part Number	Price	Description	Length (mm [in])	Weight (g [oz])	Drawing
SLM-3XST	$;64fu:	Tee link	100 [3.94]	21.8 [0.77]	PDF
SLM-2XS90	$;64fs:	Tee knuckle	NA	36.3 [1.28]	PDF

SLM-3XST

SLM-2XS90

SLM-3-50XS

Swivellink Links (Metric) Selection Guide

Part Number	Price	Description	Length (mm [in])	Weight (g [oz])	Drawing
SLM-3-50XS	$;64fv:	Ball link	50 [1.97]	15.4 [0.54]	PDF
SLM-3-100XS	$;64fx:		100 [3.94]	23.6 [0.83]	PDF

Swivellink Handle Kit (Metric) Selection Guide

Part Number	Price	Description	Weight (g [oz])	Drawing
SLM-CLAMP-HANDLE	$;5]z_:	Clamp handle kit	40.8 [1.44]	PDF

SLM-CLAMP-HANDLE

Swivellink Mounting System XS Series Accessories

Blank Mounting Plates

AFSB-6XS

SLM-6XS

The AFSB-6XS (Imperial/English) and SLM-6XS (metric) mounting plates allow users to customize mounting holes for their specific application.

Swivellink Generic Mounting Accessories
Blank Mounting Plate Selection Guide

Part Number	Price	Description	Fits To	Weight (oz [g])	Drawing
AFSB-6XS	$;64f8:	Blank mounting plate	AFSB-1XS	2.99 [84.8]	PDF
SLM-6XS	$;64fz:		SLM-1XS	2.99 [84.8]	PDF

Barrel Sensor Mounts

The barrel sensor mount accessories allow use with standard threaded barrel sensors of 18mm and 30mm diameter.

Swivellink Generic Mounting Accessories
Knuckle Selection Guide

Part Number	Price	Description	For Use With	Weight (oz [g])	Drawing
AFSB-7XS	$;64f9:	Mounting for 12mm barrel sensor	AFSB-2XS and AFSB-2-2XS	0.8 [22.7]	PDF
AFSB-8XS	$;;64ff:	Mounting for 8mm barrel sensor		0.94 [26.8]	PDF
SLM-7XS	$;;64f]:	Mounting for 12mm barrel sensor	SLM-2XSand SLM-2-2XS	0.8 [22.7]	PDF
SLM-8XS	$;;64f[:	Mounting for 8mm barrel sensor		0.94 [26.8]	PDF

AFSB-7XS

AFSB-8XS

SLM-7XS

SLM-8XS

Camera Stem Mounts

The camera stem mounts allow use with standard camera mounts. This link has a standard tripod mount (1/4 in - 20) screw on it.

Swivellink Generic Mounting Accessories
Camera Stem Mounts Selection Guide

Part Number	Price	Description	For Use With	Weight (oz [g])	Drawing
AFSB-5XS	$;64f7:	Camera stem mount	AFSB-2XS and AFSB-2-2XS	0.5 [14.1]	PDF
SLM-5XS	$;64fy:		SLM-2XS and SLM-2-2XS	0.5 [14.1]	PDF

AFSB-5XS

SLM-5XS

Swivellink Mounting System Mounting Plates

Sensor Brackets

Choose sensor bracket holder based on size (Standard vs XS) and series (AFSB vs SLM).
Then choose the sensor bracket based on the size of sensor barrel.

Swivellink Mounting Plates Selection Guide					
Part Number	***Price***	***Type***	***Fits to***	***Weight (oz [g])***	***Drawing***
Sensor Bracket Holders (Standard)					
AFSB-SBH	$;64fn:	Sensor bracket holder for standard series knuckles	Fits to Standard Series knuckle (ie AFSB-2)	2.51 [71.2]	PDF
AFSB-SBH-XS	$;64fo:	Sensor bracket holder for XS series knuckles	Fits to XS Series knuckle (ie AFSB-2XS)	0.8 [22.7]	PDF
Sensor Brackets (Standard)					
AFSB-SB-8	$;-64fi:	Sensor bracket 8mm	Fits to AFSB-SBH or AFSB-SBH-XS	1.63 [46.3]	PDF
AFSB-SB-12	$;-64fj:	Sensor bracket 12mm		1.57 [44.5]	PDF
AFSB-SB-18	$;64fk:	Sensor bracket 18mm		1.41 [39.9]	PDF
AFSB-SB-30	$;-64fl:	Sensor bracket 30mm		2.14 [60.8]	PDF

AFSB-SBH

AFSB-SB-12

SLM-SBH

SLM-SB-30

Swivellink Mounting Plates Selection Guide					
Part Number	***Price***	***Type***	***Fits to***	***Weight (oz [g])***	***Drawing***
Sensor Bracket Holders (Metric)					
SLM-SBH	$64g2:	Metric sensor bracket holder for standard series knuckles	Fits to Standard Series knuckle (ie SLM-2)	2.5 [70.8]	PDF
SLM-SBH-XS	$64g3:	Metric sensor bracket holder for XS series knuckles	Fits to XS Series knuckle (ie. SLM-2XS)	0.8 [22.7]	PDF
Sensor Brackets (Metric)					
SLM-SB-8	$;64f?:	Metric sensor bracket 8mm	Fits to SLM-SBH or SLM-SBH-XS	1.63 [46.3]	PDF
SLM-SB-12	$;;64f,:	Metric sensor bracket 12mm		1.57 [44.5]	PDF
SLM-SB-18	$64g0:	Metric sensor bracket 18mm		1.41 [39.9]	PDF
SLM-SB-30	$64g1:	Metric sensor bracket 30mm		2.14 [60.8]	PDF

Swivellink Mounting System Assemblies

Mounting System Assemblies

Mounting system assemblies come with 2 bases, 2 knuckles and a link.

Standard Mounting System Assemblies Selection Guide				
Part Number	*Price*	*Measurement Type*	*Length of Link*	*Drawing*
AFSB-1002	$064g4:	Imperial	2in	PDF
AFSB-1004	$064g5:		4in	PDF
AFSB-1006	$064g6:		6in	PDF
SLM-10050	$064g7:	Metric	50mm	PDF
SLM-100100	$064g8:		100mm	PDF

AFSB-1004

SLM-100100

AFSB-1004XS

SLM-100100XS

Extra Small Standard Mounting System Assemblies Selection Guide				
Part Number	*Price*	*Measurement Type*	*Length of Link*	*Drawing*
AFSB-1002XS	$064g9:	Imperial	2in	PDF
AFSB-1004XS	$064ga:		4in	PDF
SLM-10050XS	$064gb:	Metric	50mm	PDF
SLM-100100XS	$064gc:		100mm	PDF

Sensor Mounting Kit Assemblies

Sensor mounting kit assemblies come with 1 base, 1 knuckle, 1 sensor bracket holder, and 1 sensor bracket.

Sensor Mounting Kit Assemblies Selection Guide				
Part Number	*Price*	*Measurement Type*	*Length of Link*	*Drawing*
AFSB-SBKIT-8	$064gd:	Imperial	8mm	PDF
AFSB-SBKIT-12	$064ge:		12mm	PDF
AFSB-SBKIT-18	$;064gf:		18mm	PDF
AFSB-SBKIT-30	$064gg:		30mm	PDF
SLM-SBKIT-8	$064gh:	Metric	8m	PDF
SLM-SBKIT-12	$-064gi:		12mm	PDF
SLM-SBKIT-18	$-064gj:		18mm	PDF
SLM-SBKIT-30	$064gk:		30mm	PDF

AFSB-SBKIT-12

SLM-SBKIT-30

Swivellink Mounting System (Imperial/English Units)

Swivellink® INTELLIGENTLY DESIGNED

Swivellink Mounts are a better way to mount vision cameras, lights, and sensors. Because of the flexibility and range of Swivellink's patented design, you can fine-tune each installation to just about any position required. Components are made from aluminum alloy for light weight and structural rigidity. Both Metric and Imperial/English versions are available; however, they are not interchangeable.

This page describes Swivellink's AFSB components, which are blue in color and are in Imperial/English units.

Consider the following when selecting your components:

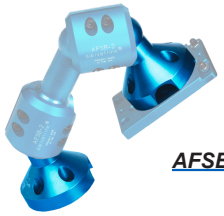
- Amount of weight the mount will be holding
- The overall length of the mount
- The area you have to work with

Carrying capacity varies with overall length and system configuration. The Standard series can hold up to 30lb [13.6 kg] at 1ft [0.3 m] with all screws torqued to 50 in•lb [5.65 N•m].

AFSB-1-15

Swivellink Bases (Imperial/English) Selection Guide

Part Number	Price	Description	Weight (oz [g])	Drawing
AFSB-1	$;;5]y!:	Round ball base	5.28 [149.7]	PDF
AFSB-1-15	$;5]y?:	Narrow ball base	5.28 [149.7]	PDF



AFSB-1

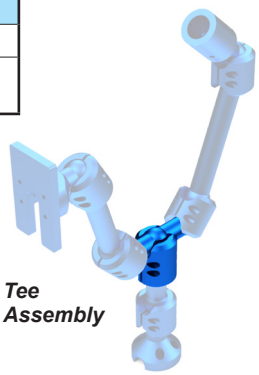
Recommended Screw Sizes for Attaching to SureFrame (T-Slot Nuts Also Required)

Part Number	Qty	10 Series		15 Series		30 Series		40 Series		45 Series	
		Screw	Part Number	Screw	Part Number	Screw	Part Number	Screw	Part Number	Screw	Part Number
AFSB-1	4	Socket head cap screw 1/4-20, 1/2 in	151040	Socket head cap screw 1/4-20, 5/8 in	161087	Socket head cap screw M6-1.0, 14mm	161094	Socket head cap screw M6-1.0, 16mm	161095	Socket head cap screw M6-1.0, 18mm	161096
AFSB-1-15	2										

AFSB-2

Swivellink Knuckle (Imperial/English) Selection Guide

Part Number	Price	Description	Weight (oz [g])	Drawing
AFSB-2	$;;5]y,:	Knuckle	5.49 [155.6]	PDF
AFSB-2-2XS	$;64fd:	Standard to XS Series coupler	1.95 [55.3]	PDF



Tee Assembly

Swivellink Tee (Imperial/English) Selection Guide

Part Number	Price	Description	Length (in [mm])	Weight (oz [g])	Drawing
AFSB-3T	$;5]z1:	Tee link	4 [101.6]	2.19 [62.1]	PDF
AFSB-290	$;5]z0:	Tee knuckle	NA	5.15 [146.1]	PDF

AFSB-3-2

Swivellink Links (Imperial/English) Selection Guide

Part Number	Price	Description	Length (in [mm])	Weight (oz [g])	Drawing
AFSB-3-2	$;5]z2:	Ball link	2 [50.8]	1.47 [41.7]	PDF
AFSB-3-4	$;5]z3:		4 [101.6]	2.05 [58.1]	PDF
AFSB-3-6	$;5]z4:		6 [152.4]	2.62 [74.4]	PDF
AFSB-3-8	$;5]z5:		8 [203.2]	3.20 [90.7]	PDF
AFSB-3-12	$;5]z6:		12 [304.8]	3.78 [107.0]	PDF

Swivellink Handle Kit (Imperial/English) Selection Guide

Part Number	Price	Description	Weight (oz [g])	Drawing
AFSB-CLAMP-HANDLE	$;5]zg:	Clamp handle kit	1.44 [40.8]	PDF

AFSB-CLAMP-HANDLE

Swivellink Mounting System Standard Series (Metric Units)

Swivellink® INTELLIGENTLY DESIGNED

Swivellink Mounts are a better way to mount vision cameras, lights, and sensors. Because of the flexibility and range of Swivellink's patented design, you can fine-tune each installation to just about any position required. Components are made from aluminum alloy for light weight and structural rigidity. Both Metric and Imperial/English versions are available; however, they are not interchangeable.

This page describes Swivellink's SLM components, which are gray in color and are in Metric units.

Consider the following when selecting your components:

- Amount of weight the mount will be holding
- The overall length of the mount
- The area you have to work with

Carrying capacity varies with overall length and system configuration. The Standard series can hold up to 30lb [13.6 kg] at 1ft [0.3 m] with all screws torqued to 50 in·lb [5.65 N·m].

SLM-1-40

Swivellink Bases (Metric) Selection Guide

Part Number	Price	Description	Weight (g [oz])	Drawing
SLM-1	$;5]zh:	Round ball base	149.7 [5.28]	PDF
SLM-1-40	$;5]#5:	Narrow ball base	149.7 [5.28]	PDF

SLM-1

Recommended Screw Sizes for Attaching to SureFrame (T-Slot Nuts Also Required)

Part Number	Qty	10 Series		15 Series		30 Series		40 Series		45 Series	
		Screw	Part Number	Screw	Part Number	Screw	Part Number	Screw	Part Number	Screw	Part Number
SLM-1	4	Button head socket cap screw 10-32, 5/8 in	161047	Button head socket cap screw 10-32, 3/4 in	161048	Socket head cap screw M6-1.0, 18mm	161096	Socket head cap screw M6-1.0, 20mm	161063	Socket head cap screw M6-1.0, 20mm	161063
SLM-1-40	2										

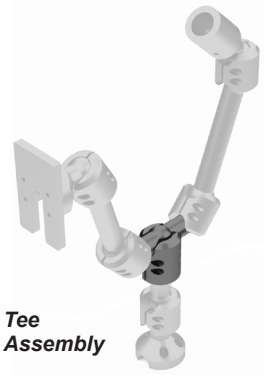
SLM-2

Swivellink Knuckle (Metric) Selection Guide

Part Number	Price	Description	Weight (g [oz])	Drawing
SLM-2	$;-5]zi:	Knuckle	155.6 [5.49]	PDF
SLM-2-2XS	$;;64ft:	Standard to XS Series coupler	55.3 [1.95]	PDF

Swivellink Tee (Metric) Selection Guide

Part Number	Price	Description	Length (mm [in])	Weight (g [oz])	Drawing
SLM-3T	$;5]zk:	Tee link	100 [3.94]	62.1 [2.19]	PDF
SLM-290	$;-5]zj:	Tee knuckle	NA	146.1 [5.15]	PDF



Tee Assembly

SLM-3-50

Swivellink Links (Metric) Selection Guide

Part Number	Price	Description	Length (mm [in])	Weight (g [oz])	Drawing
SLM-3-50	$;-5]zl:	Ball link	50 [1.97]	41.7 [1.47]	PDF
SLM-3-100	$;5]zn:		100 [3.94]	58.1 [2.05]	PDF
SLM-3-150	$;5]zo:		150 [5.91]	74.4 [2.62]	PDF
SLM-3-200	$;5]zp:		200 [7.87]	90.7 [3.20]	PDF
SLM-3-300	$;5]zq:		300 [11.81]	107.0 [3.78]	PDF

Swivellink Handle Kit (Metric) Selection Guide

Part Number	Price	Description	Weight (g [oz])	Drawing
SLM-CLAMP-HANDLE	$;5]z_:	Clamp handle kit	40.8 [1.44]	PDF

SLM-CLAMP-HANDLE

Swivellink Mounting System Standard Series Accessories

Blank Mounting Plates

AFSB-6

SLM-6

The AFSB-6 (Imperial/English) and SLM-6 (metric) mounting plates allow users to customize mounting holes for their specific application.

Swivellink Generic Mounting Accessories Blank Mounting Plate Selection Guide

Part Number	Price	Description	Fits To	Weight (g [oz])	Drawing
AFSB-6	$;5]z8:	Blank mounting plate	AFSB-1 and AFSB-1-15	6.11 [173.3]	PDF
SLM-6	$;:5]zt:	Blank mounting plate	SLM-1 and SLM-1-40	6.11 [173.3]	PDF

Barrel Sensor Mounts

The barrel sensor mount accessories allow use with standard threaded barrel sensors of 18mm and 30mm diameter.

Swivellink Generic Mounting Accessories Knuckle Selection Guide

Part Number	Price	Description	For Use With	Weight (oz [g])	Drawing
AFSB-7	$;5]ze:	Mounting for 30mm barrel sensor	AFSB-2 and AFSB-290	5.84 [165.6]	PDF
AFSB-8	$;:5]zf:	Mounting for 18mm barrel sensor	AFSB-2 and AFSB-290	5.26 [149.2]	PDF
SLM-7	$;:5]z]:	Mounting for 30mm barrel sensor	SLM-2 and SLM-290	5.84 [165.6]	PDF
SLM-8	$;:5]z[:	Mounting for 18mm barrel sensor	SLM-2 and SLM-290	5.26 [149.2]	PDF

AFSB-7

AFSB-8

SLM-7

SLM-8

Swivellink Mounting System Standard Series Mounting Plates

Mounting Plates for Cognex, Dalsa and Keyence

AFSB-5

SLM-5

Swivellink Versatile Mounting Plates Selection Guide

Part Number	*Price*	*Type*	*Fits to*	*Weight (oz [g])*	*Drawing*
AFSB-5	$;5]z7:	Versatile mounting plate	AFSB-1 and AFSB-1-15	5.38 [152.4]	PDF
SLM-5	$;5]zs:	Versatile mounting plate	SLM-1 and SLM-1-40	5.38 [152.4]	PDF

AFSB-5 and SLM-5 Versatile Mounting Plates Device Compatibility

Brand	*Mounting Plate/Adapter*
Cognex	Dataman 70 Mounting Plate
Cognex	Dataman 100 Mounting Plate
Cognex	Dataman 200 Mounting Plate
Cognex	Dataman 260 Mounting Plate
Cognex	Dataman 280 Mounting Plate
Cognex	Insight 5000 Series Mounting Plate
Cognex	Insight 9902L Series Mounting Plate
Cognex	Insight 9912 Series Mounting Plate
Dalsa	Boa Vision Mounting Plate
Keyence	IV-150 Vision Mounting Plate
Keyence	IV-2000 Vision Mounting Plate
Keyence	IV-500 Vision Mounting Plate

Note: Device compatibility was verified at time of launch.

Mounting Plates for Cognex

Swivellink Mounting Plates Selection Guide

Part Number	*Price*	*Type*	*Fits to*	*Weight (oz [g])*	*Drawing*
AFSB-521-C-DI	$;5]z9:	Mounting plate	AFSB-1 and AFSB-1-15	5.30 [150.1]	PDF
SLM-521-C-DI	$;5]zu:	Mounting plate	SLM-1 and SLM-1-40	5.30 [150.1]	PDF

AFSB-521-C-DI

AFSB-521-C-DI and SLM-521-C-DI Mounting Plates Device Compatibility

Brand	*Mounting Plate/Adapter*
Cognex	Dataman 300 Mounting Plate
Cognex	Insight 7000 Series Mounting Plate

Note: Device compatibility was verified at time of launch.

SLM-521-C-DI

Swivellink Mounting System Standard Series Mounting Plates

Mounting Plates for WenglorTPL and Keyence

AFSB-550-K-CVIV

SLM-550-K-CVIV

Swivellink Mounting Plates Selection Guide

Part Number	*Price*	*Type*	*Fits to*	*Weight (oz [g])*	*Drawing*
AFSB-550-K-CVIV	$;5]zb:	Mounting plate	AFSB-1 and AFSB-1-15	6.37 [180.5]	PDF
SLM-550-K-CVIV	$;5]zx:	Mounting plate	SLM-1 and SLM-1-40	6.37 [180.5]	PDF

AFSB-550-K-CVIV and SLM-550-K-CVIV Mounting Plates Device Compatibility

Brand	*Mounting Plate/Adapter*
WenglorTPL	OPT2400 through OPT2407
Keyence	IV-150 Vision Mounting Plate
Keyence	IV-2000 Vision Mounting Plate
Keyence	IV-500 Vision Mounting Plate
Keyence	IV-H2000MA Series Mounting Plate
Keyence	IV-H500CA Vision Mounting Plate
Keyence	IV-H500MA Vision Mounting Plate

Note: Device compatibility was verified at time of launch.

Mounting Plates for Smart Vision Lights (Brick Lights)

Swivellink Mounting Plates Selection Guide

Part Number	*Price*	*Type*	*Fits to*	*Weight (oz [g])*	*Drawing*
AFSB-620-S75	$;5]zc:	Mounting plate	AFSB-1 and AFSB-1-15	8.5 [240.9]	PDF
SLM-620-S75	$;5]zy:	Mounting plate	SLM-1 and SLM-1-40	8.5 [240.9]	PDF

AFSB-620-S75

AFSB-620-S75 and SLM-620-S75 Mounting Plates Device Compatibility

Brand	*Mounting Plate/Adapter*
Smart Vision Lights	ODS75 Brick Light Mounting Plate
Smart Vision Lights	ODSB75 Brick Light Mounting Plate
Smart Vision Lights	ODSW75 Brick Light Mounting Plate
Smart Vision Lights	S75 Brick Light Mounting Plate
Smart Vision Lights	SB75 Brick Light Mounting Plate
Smart Vision Lights	SC75 Brick Light Mounting Plate
Smart Vision Lights	SW75 Brick Light Mounting Plate

Note: Device compatibility was verified at time of launch.

SLM-620-S75

Swivellink Mounting System Standard Series Mounting Plates

Mounting Plates for Smart Vision Lights (Bar Lights)

AFSB-621-L300

SLM-621-L300

Swivellink Mounting Plates Selection Guide					
Part Number	*Price*	*Type*	*Fits to*	*Weight (oz [g])*	*Drawing*
AFSB-621-L300	$;5]zd:	Mounting plate	AFSB-1 and AFSB-1-15	14.86 [421.4]	PDF
SLM-621-L300	$;5]zz:	Mounting plate	SLM-1 and SLM-1-40	14.86 [421.4]	PDF

AFSB-621-L300 and SLM-621-L300 Mounting Plates Device Compatibility	
Brand	*Mounting Plate/Adapter*
Smart Vision Lights	L300 Bar Light Mounting Plate
Smart Vision Lights	LB300 Bar Light Mounting Plate
Smart Vision Lights	LC300 Bar Light Mounting Plate

Note: Device compatibility was verified at time of launch.

Mounting Plates for Cognex Insight

Swivellink Mounting Plates Selection Guide					
Part Number	*Price*	*Type*	*Fits to*	*Weight (oz [g])*	*Drawing*
AFSB-523-C-I2000	$;5]za:	Mounting plate	AFSB-1 and AFSB-1-15	3.57 [101.2]	PDF
SLM-523-C-I2000	$;5]zv:	Mounting plate	SLM-1 and SLM-1-40	3.57 [101.2]	PDF

AFSB-523-C-I2000 and SLM-523-C-I2000 Mounting Plates Device Compatibility	
Brand	*Mounting Plate/Adapter*
Cognex	Insight 2000 Series Mounting Plate
Cognex	Insight 8000 Series Mounting Plate

Note: Device compatibility was verified at time of launch.

AFSB-523-C-I2000

SLM-523-C-I2000

Contrinex Read-Write Modules IO-Link Capable RFID (13.56 MHz)

RFID

RFID (Radio Frequency IDentification) technology is useful in a wide range of automation and logistics applications.

This technology allows objects to be identified by means of electronic labels (also known as tags or transponders). Compared to more traditional approaches such as bar codes or laser marking, RFID technology offers a number of significant advantages. For example:

- A direct line of sight between the tag and the read/write module is not needed to read or write data.
- Information stored in the tag can be added, modified or replaced.
- Human error is reduced while increasing reliability, flexibility and traceability.

There are three standard frequencies of RFID:

- Low-Frequency (30 to 300 KHz – most are 125 to 134.2 Khz). Various application-specific standards apply
- High-Frequency (13.56 MHz) (ISO/IEC 15693)
- Ultra High-Frequency (860 to 960 MHz) (ISO/IEC 18000-63)

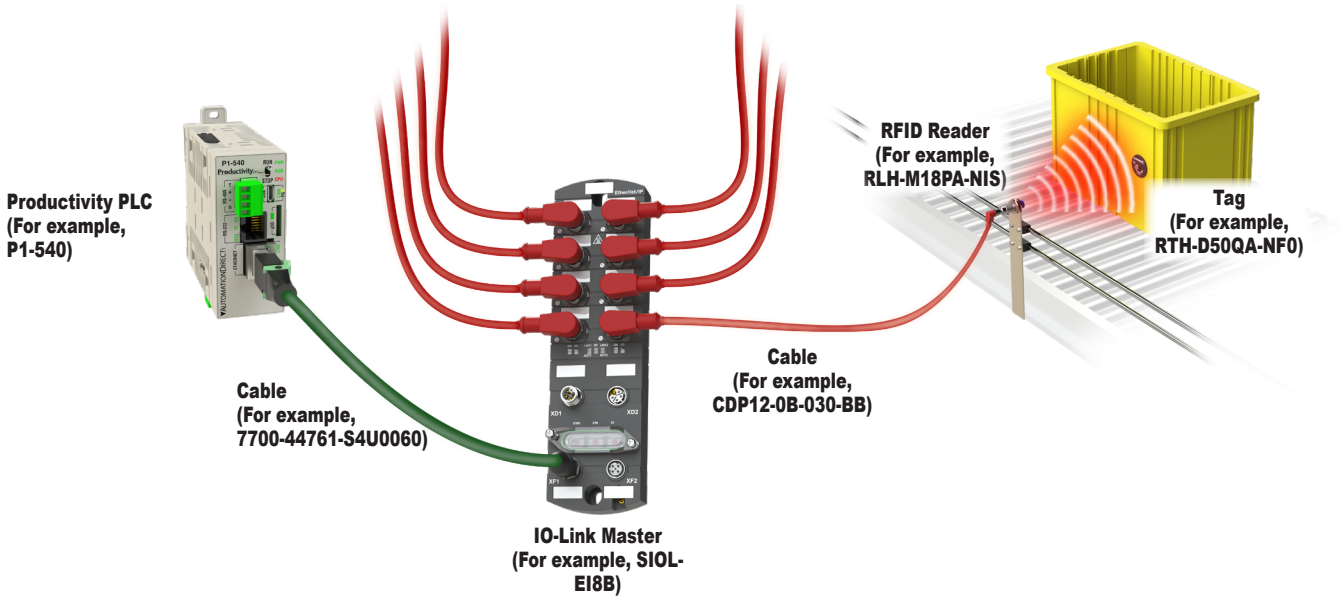
While there are pros and cons for each type of system, the High Frequency systems allow for fast communication between transponder and read/write modules. Contrinex IO-Link ready RFID technology operates on 13.56 MHz and complies with ISO/IEC 15693 and is therefore compatible with any components that meet this standard. The series has been designed for easy, cost-effective integration into existing control systems.

Simplicity of IO-Link

IO-Link is a standardized protocol (IEC 61131-9) that enables connection of intelligent devices, similar to the Contrinex RFID Read-Write Modules, to an automation system.

Communication takes place between an IO-Link master and one or more IO-Link devices. IO-Link is a point-to-point communication system and is not a fieldbus. A master module has one or more ports, and one device can be connected to each port.

The IO-Link master module serves as the interface between the IO-Link devices and the controller (PLC or Computer). The example below uses an IO-Link Master to communicate using EtherNet/IP.



Contrinex RHL Read/Write Units

Once the RLH unit is attached to the IO-Link master, the SIO functions of the device can be configured. Note that the SIO outputs will only be active if the IO-Link is not active. After the RLH unit is attached to the PLC using IO-Link, a lot more data will be available to the PLC.

- Read the identification of the Read-Write unit (for example: Manufacture, Firmware Version, Part Number, etc.)
- How long the RFID tag has been present
- Tag history
- Diagnostics
- Write to the tag
- Read the tag

And many more functions.

Contrinex Read-Write Modules IO-Link Capable RFID (13.56 MHz)

RLH-C44PA-NIS

RLH-M30PA-NIS

RLH-M18PA-NIS

Features

- IO-Link for greatly simplified RFID integration
- Available in M18 and M30 barrel sizes as well as 44mm cubic housing
- IO-Link compatible (V 1.1).
- IO-Link Class A device
- Simple I/O (SIO) mode available
- IP68/IP69K option available
- Complies with ISO/IEC 15693 (High Frequency) 13.56 MHz

Applications

- Track and trace
- Production automation
- Process control
- Automatic sorting systems
- Logistics and distribution
- Access control
- Machine tools
- Robotics
- Packaging System
- Automotive Industry
- Pharmaceutical

Agency Approvals

- CE, UL (E239373)

Simple I/O (SIO) Mode

If the Read/Write unit has a simple task, then the device may be able to be used in Simple I/O Mode.

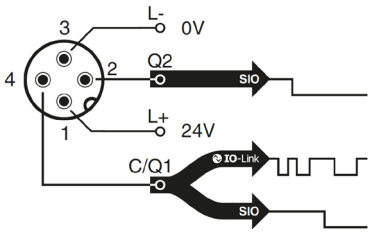
Out of the box, the read/write module is configured to simultaneously trigger both of its outputs upon tag detection. The two outputs can be individually reconfigured for data block comparison, tag IN-RANGE time over threshold, or tag is too far from reader (RSSI is below threshold) via an IO-Link master.

Full functionality is available when the module is used as an IO-Link device.

Contrinex HF RFID Read-Write Module Selection Guide

Part Number	Price	Housing Size	IP Rating	Weight (g [oz])	Drawing
RLH-C44PA-NIS	$;05hkt:	40 x 40 x 67 mm [1.57 x 1.57 x 2.64]	IP68/IP69K	105g [3.7 oz]	PDF
RLH-M30PA-NIS	$05hkv:	30mm [1.18 in] diameter 63.5 mm [2.5 in] length	IP67	87g [3.1 oz]	PDF
RLH-M18PA-NIS	$05hku:	18mm [0.71 in] diameter 63.5 mm [2.5 in] length	IP67	37g [1.3 oz]	PDF

Connection Diagram



Standard HF RFID Read-Write Module Specifications

	RLH-C44PA-NIS	RLH-M30PA-NIS	RLH-M18PA-NIS
Supply Voltage	11-32 VDC		
Maximum Current	≤ 50mA (with no load)		
Maximum Output Current	≤ 200mA (per output)		
Maximum Operating Temperature	-25° to 80°C [-13° to 176°F]		
Maximum Storage Temperature	-25° to 80°C [-13° to 176°F]		
Maximum Cable Length	20m [65.62 ft]		
Housing Material	PBTP (polybutylene terephthalate polymer)	Chrome-plated brass	Chrome-plated brass
Sensing Face Material	PBTP (polybutylene terephthalate polymer)		
Tightening Force	0.6 N•m [0.4 lb•ft] (on M12 connector)	70 N•m [51.6 lb•ft]	25 N•m [18.4 lb•ft]

Contrinex 13.56 MHz HF RFID Tags

Standard HF RFID Tags

RTH-D20QA-ND0

RTH-D30QA-ND0

RTH-D50QA-NF0

RFID tags (also known as transponders) are electronic devices that store data. Each tag has fixed memory which stores a unique preset number (i.e., an identifier) as well as user memory which can be written to for storing data. Writeable data may include, for example, the object's history or the parameters of operations to which it will be subjected.

EEPROM Tag Features

- Unlimited read cycles
- 100,000 write cycles
- 4 bytes per block
- Fully complies with ISO/IEC 15693 (High Frequency) 13.56 MHz

FRAM Tag Features

- Unlimited read cycles
- 10^{12} write cycles
- Larger amount of memory
- 8 bytes per block

Applications

- Track and trace
- Production automation
- Process control
- Automatic sorting systems
- Logistics and distribution
- Access control

Agency Approvals

- CE

CE

Standard HF RFID Tag Selection Guide

Part Number	Price	Pack Size	Diameter (mm [in])	Memory Type	User Memory Size	IP Rating	Component Material	Operating Temperature	Storage Temperature	Tightening Torque	Weight (g [oz])	Drawing
RTH-D09RA-NF0-901	$-5l0p:	10	9 [0.35]	EEPROM	316 bytes	IP67	Epoxy + PPS (Polyphenylene sulfide)	-20° to 85°C [-4° to 185°F]	-20° to 110°C [-4° to 230°F]	NA	0.25 g [0.01 oz]	PDF
RTH-D16RA-NF0-901	$-5l0q:	10	16 [0.63]	EEPROM	316 bytes	IP67					0.75 g [0.03 oz]	PDF
RTH-D20QA-NF0-901	$-5l0s:	10	20 [0.79]	EEPROM	316 bytes	IP68 IP69K	PPA (Polyphthalamide)	-25° to 80°C [-13° to 176°F]	-40° to 90°C [-40° to 194°F]	NA	1.3 g [0.05 oz]	PDF
RTH-D20QA-ND0	$5hko:	1	20 [0.79]	FRAM	2000 bytes	IP68 IP69K					1.3 g [0.05 oz]	PDF
RTH-D30QA-NF0-901	$;-5l0t:	10	30 [1.18]	EEPROM	316 bytes	IP68 IP69K				1 N•m [0.74 lb•ft]	3g [0.11 oz]	PDF
RTH-D30QA-ND0	$5hkq:	1	30 [1.18]	FRAM	2000 bytes	IP68 IP69K					3g [0.11 oz]	PDF
RTH-D50QA-NF0	$-5l0u:	1	50 [1.97]	EEPROM	316 bytes	IP68 IP69K					9.5 g [0.34 oz]	PDF
RTH-D50QA-ND0	$5hkz:	1	50 [1.97]	FRAM	2000 bytes	IP68 IP69K					9.5 g [0.34 oz]	PDF

High-Temperature HF RFID Tag

High-temperature RFID tags feature 100% silicone-free construction and thermal cycling reliability of 1000 hours (or 1000 cycles). Passive tags from the high-temperature family are ideal for use in paintshops and other high-temperature environments. Tags are insensitive to dirt, and their housings have an IP68 and IP69K enclosure rating. They are also fully ISO/IEC 15693-compliant. Tags are made from PPS (polyphenylene sulfide).

High-Temperature HF RFID Tag Selection Guide

Part Number	Price	Diameter (mm [in])	Memory Type	User Memory	IP Rating	Operating Temperature	Storage Temperature	Tightening Torque	Weight (g [oz])	Drawing
RTP-0263-020	$;5hk]:	26 [1.97]	EEPROM	160 bytes	IP68 IP69K	-25 to 180°C [-13 to 356°F]	-40 to 180°C [-40 to 356°F]	1 N•m [0.74 lb•ft]	3.3 g [0.12 oz]	PDF

RTP-0263-020

Contrinex 13.56 MHz HF RFID Tags

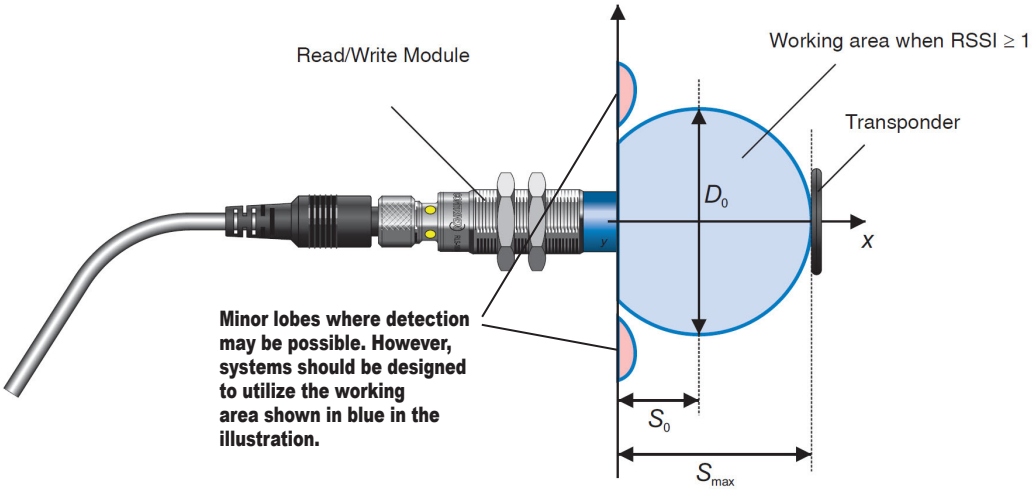
CONTRINEX

Working Distance Tables

Typical Working Distances When Using RLH-C44PA-NIS			
Tag (Transponder) Part Number	*S_{max} (mm [in])*	*S_0 (mm [in])*	*D_0 (mm [in])*
Ø 9 RTH-D09RA-NF0-901	24 [0.94]	9 [0.35]	32 [1.26]
Ø 16 RTH-D16RA-NF0-901	40 [1.57]	20 [0.79]	44 [1.73]
Ø 20 RTH-D20QA-NF0-901	40 [1.57]	18 [0.71]	44 [1.73]
Ø 20 RTH-D20QA-ND0	38 [1.50]	17 [0.67]	42 [1.65]
Ø 26 RTP-0263-020	38 [1.50]	17 [0.67]	44 [1.73]
Ø 30 RTH-D30QA-NF0-901	44 [1.73]	21 [0.83]	48 [1.89]
Ø 30 RTH-D30QA-ND0	46 [1.81]	23 [0.91]	52 [2.05]
Ø 50 RTH-D50QA-NF0	64 [2.52]	32 [1.26]	68 [2.68]
Ø 50 RTH-D50QA-ND0	58 [2.28]	26 [1.02]	66 [2.60]

Typical Working Distances When Using RLH-M30PA-NIS			
Tag (Transponder) Part Number	*S_{max} (mm [in])*	*S_0 (mm [in])*	*D_0 (mm [in])*
Ø 9 RTH-D09RA-NF0-901	17 [0.67]	5.5 [0.22]	24 [0.94]
Ø 16 RTH-D16RA-NF0-901	28 [1.10]	13 [0.51]	31 [1.22]
Ø 20 RTH-D20QA-NF0-901	26 [1.02]	12 [0.47]	30 [1.18]
Ø 20 RTH-D20QA-ND0	26 [1.02]	11.5 [0.45]	31 [1.22]
Ø 26 RTP-0263-020	33 [1.30]	15 [0.59]	36 [1.42]
Ø 30 RTH-D30QA-NF0-901	30 [1.18]	13 [0.51]	38 [1.50]
Ø 30 RTH-D30QA-ND0	34 [1.34]	15 [0.59]	38 [1.50]
Ø 50 RTH-D50QA-NF0	46 [1.81]	19 [0.75]	54 [2.13]
Ø 50 RTH-D50QA-ND0	44 [1.73]	18 [0.71]	54 [2.13]

Typical Working Distances When Using RLH-M18PA-NIS			
Tag (Transponder) Part Number	*S_{max} (mm [in])*	*S_0 (mm [in])*	*D_0 (mm [in])*
Ø 9 RTH-D09RA-NF0-901	11 [0.43]	3.5 [0.14]	15 [0.59]
Ø 16 RTH-D16RA-NF0-901	19 [0.75]	8.5 [0.33]	22 [0.87]
Ø 20 RTH-D20QA-NF0-901	18 [0.71]	8 [0.31]	21 [0.83]
Ø 20 RTH-D20QA-ND0	17 [0.67]	6 [0.24]	21 [0.83]
Ø 26 RTP-0263-020	15 [0.59]	4 [0.16]	21 [0.83]
Ø 30 RTH-D30QA-NF0-901	22 [0.87]	9 [0.35]	28 [1.10]
Ø 30 RTH-D30QA-ND0	19 [0.75]	5 [0.20]	28 [1.10]
Ø 50 RTH-D50QA-NF0	24 [0.94]	6 [0.24]	42 [1.65]
Ø 50 RTH-D50QA-ND0	20 [0.79]	0 [0]	44 [1.73]



AutomationDirect Standalone HF (13.56 MHz) RFID Read/Write Unit

RFID

RFID (Radio Frequency IDentification) technology is useful in a wide range of automation and logistics applications.

This technology allows objects to be identified by means of electronic labels (also known as tags or transponders). Compared to more traditional approaches such as bar codes or laser marking, RFID technology offers a number of significant advantages. For example:

- A direct line of sight between the tag and the read/write module is not needed to read or write data.
- Information stored in the tag can be added, modified or replaced.
- Human error is reduced while increasing reliability, flexibility and traceability.

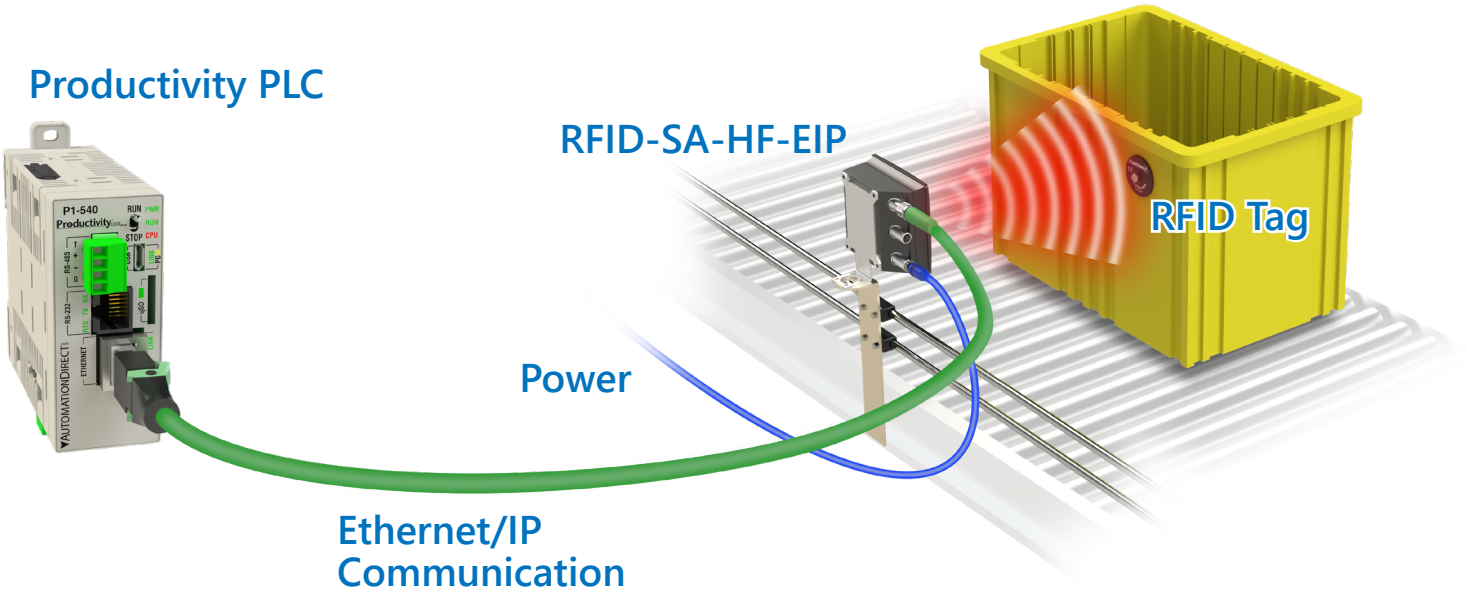
There are three standard frequencies for RFID:

- Low-Frequency (30 to 300 KHz – most are 125 to 134.2 Khz). Various application-specific standards apply
- High-Frequency (13.56 MHz) (ISO/IEC 15693)
- Ultra High-Frequency (international range 860 to 960 MHz, US range 902-928 MHz) (ISO/IEC 18000-63)

It is worth noting that NFC (Near Field Communication) also operates on the 13.56 MHz frequency. The NFC standard is detailed in ISO14443 and ISO18092. Some items that comply with NFC also comply with ISO15693. However, not all items that comply with 15693 also comply with NFC.

While there are pros and cons for each type of system, the High Frequency systems allow for fast communication between transponder and read/write modules. AutomationDirect RFID technology operates on 13.56 MHz and complies with ISO/IEC 15693 and is therefore compatible with any components that meet this standard. The series has been designed for easy, cost-effective integration into existing control systems.

RFID-SA-HF-EIP



AutomationDirect Standalone HF (13.56 MHz) RFID Read/Write Unit

RFID-SA-HF-EIP

Designed for simple integration into an existing network, the AutomationDirect Standalone HF Read/Write unit is optimized for high speed, high payload data transfer. The unit also contains an internal Ethernet switch for easy incorporation into a prewired network.

Features

- Compact standalone unit with antenna, evaluation unit and integrated communication fieldbus
- EtherNet/IP communications
- Two configurable digital I/O points
- Complies with ISO/IEC

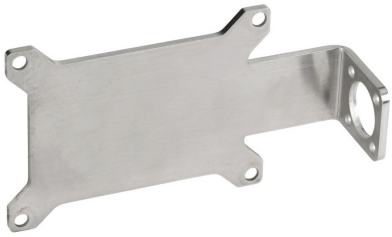
Applications

- Track and trace
- Production automation
- Process control
- Automatic sorting systems
- Logistics and distribution
- Access control
- Machine tools
- Robotics
- Packaging System
- Automotive Industry
- Pharmaceutical

AutomationDirect RFID Read/Write Unit Selection Guide

Part Number	Price	IP Rating	Communication Protocol	Drawing
RFID-SA-HF-EIP	$05yn#:	IP 67	Ethernet/IP	PDF

Mounting Bracket



RFID-SA-BA1

AutomationDirect RFID Unit Mounting Bracket Selection Guide

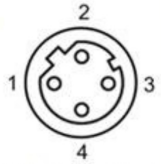
Part Number	Price	Material	Weight	Drawing
RFID-SA-BA1	$;5yn!:	304 stainless steel	0.37 lb [168g]	PDF

Electrical Connections

Connection (M12 D-Coded Ethernet)

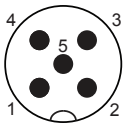
Pin	Signal
1	TxD+, transmit data +
2	RxD+, receive data +
3	TxD-, transmit data –
4	RxD-, receive data –

Note: Unit provides two M12 D-coded Ethernet connections.



M12 5-Pin Connections

Pin	Color	Signal
1	Brown	+24V
2	White	Digital Input/Output 2
3	Blue	0V
4	Black	Digital Input/Output 1
5	Gray	Not Used



AutomationDirect Standalone HF (13.56 MHz) RFID Read/Write Unit

AutomationDirect RFID Read/Write Unit General Specifications	
Electrical Data	
Operating Voltage	19.2 to 28.8 VDC
Current Consumption	500mA
Protection Class	III
Operating Frequency	13.56 MHz
RFID Standard	ISO 15693
Outputs	
Maximum Current Load Per Output	100mA
Monitoring Range	
Maximum Distance to ID Tag	220mm
Interfaces	
Communication Interface	Ethernet
Protocol	Ethernet/IP
Default Settings, Ethernet – TCP/IP	
Protocol	TCP/IP
Factory Settings	IP address: 192.168.0.79 Subnet mask: 255.255.255.0 Gateway IP address: 192.168.0.100
Usage Type	Parameter setting: Data transmission
Operating Conditions	
Ambient Temperature	-20 to 60°C [-4 to 140°F]
Storage Temperature	-25 to 80°C [-13 to 176°F]
Protection	IP 67
Tests/Approvals	
EMC	EN 301489-3
Shock Resistance	IEC 60028-2-27 50g (11ms) / single shock
Vibration Resistance	EN 60068-2-6 2g (10 to 150 Hz)
Radio Approval	EN 300 330 V2.1.1
MTTF	130 years
Mechanical Data	
Weight	640.5 g [22.58 oz]
Material	PBT/PC, stainless steel, aluminum
Displays/Operating Elements	
Voltage Supply	1xLED, green
Signal Strength LED Display	4x LED, yellow
Ethernet Status (per Ethernet Port)	2x LED, green/yellow

Contrinex 13.56 MHz HF RFID Tags

Working Distance Tables

Typical Working Distances When Using RFID-SA-HF-EIP			
Tag (Transponder) Part Number	*S_{max} (mm [in])*	*S_0 (mm [in])*	*D_0 (mm [in])*
Ø 9 RTH-D09RA-NF0-901	Not recommended*		
Ø 16 RTH-D16RA-NF0-901	50 [1.97]	20 [0.79]	100 [3.94]
Ø 20 RTH-D20QA-NF0-901	80 [3.15]	30 [1.18]	130 [5.12]
Ø 20 RTH-D20QA-ND0	75 [2.95]	30 [1.18]	130 [5.12]
Ø 26 RTP-0263-020	90 [3.54]	40 [1.57]	135 [5.31]
Ø 30 RTH-D30QA-NF0-901	100 [3.94]	50 [1.97]	140 [5.51]
Ø 30 RTH-D30QA-ND0	95 [3.74]	50 [1.97]	140 [5.51]
Ø 50 RTH-D50QA-NF0	170 [6.69]	65 [2.56]	150 [5.91]
Ø 50 RTH-D50QA-ND0	165 [6.50]	65 [2.56]	150 [5.91]

* The size of this particular tag requires extremely short distances to work. For this reason this particular tag is not recommended for use with the RFID-SA-HF-EIP RFID unit.

Minor lobes where detection may be possible. However, systems should be designed to utilize the working area shown in blue in the illustration.