

Machine Vision Illumination



Machine Vision Illumination

Illumination is one of the most critical components of a machine vision system. The selection of the appropriate lighting component for a specific application is very important to ensure that a machine vision system performs its tasks consistently and reliably.

The main reason is that improper illumination results in loss of information which, in most cases, cannot be recovered via software. This is why the selection of quality lighting components is of primary importance: there is no software algorithm capable of revealing features that are not correctly illuminated.

The MStar LED lighting series offers a wide selection of lighting that is directly connected and controlled by HCvision system to obtain consistent target illumination and highlight desired features. This lineup spans from traditional machine vision lighting (available in white, red, and blue) to innovative, high performance lighting techniques. The high performance lighting unlocks inspections that were previously impossible or unreliable.

Since many parameters must be considered to make the most appropriate choice of lighting, we can help you to select the proper lights with our knowledge and experience in machine vision.





Steps for Lighting Selection

The lighting selection plays an important role in determining the performance of image processing-based inspection.

Three steps for selecting Lighting

1 Determine the type of lighting (specular reflection/diffuse reflection/transmitted light).

Confirm the characteristics of the inspection (flaw, shape, presence/absence, etc.).

Check if the surface is flat, curved, or uneven.

2 Determine the shape and size of the necessary light.

Check the dimensions of the target and installation conditions.

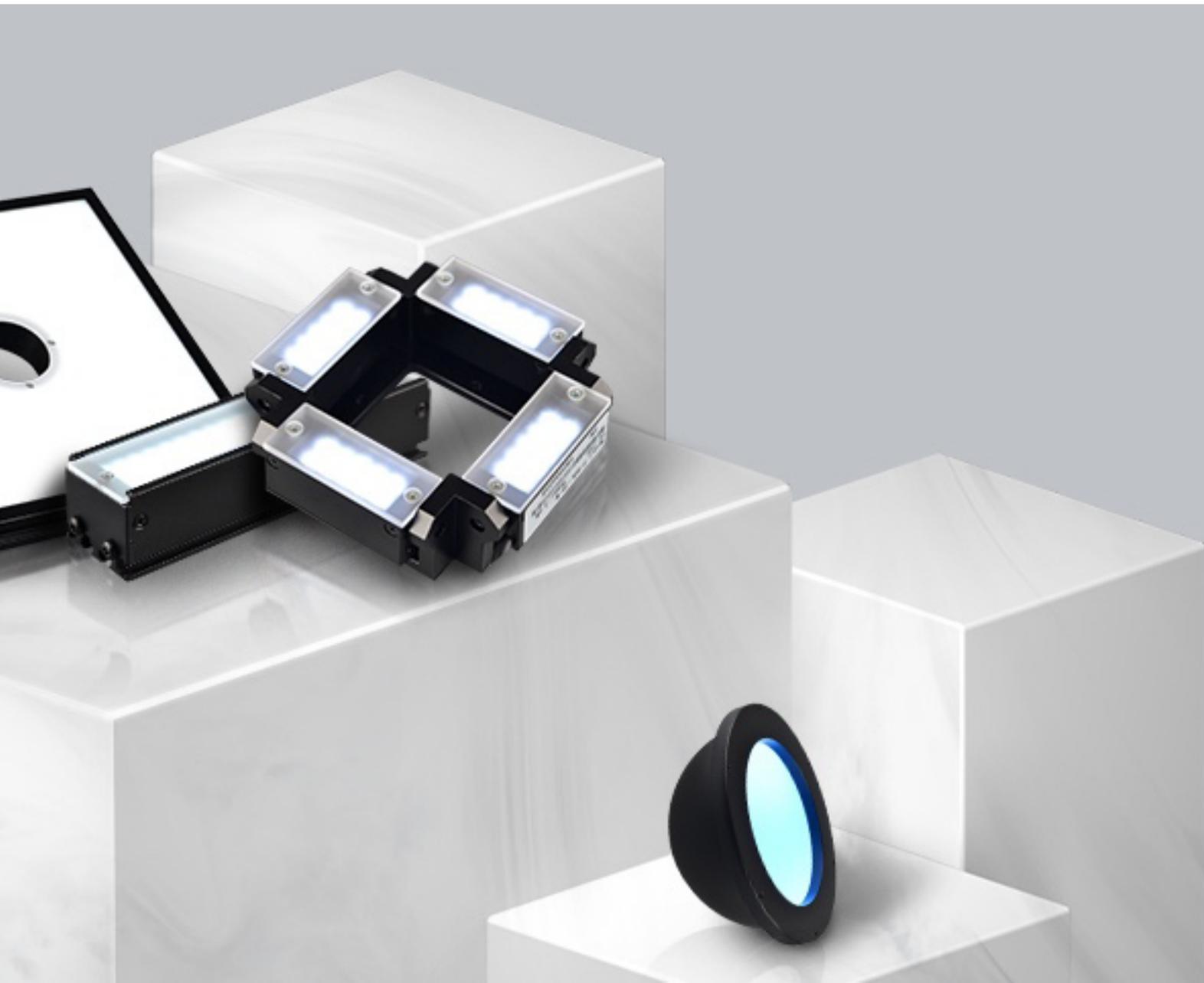
Examples: ring, low-angle, coaxial, dome.

3 Determine the color (wavelength) of lighting

Check the material and color of the target and background.

Examples: red, white, blue.

For every application, the main objectives of lighting selection are the following: 1. Maximizing the contrast of the features that must be inspected or measured; 2. Minimizing the contrast of the features of no interest; 3. Getting rid of unwanted variations caused by: a. Ambient light, b. Differences between items that are non-relevant to the inspection task.





LED Light Lineup



A00-A45 series
High angle ring lights P.06



A60-A90 series
Low angle ring lights P.08



HPD series
Ring shadowless lights P.10



WG series
Low angle ring shadowless diffused lights P.11



BH series
Flat ring shadowless diffused lights P.12



FM/FM2F series
Square shadowless diffused lights P.13



TX2/TX3/TXX2 series
Bar lights P.14



FTX series
Bar light units P.16



HBL series
High power bar lights P.17



VTX series
Diffused bar lights P.17



BGS series
Backlights P.18

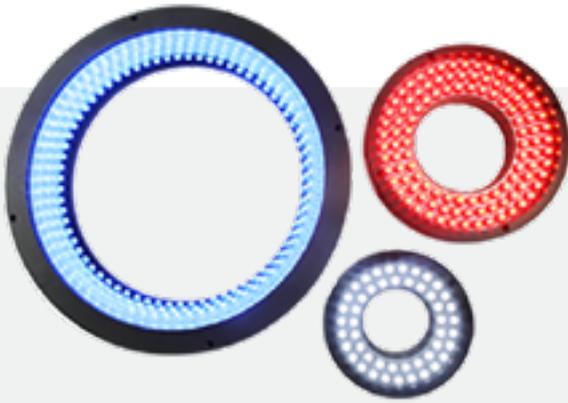


BGLSX series
Large size backlights P.19

	PXBG series Parallel backlights	P.20		XXLS/XLS series Small size line lights	P.29
	BGDS series Ultra-thin backlights	P.21		LS3 series Standard size line lights	P.30
	HD series Arc backlights	P.21		LS4 series Standard size line lights	P.32
	FK/YKBGXL series Backlights with center hole	P.22		LS4TZ series Coaxial line lights	P.34
	TZ series Coaxial Lights	P.24		IDTLS series Tunnel line light	P.35
	TZ-GL series High brightness coaxial lights	P.25		DG series Point lights	P.36
	TZ2A45 series 45° coaxial lights	P.25		IR series IR lights	P.37
	PXTZ series Parallel coaxial lights	P.26		UV series UV lights	P.38
	BWG series Dome Lights	P.27		Light controller lineup	P.39
	IDT series Tunnel shape dome lights	P.28			



High Angle Ring Lights A00-A45 Series



The required irradiance is ensured by radiating direct light towards the center of the workpiece.

Technical details

Color: Red, Green, Blue, White

24 DC Input Power

Continuous and Strobe Applications

Lighting Cable 2000mm

Product Features

- LED high density arrangement and high brightness
- Color combination of multiple angles, highlighting the three-dimensional information of the detected object
- Compact structure, saving installation space
- Diffuser is available to increase the uniformity of illumination

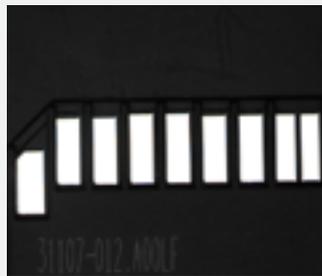
Applications

- Lead frame inspection
- Electronic component appearance inspection
- QFP/SOP lead curve inspection
- Transparency film dirt inspection
- Various types of silhouette observation

Sample Images



Imaging for characters printed on water bottle cap



Imaging for characters printed on water bottle cap



Imaging for characters printed on water bottle cap

Optional Accessory: Diffusion Plate

Used to create a relatively non-directional light. Reducing glare on specular surfaces.



Illumination Structure

Bend the flexible circuit board to any shape necessary and mount LEDs with high density. Illuminates so that direct light is concentrated in the center.



High Angle Ring Lights A00-A45 Series

Part number	Optical spec.	Electrical specifications			Dimensions	
	Emission angle (deg)	Supply Voltage (v)	Power cons. (w) Red:625nm ●	Power cons. (w) Green: 525nm ● Blue: 470nm ● White ○	Outer diam. (mm)	Inner diam. (mm)
HXA00D43R2X-24V	0°	24	1.44	2	43	15
HXA00D54R2X-24V	0°	24	1.8	2.1	54	23.5
HXA00D70R3X-24V	0°	24	3.2	4	70	30
HXA00D92R4X-24V	0°	24	6.5	7.5	92	40
HXA00D120R3X-24V	0°	24	5.4	6.8	120	76
HXA00D130R5X-24V	0°	24	8	10	130	62
HXA00D150R5X-24V	0°	24	9.8	12.3	150	86
HXA00D180R6X-24V	0°	24	9.8	12.24	180	110
HXA15D50R2X-24V	15°	24	1.8	2.4	50	26.6
HXA15D70R3X-24V	15°	24	3.2	4	70	32
HXA15D92R4X-24V	15°	24	4.7	6.72	92	40
HXA15D103R4X-24V	15°	24	5.5	6.92	103	56
HXA15D103R5X-24V	15°	24	6.5	8.1	103	48
HXA30D46R2X-24V	30°	24	1.44	1.8	46	20
HXA30D54R2X-24V	30°	24	2.16	2.5	54	23.5
HXA30D70R3X-24V	30°	24	3.4	4.3	70	36
HXA30D92R4X-24V	30°	24	5.6	6.9	92	48
HXA30D120R5X-24V	30°	24	10	11.5	120	60
HXA30D180R6X-24V	30°	24	16	19.9	180	120
HXA30D211R6X-24V	30°	24	25	29	211	145
HXA45D26R1X-24V	45°	24	0.35	0.55	26	10
HXA45D54R2X-24V	45°	24	2.16	2.3	54	23.5
HXA45D70R3X-24V	45°	24	3.6	4.3	70	35
HXA45D92R4X-24V	45°	24	5	6.3	92	52
HXA45D100R5X-24V	45°	24	6.2	7.8	100	52
HXA45D120R5X-24V	45°	24	9.6	10.8	120	72
HXA45D150R4X-24V	45°	24	10.8	13.2	150	98

Common Specifications

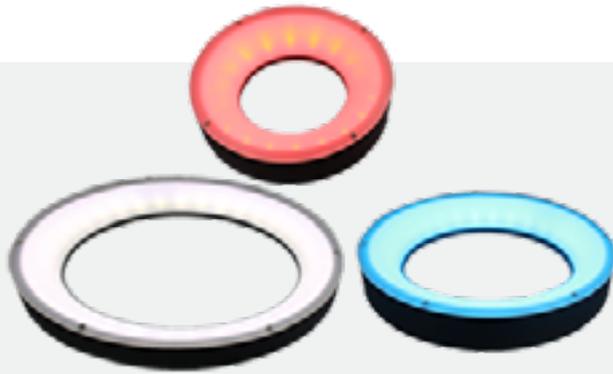
Input voltage	24 VDC
Connector	SMR-03V-B
Polarity	1: (+), 2: NC, 3: (-)
Cable length	2000 mm
Optional Accessory	Diffusion plate, Polarizing plate. DC extension cable: 1m/2m/3m
Operating environment (indoor)	Temperature: 0~40 °C Humidity:20% to 85% RH (with no condensation)
Life time	White:30,000hrs, Red: 60,000hrs (Depends on the operating environment, not a gurantee)
Case material	Aluminum alloy, Resin

Explanation of Model Code

HX	A00	D43	R2	X
Series	Angle*	O.D.	LED rows	Color (W/R/G/B)

* The emission angle refers to the angle between light and vertical plane.

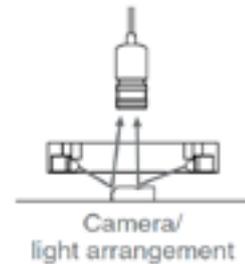
Low Angle Ring Lights A60-A90 Series



Providing direct light from a low angle to the center section allows for an image that emphasizes the workpiece's characteristic features.

Low angle light illumination techniques

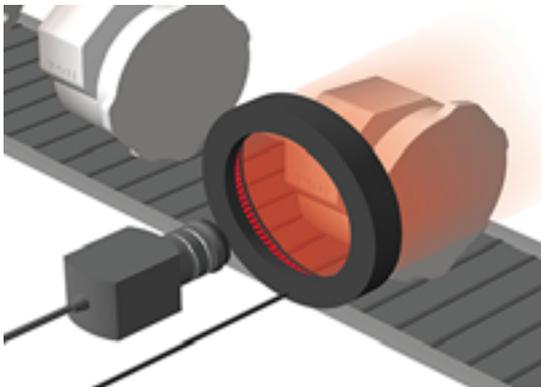
Low angle lighting provides direct light at a shallow angle onto the target. Typically inspection of the edge of a target or physical flaws on the surface are hard to detect with standard direct lighting. As the direction of the light is almost parallel to the surface any change in surface height deflects the normal path of light to the camera, subsequently highlighting the change.



Applications

Substrate and PCB positioning /Chip component inspection/LCD alignment/Plastic /container inspection/Label inspection/Mounter/IC marking inspection, etc.

Example: Imaging of engraved text on a metal block (stain finishing)



Description	Character recognition
Workpiece	Metal block
Conventional lighting	LED Dome Light
New lighting	HXA75D130R3R
Result	Extracts only the engraved text

Workpiece image



Metal block (stain finishing)

LED Dome Light



The whole thing is illuminated, making it difficult to emphasize only the characters.

HXA75D130R3R



Reduces effects from the stain finishing, making it possible to emphasize the characters.

Low Angle Ring Lights A60-A90 Series

Part number	Optical spec.	Electrical specifications			Dimensions	
	Emission angle (deg)	Supply Voltage (v)	Power cons. (w) Red:625nm ●	Power cons. (w) Green: 525nm ● Blue: 470nm ● White ○	Outer diam. (mm)	Inner diam. (mm)
HXA60D74R2X-24V	60°	24	2.7	3.4	74	41
HXA60D90R2X-24V	60°	24	3.04	3.8	90	57
HXA60D120R3X-24V	62°	24	8.64	9	120	80
HXA60D151R3X-24V	60°	24	8.99	10.3	151	114
HXA60D202R3X-24V	60°	24	12.4	15	202	167
HXA75D100R2X-24V	75°	24	4.5	5.7	100	72
HXA75D130R3X-24V	75°	24	6.8	8.6	130	94
HXA75D170R3X-24V	75°	24	8.9	11.2	170	136
HXA75D202R3X-24V	75°	24	12	14	202	167
HXA90D56R1X-24V	90°	24	1.08	1.2	56	24
HXA90D80R1X-24V	90°	24	1.44	1.8	80	50
HXA90D101R1X-24V	90°	24	2	2.5	101	70
HXA90D151R1X-24V	90°	24	3.24	5	151	121
HXA90D181R1X-24V	90°	24	9.2	11.5	181	157.6
HXA90D211R1X-24V	90°	24	5	6.2	211	187

Common Specifications

Input voltage	24 VDC
Connector	SMR-03V-B
Polarity	1: (+), 2: NC, 3: (-)
Cable length	2000 mm
Optional Accessory	Diffusion plate, Polarizing plate. DC extension cable: 1m/2m/3m
Operating environment (indoor)	Temperature: 0~40 C Humidity:20% to 85% RH (with no condensation)
Life time	White:30,000hrs, Red: 60,000hrs (Depends on the operating environment, not a gurantee)
Case material	Aluminum alloy, Resin

Explanation of Model Code

HX	A60	D151	R3	X
Series	Angle*	O.D.	LED rows	Color (W/R/G/B)

* The emission angle refers to the angle between light and vertical plane.

Optional Accessory: Diffusion Plate

Used to create a relatively non-directional light.
Reducing glare on specular surfaces.





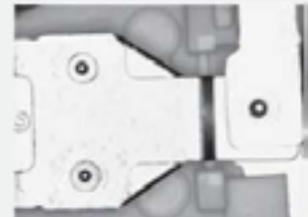
Ring Shadowless Lights HPD Series

- Optimal soft, uniform light for shiny surfaces
- Diffused, shadowless illumination preventing halation effect

Part number	Electrical specifications			Dimensions	
	Supply Voltage (v)	Power cons. (w) Red:625nm ●	Power cons. (w) Green: 525nm ● Blue: 470nm ● White ○	Outer diam. (mm)	Inner diam. (mm)
HPDD44R1X-24V	24	1.6	2.1	44	15
HPD70R1X-24V	24	2	3	75	42
HPDD110R2X-24V	24	4	6.7	114	68
HPDD130R3X-24V	24	6.8	8.6	130	86
HPDD150R4X-24V	24	9.6	13.6	150	96
HPDD170R3X-24V	24	24	30	176	111
HPDD240R1X-24V	24	36	36	245	158.8

Applications

- Low angle feature extraction
- High angle uniform irradiation
- Dirty detection of paper cups
- Appearance color and fingerprint identification
- ...



Explanation of Model Code

HPD	D44	R1	X
Series	O.D.	LED rows	Color (W/R/G/B)



Low angle ring shadowless diffused lights

WG Series

Light from the vertically-arranged LEDs is transmitted through the light-guiding diffusion plate and uniform diffused light is illuminated centrally on the workpiece from a low angle.



Part number	Optical spec.	Electrical specifications			Dimensions	
	Emission angle (deg)	Supply Voltage (v)	Power cons. (w) Red:625nm ●	Power cons. (w) Green: 525nm ● Blue: 470nm ● White ○	Outer diam. (mm)	Inner diam. (mm)
WGA45D51R2-24V	45°	24	2.88	3.6	50.8	8
WGA45D76R2-24V	45°	24	5	5.7	76.2	27
WGA45D102R2-24V	45°	24	8	10	100	45
WGA45D127R2-24V	45°	24	8	10	126.5	71
WGA60D51R2-24V	60°	24	4	4.8	50.8	18
WGA60D76R2-24V	60°	24	5	5.4	76.2	43
WGA60D102R2-24V	60°	24	4.5	5.7	100	68
WGA60D127R2-24V	60°	24	5.7	7.6	126.5	93

Applications

These Ring Lights can be used to highlight and image the characters and scratches uniformly in a dark field.

Example: Exterior imaging for metal parts

■ Workpiece image



Nut for bearings

■ LED Ring Light



It is difficult to evenly illuminate the slanted exterior.

■ WGA60D127R2R

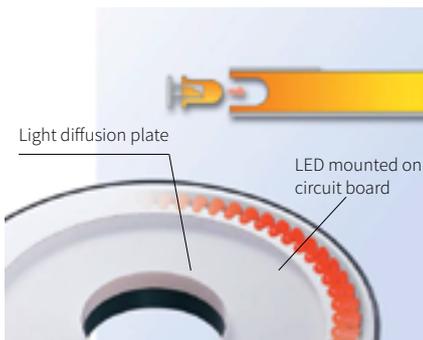


It is possible to evenly illuminate the slanted exterior.

Flat ring shadowless diffused lights

BH series

- LED side emitting, through the flat light guide materials to diffuse light, good uniformity
- Eliminate the glare and reflective light from LED, possess the shadowless effect.
- Light, compact construction is easy to install, can replace the coaxial lights.



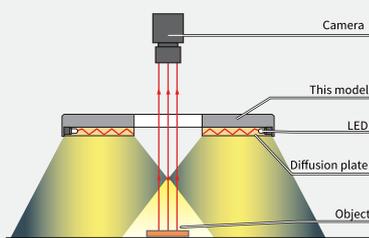
A unique light guiding method provides uniform diffused illumination and eliminates LED glare and shadows.

The LEDs are arranged in a straight line on a flexible circuit board, and then wrapped around the perimeter of a light diffusion plate. This channels the light directly from the LEDs into the light diffusion plate. In addition, a reflective film is applied to the surfaces of the light diffusion plate to refract and scatter the light in a complex way after it is introduced from the emitters. The light will spread evenly through the entire light diffusion plate and produce a very even light distribution.

Part number	Optical spec.	Electrical specifications			Dimensions	
	Emission angle (deg)	Supply Voltage (v)	Power cons. (w) Red:625nm ●	Power cons. (w) Green: 525nm ● Blue: 470nm ● White ○	Outer diam. (mm ²)	Inner diam. (mm ²)
BHA00D100R1-24V	0	24	4	4.6	100	30
BHA00D76R1-24V	0	24	2	2.1	76	21
BHA15D76R1W-24V	15	24	4.8	6	76	21
BHA15D102R1-24V	15	24	4	4.7	100	30
BHA30D51R1-24V	30	24	1.6	2.8	50.8	8
BHA30D76R1W-24V	30	24	2.4	2.9	76	21
BHA30D102R1R-24V	30	24	2.4	2.9	100	30
BHA30D127R2W-24V	30	24	8	10	126.5	30
BHA45D127R4-24V	45	24	12	15	126.5	30

Illumination Structure

Light from the LEDs around the periphery of the light diffusion plate is scattered and reflected within the plate to create diffuse light that illuminates from directly overhead.



Examples of Flat Ring Light Images

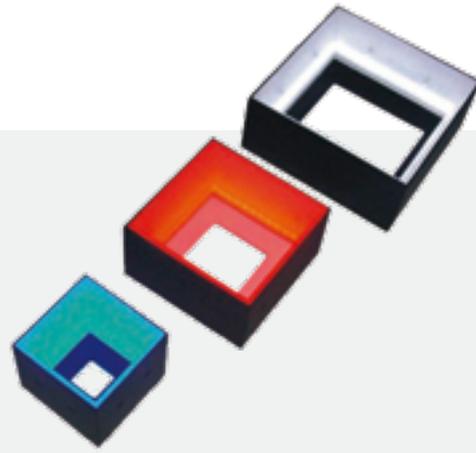
Illuminated by the Shadowless lights on Bottle bottom. Show the products surface in uniform. Can show the black spots, printed character and other defects clearly.



Square shadowless diffused lights

FM/FM2F series

- Light from the LEDs installed above is transmitted through the light-guiding diffusion plate and diffused light is illuminated from four directions on the workpiece from a low angle.
- This is perfect for square workpieces: detecting the outline of corners and preventing glare.



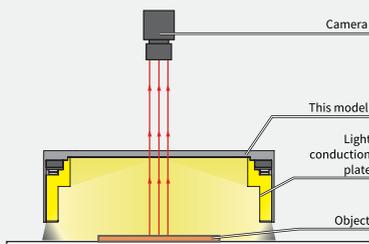
Explanation of Model Code

FM2F	A60	D48	R1	X
Series	Angle	O.D.	LED rows	Color (W/R/G/B)

Part number	Optical spec.	Electrical specifications			Dimensions	
	Emission angle (deg)	Supply Voltage (v)	Power cons. (w) Red: 625nm ●	Power cons. (w) Green: 525nm ● Blue: 470nm ● White ○	Outer diam. (mm ²)	Inner diam. (mm ²)
FM2FA60D48R1W-24V	60°	24	1.6	2.2	48x48	26x26
FM2FA60D76R1W-24V	60°	24	7.2	9	76x76	40x40
FM2FA60D102R1W-24V	60°	24	4	5	101.6x101.6	66x66
FM2FA75D76R1W-24V	75°	24	7.7	9.6	76x76	40x40
FM2FA75D102R1W-24V	75°	24	4	4.9	101.6x101.6	66x66
FM2FA90D102R1W-24V	90°	24	3	3.5	101.6x101.6	80x80
FMFA90D70R1W-24V	90°	24	2.4	3	76x76	55x55

Illumination Structure

The object is illuminated from a low angle by uniform diffuse light through the light conduction plate.



Examples of square shadowless diffused lights



Use these lights to illuminate in a specific angle. The products surface in uniform light. Can show the products contour, surface scratches and other defects clearly.



Inspect BGA welding spots. The low angle square shadowless lights will show the edge and center part clearly. The image will be uniform and without shadow.

Bar Lights TX2/TX3/TXX2 series

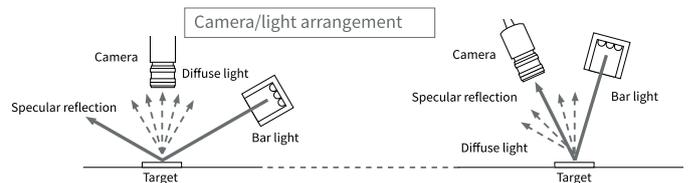


These lights can be used alone or in combination to create lighting with a high degree of freedom.

Compatible with a wide range of uses

You can freely adjust the illuminating direction and angle for use in a wide range of uses.

Because Bar Lights can freely adjust their illuminating direction and angle to match the workpiece, they can provide the optimal image.



Illumination Structure

Can be directed at any angle to the surface for either direct, bright-field lighting or optimal oblique, dark-field lighting



Common Specifications

Input voltage	24 VDC
Connector	SMR-03V-B
Polarity	1: (+), 2: NC, 3: (-)
Cable length	1000 mm
Optional Accessory	Diffusion plate, Polarizing plate. DC extension cable: 1m/2m/3m
Operating environment (indoor)	Temperature: 0~40 °C Humidity: 20% to 85% RH (with no condensation)
Life time	White: 30,000hrs, Red: 60,000hrs (Depends on the operating environment, not a guarantee)
Case material	Aluminum alloy, Resin

Examples of Bar Light Images

Imaging the appearance of confectionery packaging



Workpiece image



LED Ring Light



LED Bar Light

Bar Lights

TX2/TX3/TXX2 series

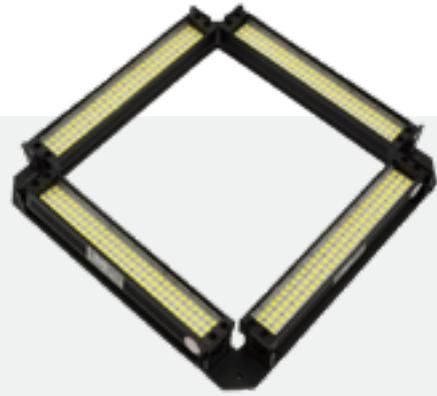
Explanation of Model Code

TX2	D50X19	R3	X
Series	Emitting Surface	LED rows	Color (W/R/G/B)

Series	Part number	Electrical specifications			Dimensions
		Supply Voltage (v)	Power cons. (w) Red:625nm ●	Power cons. (w) Green: 525nm ● Blue: 470nm ● White ○	Emitting Surface (mm ²)
TX2 Series	TX2D50X19R3-24V	24	0.8	1	50x19
	TX2D80X19R3-24V	24	1.6	2.1	80x19
	TX2D100X19R3-24V	24	2.5	3	100x19
	TX2D144X19R3-24V	24	3.6	4	144x19
	TX2D190X19R3-24V	24	4.7	5	190x19
TX3 Series	TX3D67X29R6-24V	24	3.2	4.3	67x29
	TX3D86X29R6-24V	24	4.3	6.5	86x29
	TX3D100X29R6-24V	24	5	6.5	100x29
	TX3D200X29R6-24V	24	10	13	200x29
	TX3D300X29R6-24V	24	15	19	300x29
	TX3D400X29R6-24V	24	20	25	400x29
	TX3D500X29R6-24V	24	21	25	500x29
	TX3D600X29R6-24V	24	21	26	600x29
	TX3D700X29R6-24V	24	29	36	700x29
	TX3D800X29R6-24V	24	33	41	800x29
	TX3D900X29R6-24V	24	36.5	46	900x29
	TX3D1000X29R6-24V	24	40	45	1000x29
	TX3D1100X29R6-24V	24	42.5	47.5	1100x29
TX3D1200X29R6-24V	24	60	76	1200x29	
TXX2 Series	TXX2D208X21R3-24V	24	4	5	208x21
	TXX2D308X21R3-24V	24	8.6	9.3	308x21
	TXX2D408X21R3-24V	24	11.5	13.0	408x21
	TXX2D508X21R3-24V	24	14.4	16.2	508x21
	TXX2D608X21R3-24V	24	17.3	19.4	608x21
	TXX2D708X21R3-24V	24	20.2	22.7	708x21
	TXX2D808X21R3-24V	24	23.0	25.5	808x21
	TXX2D908X21R3-24V	24	25.9	29.2	908x21
	TXX2D1008X21R3-24V	24	28.8	32.4	1008x21
TXX2D1208X21R3-24V	24	31	39	1208x21	

Bar light units FTX series

- The square lights are made up of four bars lights, which can be individually controlled and positioned.
- Optimal direct bright field or oblique dark field lighting from adjustable angles



Series	Part number	Electrical specifications			Dimensions
		Supply Voltage (v)	Power cons. (w) Red:625nm ●	Power cons. (w) Green: 525nm ● Blue: 470nm ● White ○	Emitting Surface of Single Light (mm ²)
FTX Series	FTXD50R3-24V	24	1.1x4	1.8x4	50x19
	FTXD80R3-24V	24	2.2x4	2.9x4	80x19
	FTXD100R3-24V	24	2.5x4	3.2x4	100x19
	FTXD144R3-24V	24	3.6x4	4x4	140x19
	FTXD190R3-24V	24	4.7x4	6.5x4	190x19

Explanation of Model Code

FTX	D50	R3	X
Series	Emitting Surface of one single light	LED rows of one single light	Color (W/R/G/B)

Illumination Structure

Using four bar lights in a square arrangement allows for adjustment in four independent directions. Optimal lighting according to the target profile can be set to highlight and extract specific characteristics.

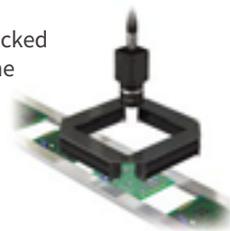
Illumination of a target can be freely controlled by changing the angle and choosing which sides of the target should be lit.

These units are made of lights in four directions whose angles, light intensities, and lighting timings can be set separately, which makes it possible to perform previously difficult inspections.

Imaging Example

Inspection of sealant

The presence/absence of sealant can be checked across the whole target area. By adjusting the installation distance and angle the whole target can be uniformly lit.



High Power Bar Lights HBL series

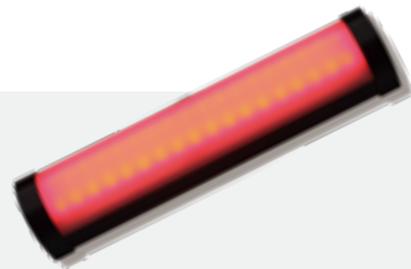
These bar lights are using high power LED beads which is suitable for long distance illumination.



Series	Part number	Electrical specifications			Dimensions
		Supply Voltage (v)	Power cons. (w) Red:625nm ●	Power cons. (w) Green: 525nm ● Blue: 470nm ● White ○	Emitting Surface (mm ²)
<i>HBL Series</i>	HBLD150R2-24V	24	9.6	12	56.4x151.5
	HBLD300R1-24V	24	7.2	10	27.5x302.5
	HBLD350R2-24V	24	28	35	60x350
	HBLD400R1-24V	24	8	10	27.5x403.3
	HBLD500R2-24V	24	40	50	60x500
	HBLD600R1-24V	24	16	20	27.5x604.5

Diffused bar lights VTX series

The use of LED and diffuse lighting can achieve a wide range of uniform lighting and the effect of fluorescent lamps.



Series	Part number	Electrical specifications			Dimensions
		Supply Voltage (v)	Power cons. (w) Red:625nm ●	Power cons. (w) Green: 525nm ● Blue: 470nm ● White ○	Emitting Surface (mm ²)
<i>VTX Series</i>	VTXD100DFW-24V	24	1.9	2.4	102x12.5
	VTXD200DFW-24V	24	3.8	5.7	202x12.5
	VTXD300DFW-24V	24	5.7	8.6	302x12.5
	VTXD400DFW-24V	24	7.6	10	402x12.5
	VTXD500DFW-24V	24	9.6	12	502x12.5
	VTXD600DFW-24V	24	12	17	602x12.5

Backlights BGS series

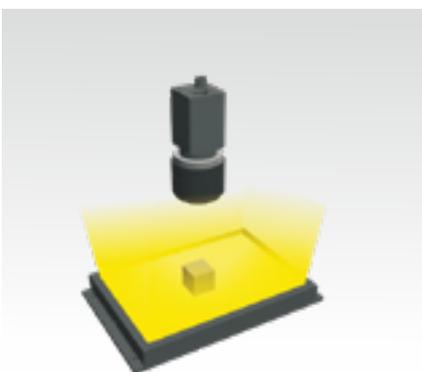
Back lights enable crisp silhouetting of target profiles to enable high precision measurement or part differentiation.

These lights can also be used as reflected lights with large lighting areas.



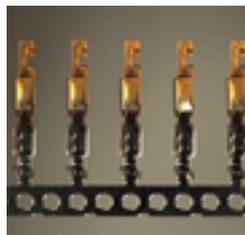
Series	Part number	Electrical specifications			Dimensions
		Supply Voltage (v)	Power cons. (w) Red: 625nm ●	Power cons. (w) Green: 525nm ● Blue: 470nm ● White ○	Emitting Surface (mm ²)
<i>BGS Series</i>	BGSD20X20-24V	24	1	1.7	20x20
	BGSD30X30-24V	24	1.1	2	30x30
	BGSD40X44-24V	24	3.2	4	40x44
	BGSD50X50-24V	24	2.64	3.5	50x50
	BGSD50X75-24V	24	3.2	4	50x75
	BGSD50X160-24V	24	5.6	6.7	50x160
	BGSD80X80-24V	24	6.4	8	80x80
	BGSD100X100-24V	24	10.8	13.5	100x100
	BGSD100X150W-24V	24	16	20	100x150
	BGSD30X120-24V	24	2.8	4.3	30x120
<i>Non-Standard BGS Series</i>	BGSD12X18-24V-C	24	0.48	0.6	12x18
	BGSD16X33-24V-C	24	0.8	1	16x33
	BGSD31X193-24V-C	24	5.2	7.7	31x193
	BGSD66X80-24V-C	24	5.7	7.2	66x80
	BGSD84X242-24V-C	24	16	19	84x242
	BGSD100X126-24V-C	24	8	12	100x126

Illumination Structure

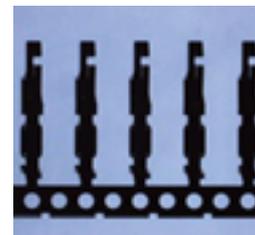


Imaging Example

Imaging of connector pin strip



Standard Light
Some edge points are unclear and blend into the background.



Backlight
Complicated outlines and edge points are clearly shown with a sharp contrast.

Large size backlights BGLX series

Flat light units with an emitting surface of up to 1000 x 1200 mm.

They are ideal for inspecting large workpieces and available to inspect a wide area.

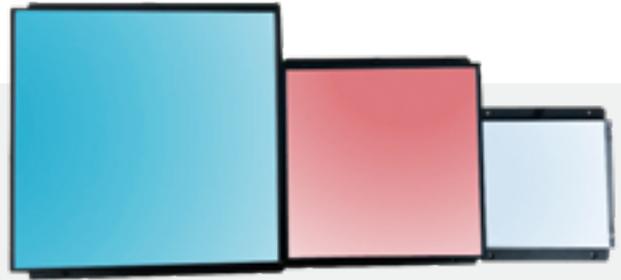


Series	Part number	Electrical specifications			Dimensions
		Supply Voltage (v)	Power cons. (w) Red:625nm ●	Power cons. (w) Green: 525nm ● Blue: 470nm ● White ○	Emitting Surface (mm ²)
BGLX Series	BGLXD80X160-24V	24	3.45	4.6	80x160
	BGLXD100X150R-24V	24	8	10	100x150
	BGLXD100X200-24V	24	18	22	100x200
	BGLXD120X120-24V	24	6.14	8.45	120x120
	BGLXD120X180-24V	24	15.12	17.28	120x180
	BGLXD160X160-24V	24	14	15.6	160x160
	BGLXD160X240-24V	24	50	60	160x240
	BGLXD160X320-24V	24	25	32	160x320
	BGLXD160X400-24V	24	21	27	160x400
	BGLXD200X240-24V	24	21.6	33	200x240
	BGLXD200X400-24V	24	45	57	200x400
	BGLXD240X240-24V	24	20	26	240x240
	BGLXD240X320-24V	24	32	48	240x320
	BGLXD240X400R-24V	24	39	52	240x400
	BGLXD240X480-24V	24	46	190	240x480
	BGLXD320X320-24V	24	50	64	320x320
	BGLXD320X400-24V	24	64	80	320x400
	BGLXD400X400-24V	24	92	115	400x400
	BGLXD400X480W-24V	24	101	127	400x480
	BGLXD400X560-24V	24	110	137	400x560
	BGLXD240X560-CT-24V	24	96	120	240x560
	BGLXD400X720-CT-24V	24	168	175	400x720
	BGLXD480X480-CT-24V	24	128	160	480x480
	BGLXD480X560W-CT-24V	24	154	193	480x560
BGLXD560X560W-CT-24V	24	192	240	560x560	
BGLXD640X800-CT-24V	24	240	300	640x800	
BGLXD1000X1200-CT-24V	24	920	1152	1000x1200	

Parallel backlights PXBG series

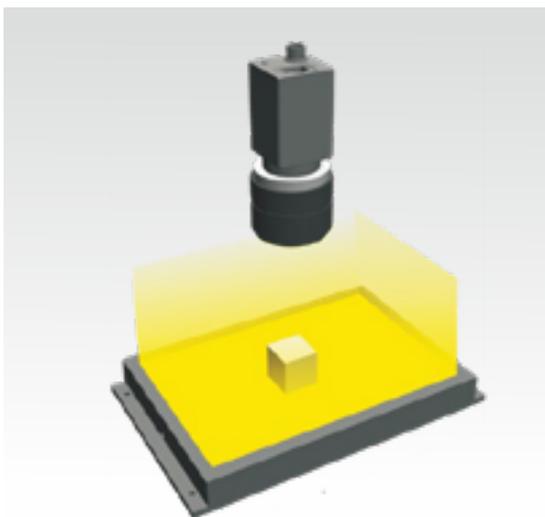
Optimizes the lights with unique material making the light radiate in parallel.

These lights with parallel light have a better performance in appearance inspection and size measurement.

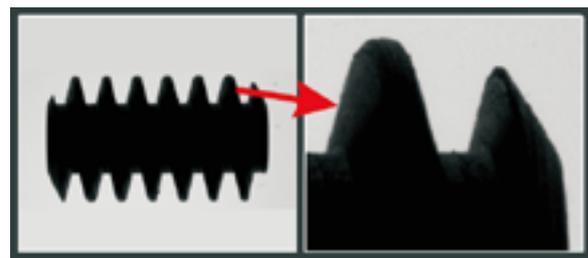


Series	Part number	Electrical specifications			Dimensions
		Supply Voltage (v)	Power cons. (w) Red:625nm ●	Power cons. (w) Green: 525nm ● Blue: 470nm ● White ○	Emitting Surface (mm ²)
PXBG Series	PXBGSD20X20-24V	24	0.8	1	20x20
	PXBGSD30X30-24V	24	1.9	2.4	30x30
	PXBGSD50X50-24V	24	2.64	3.4	55x51.5
	PXBGSD80X80-24V	24	9.6	12	84x82
	PXBGSD100X100-24V	24	12	16.8	100x100
	PXBGLXD100X150W-24V	24	16	20	100x150
	PXBGLXD120X120-24V	24	6.14	8.45	120x120
	PXBGLXD160X160-24V	24	14	15.6	160x160
	PXBGLXD240X240-24V	24	38	48	240x240
	PXBGLXD400X400-24V	24	92	115	400x400

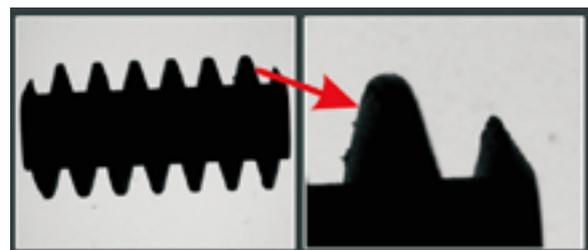
Illumination Structure



Imaging Example



Standard backlight



Parallel backlight

Ultra-thin backlights BGDS series

These flat lights with standard mold shell have a more compact structure.

They are ideal for applications which have limited installation space.



Series	Part number	Electrical specifications			Dimensions
		Supply Voltage (v)	Power cons. (w) Red:625nm ●	Power cons. (w) Green: 525nm ● Blue: 470nm ● White ○	Emitting Surface (mm ²)
BGDS Series	BGDS25X36R-24V	24	0.4	0.57	25x36
	BGDS31X58W-24V	24	0.8	1	31x59
	BGDS70X70W-24V	24	2	2.8	70x70
	BGDS100X100W-24V	24	4.8	5.8	100x100
	BGDS180X250-24V	24	11	13	180x250
	BGDS200X200-24V	24	11.2	14.4	200x200
	BGDS664X664W-24V-C	24	73	92	664x664

Arc backlights HD series

- Custom surface structure, more suitable for arc assembly line or arc structure product detection
- High brightness, the surface brightness value is up to 56000Lux



Series	Part number	Electrical specifications		
		Supply Voltage (v)	Power cons. (w) Red:625nm ●	Power cons. (w) Green: 525nm ● Blue: 470nm ● White ○
HD Series	HBGLXD50X80X-24V-C	24	3.6	4.5
	HBGLXD120X120X-24V-C	24	5.6	7
	HBGLX120X245X-24V-C	24	11.2	14
	HBGLXD120X300X-24V-C	24	21.6	27
	HBGLXD120X400X-24V-C	24	23	29
	HBGLXD250X400X-24V-C	24	32	40
	HBGLXD250X700X-24V-C	24	43	54

Backlights(Camera-window type)

FK/YKBGXL

These flat lights have a square or circular hole on the center.

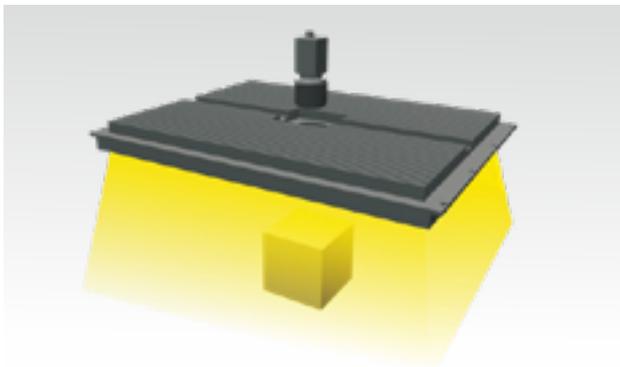
Provide a light from the same axis as the camera and a wide range of uniform illumination.

Available for reflection purpose.



Illumination Structure

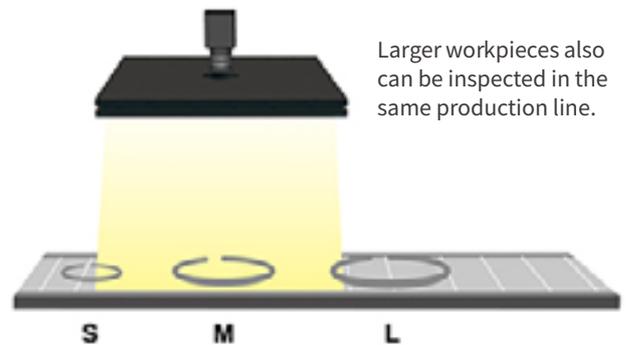
Flat lights with a camera window at the center of the emitting surface. They do not serve as a back light but provide a light from the same axis as the camera like dome lights and coaxial lights.



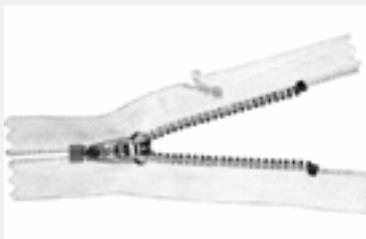
Uniform illumination of a wide range

These light units have a wider emitting surface compared to that of coaxial lights and dome lights. This enables uniform illumination of a wide range.

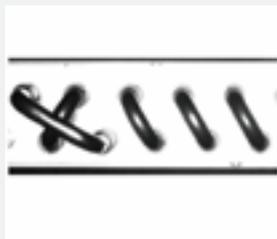
Applicable to a wide range of workpiece sizes



Imaging Examples



Imaging of zipper teeth



Imaging of plastic parts for location

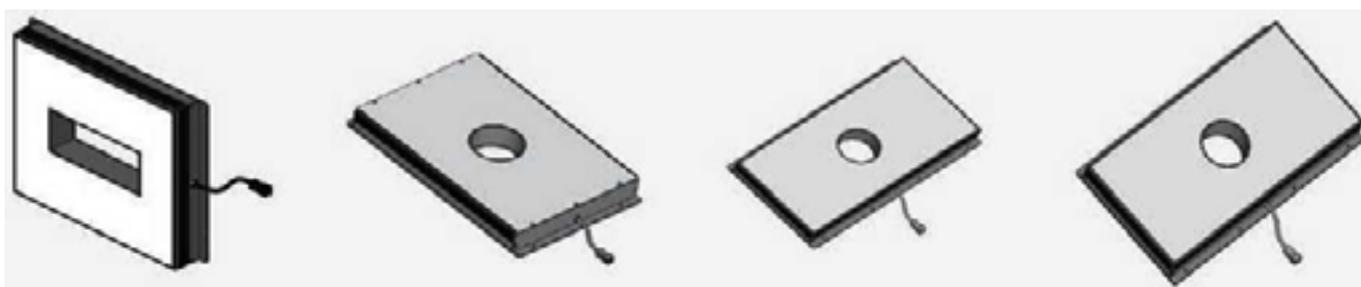


Imaging of plastic parts for location

Backlights(Camera-window type)

FK/YKBGXL

Series	Part number	Electrical specifications			Dimensions		
		Supply Voltage (v)	Power cons. (w) Red:625nm ●	Power cons. (w) Green: 525nm ● Blue: 470nm ● White ○	Number of holes	Emitting Surface (mm ²)	Hole Size (mm ²)
Square hole type	FKBGLXD100X200X-40X100MM-24V	24	11.2	14	1	100x200	40x100
	FKBGLXD120X200X-40X100MM-24V	24	10.2	12.5	1	120x200	40x100
	FKBGLXD180X190X-120X130MM-24V	24	15	18.7	1	180x190	120x130
	FKBGLXD184X184X-46X100MM-24V	24	11	13.5	1	184x184	46x100
	FKBGLXD185X187X-100X100MM-24V	24	14	17.5	1	185x187	100x100
	FKBGLXD190X190X-135X135MM-24V	24	27.6	31.5	1	190x190	135x135
	FKBGLXD200X350X-50X50MM-24V	24	27	34	1	200x350	50x50
	FKBGLXD200X800X-40X650MM-24V	24	76	87	1	200x800	40x650
	FKBGLXD205X205X-40X40MM-24V	24	26	33	1	205x205	40x40
	FKBGLXD300X400X-50X70MMX2-24V	24	35	53	1	300x400	50x70
	FKBGLXD570X590X-60X60MM x 4-24V	24	200	209	4	570x590	60x60
	FKBGLXD1000X1000X-150X150MM-CT-24V	24	504	630	1	1000x1000	150x150
Circular hole type	YKBGLXD120X120X-35MM-24V	24	6	7.5	1	120x120	Φ35
	YKBGLXD150X200X-50MM-24V	24	16	21	1	150x200	Φ50
	YKBGLXD160X160X-70MM-24V	24	12	15	1	160x160	Φ70
	YKBGLXD160X240X-50MM-24V	24	26.5	33	1	160x240	Φ50
	YKBGLXD240X240X-50MM-24V	24	35	48	1	240x240	Φ50
	YKBGLXD240X320X-50MM-24V	24	48	59	1	240x320	Φ55
	YKBGLXD240X480X-55MM-24V	24	85	60	1	240x480	Φ55
	YKBGLXD320X320X-55MM-24V	24	43	51	1	320x320	Φ55
	YKBGLXD400X400X-50MM-24V	24	96	105	1	400x400	Φ50
	YKBGLXD400X480X-50MM-24V	24	64	80	1	400x480	Φ50
	YKBGLXD560X560X-70MM-CT-24V	24	180	228	1	560x560	Φ70
	YKBGLXD560X720X-50MM-CT-24V	24	240	300	1	560x720	Φ50
	YKBGLXD640X720X-50MM-CT-24V	24	185	230	1	640x720	Φ50
	YKBGLXD640X800X-50MM-CT-24V	24	192	240	1	640x800	Φ50
	YKBGLXD800X800X-70MM-CT-48V	24	360	457	1	800x800	Φ70
	YKBGLXD880X960X-50MM-CT-24V	24	300	375	1	880x960	Φ50
YKBGLXD930X930X-50MMX4-CT-24V	24	320	350	4	930x930	Φ50	



Coaxial lights TZ series

TZ series consists of LED coaxial lights that provide coaxial illumination ideal for inspection of scratches/dents on glossy surfaces or pattern inspection on PCB to be used in combination with telecentric lenses.

Light is reflected by a 45° beam splitter so that it is projected on the same axis as the camera.



Series	Part number	Electrical specifications			Dimensions
		Supply Voltage (v)	Power cons. (w) Red: 625nm ●	Power cons. (w) Green: 525nm ● Blue: 470nm ● White ○	Emitting Surface (mm ²)
TZ Series	TZ2D25X-24V	24	0.8	1	25x25
	TZD40X-24V	24	4.8	6	40x40
	TZ3D50X-24V	24	5	7.4	50x50
	TZ2D70X-24V	24	7	14.5	70x70
	TZ2D85X-24V	24	9.1	10	85x85
	TZ2D100X-24V	24	13.6	17	100x100
	TZ2D130X-24V	24	18	23	130x130
	TZ2D150X-24V	24	29.6	37	150x150
	TZ2D200X-24V	24	24	30	200x200
	TZ2D200X250X-24V	24	36	48	200x250
TZ2D200X450X-24V	24	40	51	200x450	

Illumination Structure

By using the half mirror, diffused light from the LED is illuminated on the same axis as the camera axis.



Imaging Example

Imaging of engraved text on a metal connector hood



LED Bar Light
It is difficult to read the text engraved in the surface.

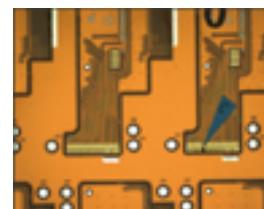


TZ3D50R-24V
Effect from the surface unevenness is reduced and a clear image of the engraved text can be made.

Imaging for touch screen counterpoint

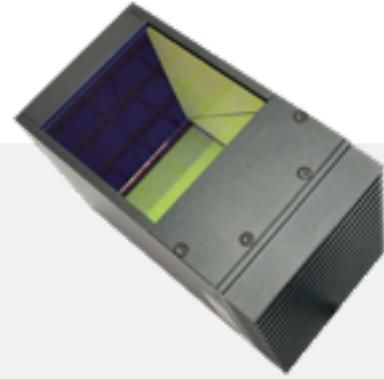


Imaging of pins of FPC



High brightness coaxial lights TZ-GL series

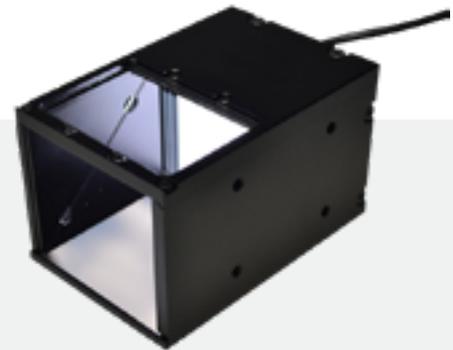
TZ-GL series coaxial lights use high power LED beads, which have a twice brightness compared with TZ series.
Optional with fan design for cooling.



Series	Part number	Electrical specifications			Dimensions
		Supply Voltage (v)	Power cons. (w) Red:625nm ●	Power cons. (w) Green: 525nm ● Blue: 470nm ● White ○	Emitting Surface (mm ²)
TZ-GL Series	TZ2D25X-GL-24V	24	3.2	4	25x25
	TZ2D60X-GL-24V	24	9.6	12	60x60
	TZ2D70X-GL-24V	24	17	20	70x70
	TZ2D80X-GL-24V	24	20	26	80x80
	TZ2D100X-GL-24V	24	27	34	100x100
	TZ2D130X-GL-24V	24	45	60	130x130

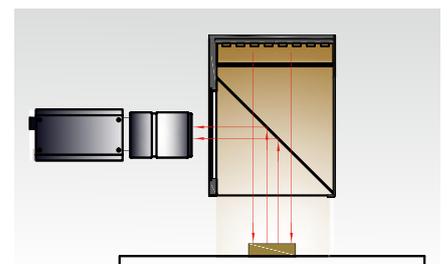
45° coaxial lights TZ2A45 series

TZ2A45 series coaxial lights use special design to enable that the camera can capture images from the side of the coaxial light. They are suitable for applications which have limited installation space.



Series	Part number	Electrical specifications			Dimensions
		Supply Voltage (v)	Power cons. (w) Red:625nm ●	Power cons. (w) Green: 525nm ● Blue: 470nm ● White ○	Emitting Surface (mm ²)
TZ2A45 Series	TZ2A45D80X-24V-C	24	4	5	80x80
	TZ2A45D100X-24V	24	18	23	100x100
	TZ2A45D130X-24V	24	24	24	130x130
	TZ2A45D170X-24V	24	60	75	170x170

Illumination Structure



Parallel coaxial lights PXTZ series



Unique optical structure to greatly reduce the loss of the light.

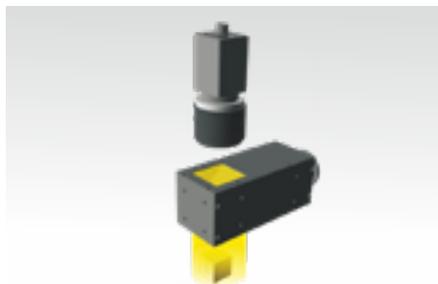
PXTZ series coaxial lights generate parallel lights to be reflected by a mirror and all the lights can come through the lens to clearly highlight the surface image of the object.

Light brightness range: 5300lux-7000lux, remains stable brightness within 200mm distance.

Series	Part number	Electrical specifications			Dimensions
		Supply Voltage (v)	Power cons. (w) Red:625nm ●	Power cons. (w) Green: 525nm ● Blue: 470nm ● White ○	Emitting Surface (mm ²)
PXTZ Series	PXTZD48X-6V	6	5	7.2	48x48

Illumination Structure

By using the half mirror, diffused light from the LED is illuminated on the same axis as the camera axis.



Imaging Example

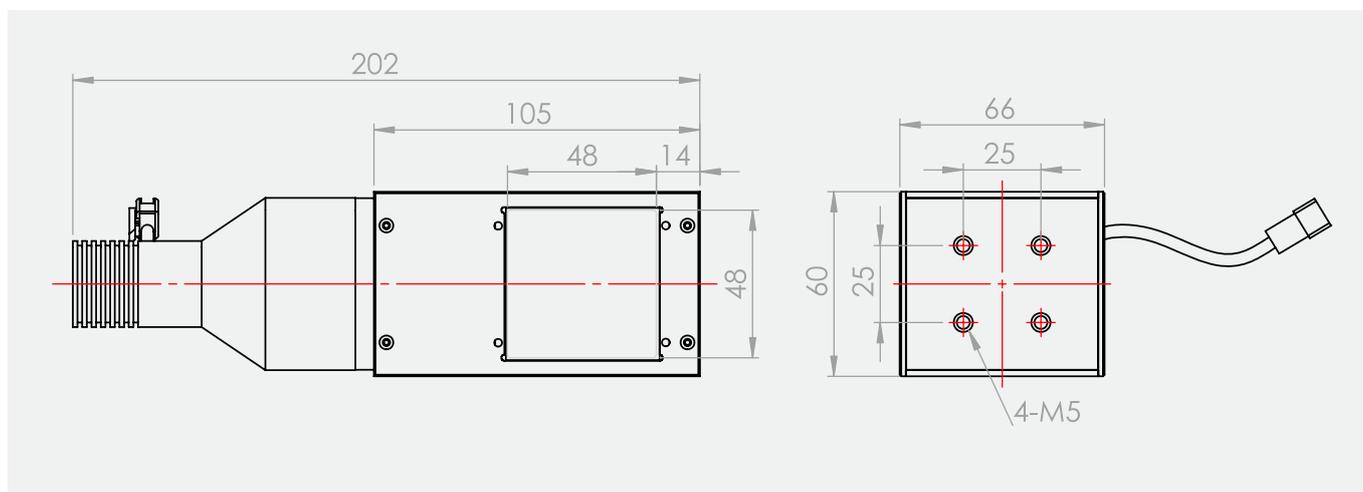
Imaging of engraved text on a metal part



Parallel coaxial light



Standard coaxial light



Dome lights BWG series

BWG series consists of LED dome illuminators designed to provide uniform illumination of complex surfaces. Light comes from all angles effectively eliminating glares and shadows.

All the dome lights are available with full color (RGB) type.



Illumination Structure

Uses a unique illuminating mechanism to illuminate diffused light at high output.



Full-color (RGB) Type

Controls red, blue, and green light to create the color you want with just one Light Unit.

If there are workpieces with different colors but the same shape, or if there are different types of products on the same assembly line, you were required to set up the Light Units of different LED colors to detect the features. Full-color type Light Unit emits and controls red, blue, and green light with a single unit. This enables you to take the best image to meet your needs.

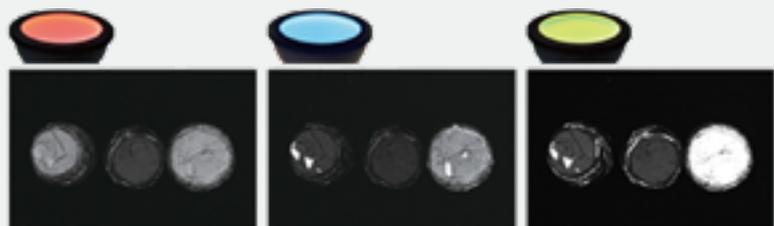
Series	Part number	Electrical specifications			Dimensions		
		Supply Voltage (v)	Power cons. (w) Red: 625nm ●	Power cons. (w) Green: 525nm ● Blue: 470nm ● White ○	Emitting Diameter (mm)	Outer Diameter (mm)	Height (mm)
BWG Series	YKBWGD53X-9MM-24V	24	0.8	1.5	24.5	53	36.8
	YKBWGD78X-35MM-24V	24	6	6.4	41	95	41.7
	FKBWGD84X-24X24MM-24V	24	3.24	3	54	84	40
	YKBWGD103X-25MM-24V	24	5.5	3.3	81	118	56.8
	YKBWGD165X-40MM-TK-24V	24	16	10	134	185	89
	YKBWGD200X-50MM-TK-24V	24	6.4	12	193	232	113
	YKBWGD262X-50MM-24V	24	20	20	217	284	140
	YKBWGD420X-50MM-24V	24	21	27	360	420	209
	YKBWGD938X-90MM-4CH-24V	24	/	110	870	980	490

Imaging Example

Exterior imaging using color determination of a multi-colored workpiece

Full color (RGB) type

YKBWGD200RGB-50MM-TK-24V



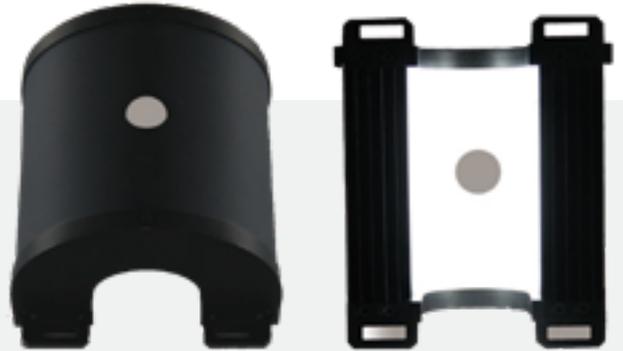
Imaging with red light

Imaging with blue light

Imaging with green light

Tunnel shape dome lights IDT series

- IDT series is a shadowless lighting with high homogeneity. The light from high density SMD beads become uniform after spherical diffuse reflection.
- Applied to surface inspection of reflective objects, flaw inspection of irregular surface, appearance inspection of food or medicine, printing inspection of package or cigarette cases.



Series	Part number	Electrical specifications			Dimensions
		Supply Voltage (v)	Power cons. (w) Red:625nm ●	Power cons. (w) Green: 525nm ● Blue: 470nm ● White ○	Emitting Surface (mm ²)
IDT Series	IDT2D15X400X-24V-C	24	320	400	15x400
	YKIDTD50X-25MM-24V	24	3	4	42x54
	FKIDTD349X-80X330MM-24V	24	12	13.5	80x290
	FKIDTD200X300X-40X150MM-24V-C	24	6	7.7	200x300
	YKIDTD100X-15MM-TK-24V	24	3	3.8	40x100
	YKIDTD150X-25MM-TK-24V	24	3.2	4	60x163
	YKIDTD200X-25MM-TK-24V	24	56	7	126x200
	YKIDTD150X200X-40MM-TK-24V	24	3	3.8	150X200
	YKIDTD200X280X-55MM-TK-24V	24	3.2	4	200X280
	YKIDTD150X200X-50MMx2-FK-24V	24	2.4	3	150X200
	YKIDTD300X400X-50MM-FK-24V	24	4.8	6	300X400
	YKIDTD150X260X-50MMX2-FK-24V	24	3.2	3.8	150X260



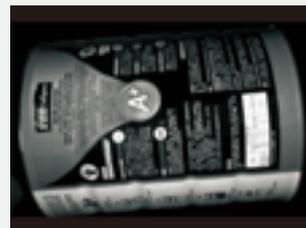
Imaging Examples



Imaging of auto logos



Imaging of fork



Imaging of characters on milk powder can

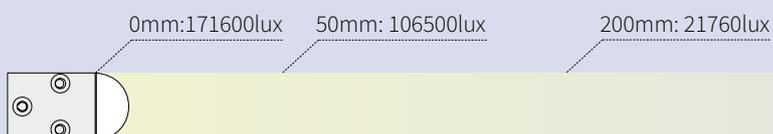
Small size line lights XXLS/XLS series

Light from the chip LEDs inside the unit passes through the cylindrical lens and is formed into a high-intensity, tightly focused beam. Units with 16-mm or 17.5-mm light-emitting width are available. The LEDs comes in red, white, blue, or green.



Series	Part number	Electrical specifications			Emitting Surface (mm ²)
		Supply Voltage (v)	Power cons. (w) Red: 625nm ●	Power cons. (w) Green: 525nm ● Blue: 470nm ● White ○	
XXLS series	XXLSD38X-24V-C	24	1.6	2.4	16x38
	XXLSD75X-24V	24	3.2	4	16x75
	XXLSD150X-24V	24	5	6	16x150
	XXLSD225X-24V	24	7.2	9.6	16x225
	XXLSD300X-24V	24	9.2	11.5	16x300
	XXLSD450X-24V	24	16	19	16x450
	XXLSD825X-24V	24	24	30	16x825
XLS series	XLSD50X-24V	24	4.8	6	17.5*50
	XLSD75X-24V	24	5	6.24	17.5*74
	XLSD150X-24V	24	10	12.5	17.5*148
	XLSD225X-24V	24	14.8	18.5	17.5*222
	XLSD300X-24V	24	20	25	17.5296
	XLSD375X-24V	24	24	31	17.5x370
	XLSD450X-24V	24	30	37.5	17.5x444
	XLSD525X-24V	24	35	43.7	17.5x5.8
	XLSD600X-24V	24	40	50	17.5x592
	XLSD675X-24V	24	45	56.2	17.5x666
	XLSD750X-CT-24V	24	50	62.4	17.5x740
	XLSD825X-CT-24V	24	55	68.7	17.5x814
	XLSD900X-CT-24V	24	60	75	17.5x888
	XLSD975X-CT-24V	24	64	81	17.5x962
	XLSD1050X-CT-24V	24	70	87.4	17.5x1036
	XLSD1125X-CT-24V	24	75	93.6	17.5x1110
	XLSD1200X-CT-24V	24	85	106	17.5x1184
XLSD1350X-CT-24V	24	90	112.4	17.5x1332	
XLSD1500X-CT-24V	24	100	125	17.5x1480	

Light brightness LED Light Unit used: XXLSD75W-24V



Standard line lights

LS3 series

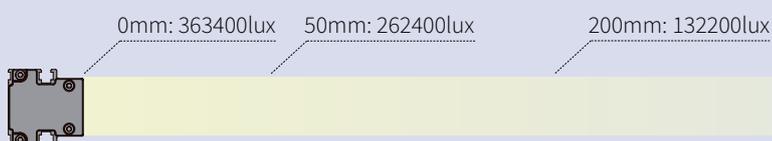
Light Units with an emitting surface length of 75 mm to 1,800 mm are available at affordable prices.

Utilizing our many years of technical expertise, LS3 series LED line lights are our third generation standard line lights which are suitable for high-performance line scan applications



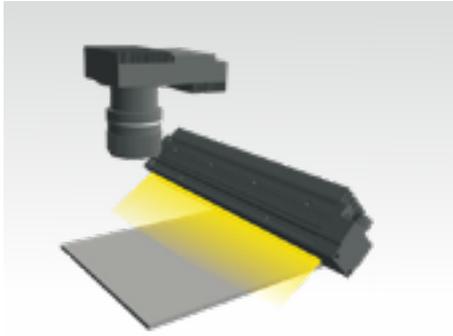
Series	Part number	Electrical specifications			Dimensions			
		Supply Voltage (v)	Power cons. (w) Red:625nm ●	Power cons. (w) Green: 525nm ● Blue: 470nm ● White ○	Number of fans	Emitting Surface Width (mm)	Emitting Surface Length (mm)	Height (mm)
LS3 Series	LS3D75X-FAW-24V	24	13.6	17	1	16	75	82
	LS3D150X-FAW-24V	24	16	20	1	16	148	82
	LS3D225X-FAW-24V	24	18	23	1	16	222	82
	LS3D250X-FAW-24V	24	29	36	1	16	250	82
	LS3D300X-FAW-24V	24	35	41	2	16	296	82
	LS3D375X-FAW-24V	24	38	48	2	16	370	82
	LS3D450X-CT-FAW-24V	24	58	60	2	16	444	82
	LS3D525X-CT-FAW-24V	24	80	100	2	16	518	82
	LS3D600X-CT-FAW-24V	24	64	80	4	16	592	82
	LS3D675X-CT-FAW-24V	24	128	159	4	16	666	82
	LS3D750X-CT-FAW-24V	24	80	100	4	16	740	82
	LS3D825X-CT-FAW-24V	24	152	190	4	16	814	82
	LS3D900X-CT-FAW-24V	24	170	213	4	16	888	82
	LS3D975X-CT-FAW-24V	24	200	230	4	16	962	82
	LS3D1050X-CT-FAW-24V	24	216	249	4	16	1036	82
	LS3D1125X-CT-FAW-24V	24	212	266.4	6	16	1110	82
	LS3D1200X-CT-FAW-24V	24	227	284.16	6	16	1184	82
	LS3D1275X-CT-FAW-24V	24	240	301	6	16	1258	82
	LS3D1350X-CT-FAW-24V	24	256	320	6	16	1332	82
	LS3D1425X-CT-FAW-24V	24	270	337	6	16	1406	82
LS3D1500X-CT-FAW-24V	24	370	384	8	16	1480	82	
LS3D1575X-CT-FAW-24V	24	322	403	8	16	1554	82	
LS3D1650X-CT-FAW-24V	24	338	422	8	16	1628	82	
LS3D1725X-CT-FAW-24V	24	354	442	8	16	1702	82	
LS3D1800X-CT-FAW-24V	24	368	460	8	16	1776	82	

Light brightness LED Light Unit used: LS3D300W-FAW-DF-24V



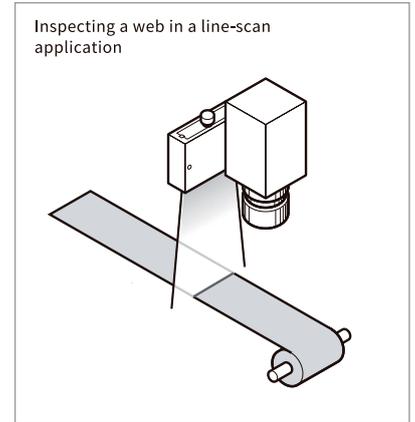
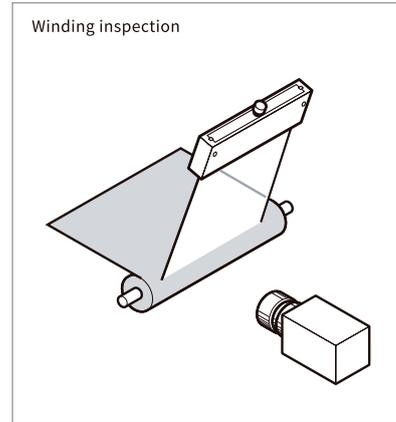
Illumination Structure

High-output Line Lights with fan cooling. The emitted light is not easily diffused, so that light quantity loss is minimal, enabling long irradiation distance

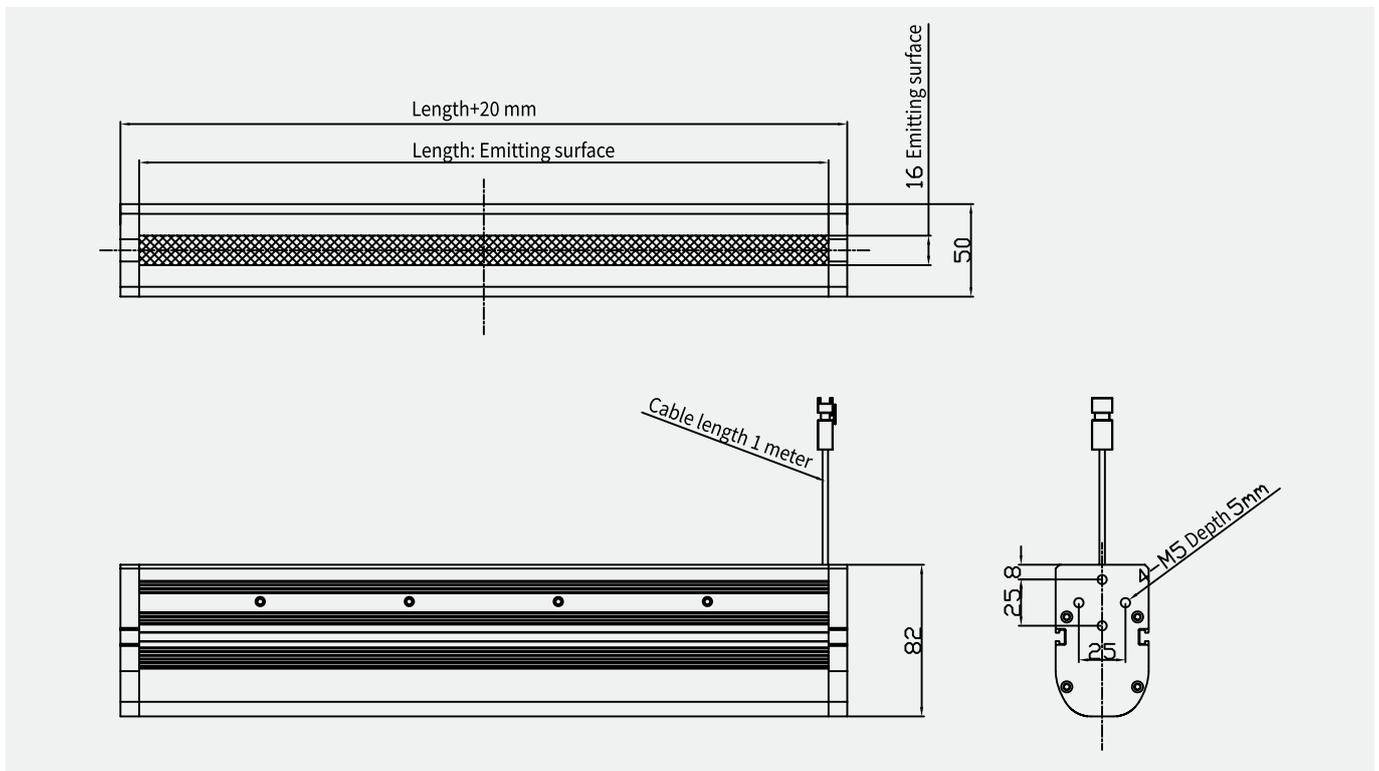


Applications

Specially designed for line scan system. Suitable for inspections of paper, non-woven cloth, glass, thin film, solar cell, lithium battery, and etc..



Dimension Diagrams (mm)



Order Emitting Surface Lengths from 75 mm to 1,800 mm

The right length of Light Unit is available for each applications



Lengths can be specified in 75-mm increments between **75 mm ...**



...and 1,800 mm.

Specify the emitting surface length in 75-mm increments.

Select from sizes ranging between 75 mm and 1,800 mm based on your specific needs for a variety of applications.

Standard line lights **LS4 series**

Wide Selection, High light intensity

Light Units with an emitting surface length of 150 mm to 2,400 mm are available at affordable prices, which are suitable for high-performance line scan applications.

Compared with LS3 series, LS4 series has a higher light intensity.



Illumination Structure

High-output Line Lights with fan cooling. The emitted light is not easily diffused, so that light quantity loss is minimal, enabling long irradiation distance

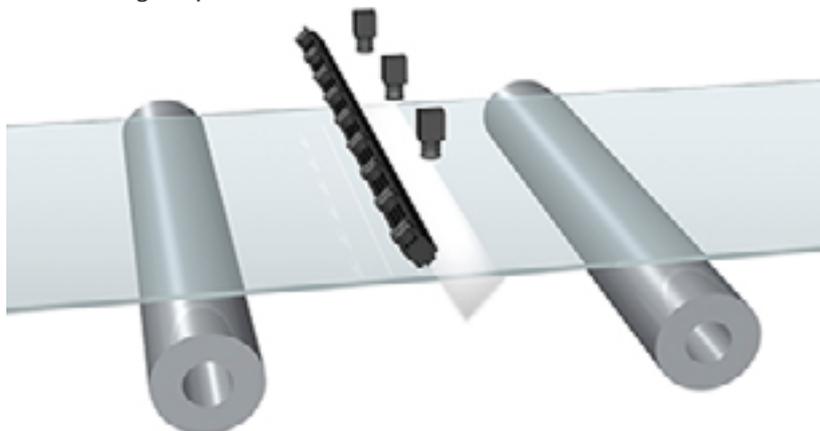


Applications

Specially designed for line scan system.

Suitable for inspections of paper, non-woven cloth, glass, thin film, solar cell, lithium battery, and etc..

Glass damage inspection

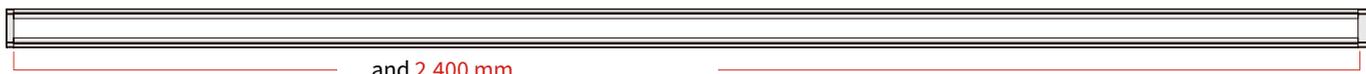


Order Emitting Surface Lengths from 150 mm to 2,400 mm

The right length of Light Unit is available for each applications



Lengths can be specified in 50mm increments between 150mm ...



and 2,400 mm.

Specify the emitting surface length in 50-mm increments.

Select from sizes ranging between 150 mm and 2,400 mm based on your specific needs for a variety of applications.

Series	Part number	Electrical specifications			Dimensions
		Supply Voltage (v)	Power cons. (w) Red:625nm ●	Power cons. (w) Green: 525nm ● Blue: 470nm ● White ○	Emitting length (mm)
LS4 Series	LS4D150-CT-FAW-GL-24V	24	24	30	150
	LS4D200-CT-FAW-GL-24V	24	32	40	200
	LS4D250-CT-FAW-GL-24V	24	40	50	250
	LS4D300-CT-FAW-GL-24V	24	48	60	300
	LS4D400-CT-FAW-GL-24V	24	64	80	400
	LS4D450-CT-FAW-GL-24V	24	72	90	450
	LS4D500-CT-FAW-GL-24V	24	80	100	500
	LS4D550-CT-FAW-GL-24V	24	88	110	550
	LS4D600-CT-FAW-GL-24V	24	96	120	600
	LS4D650-CT-FAW-GL-24V	24	104	130	650
	LS4D700-CT-FAW-GL-24V	24	112	140	700
	LS4D750-CT-FAW-GL-24V	24	120	150	750
	LS4D800-CT-FAW-GL-24V	24	128	160	800
	LS4D850-CT-FAW-GL-24V	24	136	170	850
	LS4D900-CT-FAW-GL-24V	24	144	180	900
	LS4D950-CT-FAW-GL-24V	24	152	190	950
	LS4D1000-CT-FAW-GL-24V	24	160	200	1000
	LS4D1050-CT-FAW-GL-24V	24	168	210	1050
	LS4D1100-CT-FAW-GL-24V	24	176	220	1100
	LS4D1150-CT-FAW-GL-24V	24	184	230	1050
	LS4D1200-CT-FAW-GL-24V	24	192	240	1100
	LS4D1250-CT-FAW-GL-24V	24	200	250	1150
	LS4D1300-CT-FAW-GL-24V	24	208	260	1200
	LS4D1350-CT-FAW-GL-24V	24	216	270	1250
	LS4D1400-CT-FAW-GL-24V	24	224	280	1300
	LS4D1450-CT-FAW-GL-24V	24	232	290	1350
	LS4D1500-CT-FAW-GL-24V	24	240	300	1400
	LS4D1550-CT-FAW-GL-24V	24	248	310	1450
	LS4D1600-CT-FAW-GL-24V	24	256	320	1500
	LS4D1650-CT-FAW-GL-24V	24	264	330	1550
	LS4D1700-CT-FAW-GL-24V	24	272	340	1600
	LS4D1750-CT-FAW-GL-24V	24	280	350	1650
LS4D1800-CT-FAW-GL-24V	24	288	360	1700	
LS4D1850-CT-FAW-GL-24V	24	296	370	1750	
LS4D1900-CT-FAW-GL-24V	24	304	380	1800	
LS4D1950-CT-FAW-GL-24V	24	312	390	1850	
LS4D2000-CT-FAW-GL-24V	24	320	400	1900	
LS4D2050-CT-FAW-GL-24V	24	328	410	1950	
LS4D2100-CT-FAW-GL-24V	24	336	420	2000	
LS4D2150-CT-FAW-GL-24V	24	344	430	2150	
LS4D2200-CT-FAW-GL-24V	24	352	440	2200	
LS4D2250-CT-FAW-GL-24V	24	360	450	2250	
LS4D2300-CT-FAW-GL-24V	24	368	460	2300	
LS4D2350-CT-FAW-GL-24V	24	376	470	2350	
LS4D2400-CT-FAW-GL-24V	24	384	480	2400	

Coaxial line lights LS4TZ series

The coaxial line lights have a better effect for the inspection of reflective objects, which are idea choices for large size printing inspection, keyboard inspection, mobile phone panel inspection and etc.



Series	Part number	Electrical specifications			Dimensions
		Supply Voltage (v)	Power cons. (w) Red:625nm ●	Power cons. (w) Green: 525nm ● Blue: 470nm ● White ○	Emitting length (mm)
LS4TZ Series	LS4TZD150-CT-FAW-GL-24V	24	32	40	150
	LS4TZD200-CT-FAW-GL-24V	24	40	50	200
	LS4TZD250-CT-FAW-GL-24V	24	52	65	250
	LS4TZD300-CT-FAW-GL-24V	24	75	75	300
	LS4TZD350-CT-FAW-GL-24V	24	72	90	350
	LS4TZD400-CT-FAW-GL-24V	24	80	100	400
	LS4TZD450-CT-FAW-GL-24V	24	92	115	450
	LS4TZD500-CT-FAW-GL-24V	24	100	125	500
	LS4TZD550-CT-FAW-GL-24V	24	112	140	550
	LS4TZD600-CT-FAW-GL-24V	24	120	150	600
LS4TZD650-CT-FAW-GL-24V	24	128	160	650	

Illumination Structure



Example Images



Imaging of glass for fingerprints, scratches, and stains.



Imaging of rare PCB

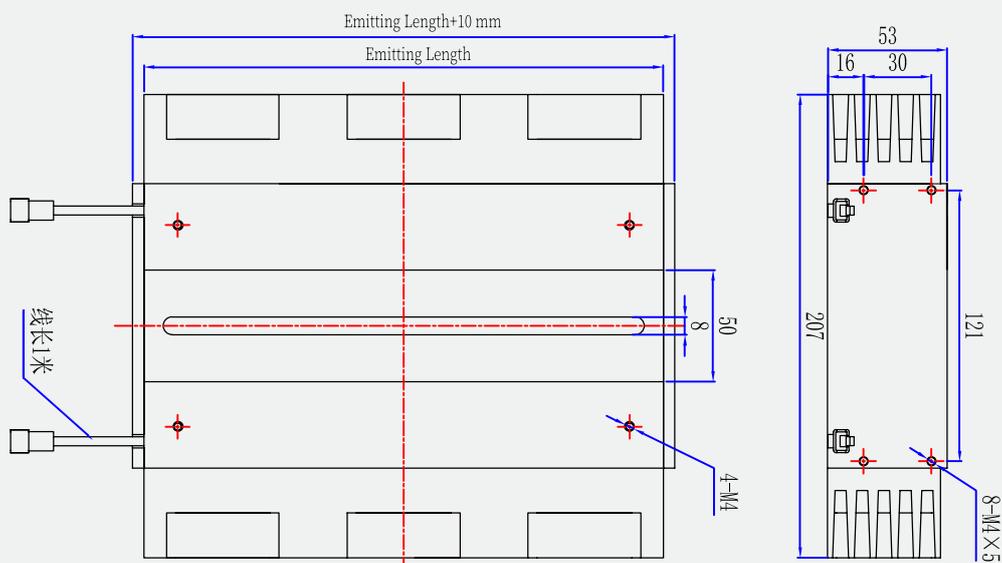
Tunnel shape line lights IDTLS series

The IDTLS series tunnel shape lines have super high light intensity up to 100Wlux, especially design for solar panel inspection.



Series	Part number	Electrical specifications			Dimensions
		Supply Voltage (v)	Power cons. (w) Red: 625nm ●	Power cons. (w) Green: 525nm ● Blue: 470nm ● White ○	Emitting Surface (mm ²)
IDTLS Series	IDTD50X135W-LS-C	24	160	200	50X135
	IDTD50X170W-LS-C	24	240	300	50X170
	IDTD50X230W-LS-C	24	240	300	50X230
	IDT50X230W-LS-FAW-CH2-CT-24V	24	320	400	50X230
	IDT50X600W-LS-FAW-CH2-CT-48V	48	580	720	50X600
	IDT50X700W-LS-FAW-CH2-CT-48V	48	675	840	50X700
	IDT50X750W-LS-FAW-CH2-CT-48V	48	720	900	50X750
	IDT50X1100W-LS-FAW-CH2-CT-48V	48	1050	1300	50X1100
	IDT50X1200W-LS-FAW-CH2-CT-48V	48	1100	1400	50X1200
	IDT50X1500W-LS-FAW-CH2-CT-48V	48	1480	1860	50X1500

Typical Dimension

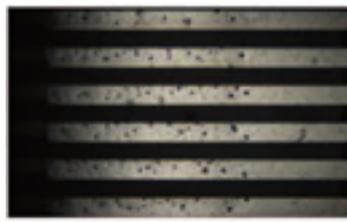


Point lights DG series



- Best suited for objects with high-reflection or specular surface
- 4 colors available for various test objects and applications
- Space-saving design with competitive prices

Imaging Examples



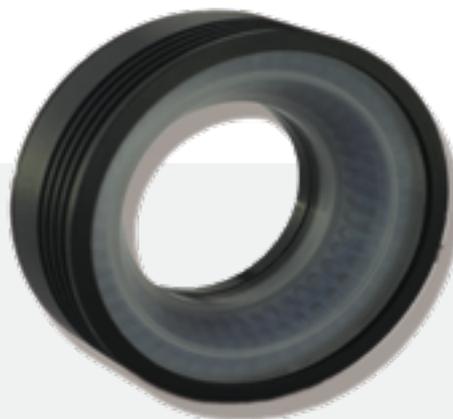
Series	Part number*	Electrical specifications			Dimensions	
		Max. Current (mA)	Power cons. (w)	Luminous Flux (lm)(lux)	Emitting Diameter (mm)	Mechanical Size (mm)
DG Series	DG-1W	300	1	70lm	Φ6	Φ30x59.3
	DG-3W	800	3	170lm	Φ6	Φ30x69.3
	DG-5W	1200	5	260lm	Φ6	Φ30x84.3
	DG-10W	2200	10	400lm	Φ10	Φ38x90.3
	XDG-0.7W	200	0.7	40lm	Φ6	Φ14x32
	XDG-1W	300	1	65lm	Φ6	Φ18x40
	XDG-3W	800	3	160lm	Φ6	Φ18x57.6
	DG-3W-X-JG	800	3	170lm	-	-
	DG-5W-X-JG	1200	5	260lm	-	-
	DG-10W-X-JG	2200	10	400lm	-	-
	DG-3W-X-TJ	800	3	110,000lux	Φ22	Φ30x130
	DG-5W-X-TJ	1200	5	140,000lux	Φ22	Φ30x136
DG-3W-X-TJ-25MM	800	3	110,000lux	Φ22	Φ25x130	

*: DJ-TJ series uses a special designed lens which makes the emitting size of the point lights adjustable.

Line-up IR Lights

Wide selection with a peak wavelength of 850 and 940 nm

These IR Lights provide a wide selection with a peak wavelength of 850 and 940 nm for almost all the series our lights, and are effective for materials that chemically react to visible light rays or allow IR wavelength transmission

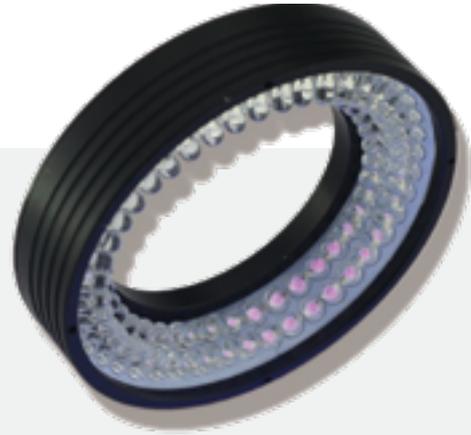


IR Lights

Part number	Part number	Part number
YKBGLXD320X620IR850-50MM-CT-24V	HXA60D66IR940-FS-24V-C	HXA30D120R5IR850-12V
BGLXD640X800IR850-CT-24V	TX3D100X29R6IR850-24V	PXBGD40X134IR940-24V
HXA30D70R3IR940-54C-OX24V	BGLXD640X640IR940-24V	HXA60D151R3IR850-24V
BGSD40X44IR940C-OX24V	LS2D900IR80-CT-FC-FS-24V	TX2D20X25R4IR850-24V
HXA15D92R4IR850-24V	BGSD20X20IR850-24V	LSD750IR850-CT-DF-24V-C
BGLXD160X480IR850-24V	HXA00D100R5IR940-24V-C-DF	TX2D100X19R3IR850-24V
HXA45D70R3IR940-CH3-24V-C	LS2D600IR80-CT-24V	TX2D80X19R3IR940-24V
HXA15D70R3IR940-24V	TZ2D50IR940-24V	TX3D86X29R6IR850-24V
HXA60D90R2IR940-24V	LS2D900IR80-CT-24V	TX2D80X19R3IR850-24V
HXA15D70R3IR850-24V	TX3D200X29R6IR940-24V	TX2D190X19R3IR850-24V
HXA45D92R4IR850-24V	TX3D200X29R6IR850-24V	HXA90D56R11R850-24V-C
HXA30D120R5IR850-24V	TX3D700X29R6IR850-24V	LS2D75IR850-24V
HXA30D92R4IR850-24V	BGLXD100X150IR850-24V	TX2D100X19R3IR850-12V
BGSD50X50IR850-24V	LS2D270WBIR-HL-FAW-C	LS2D300IR-DF-24V
YKBGLXD560X560IR850-70MM-CT-24V	TX3D300X29R6IR850-24V	PXBGD40X134IR940-GL-24V-C-Y1
HXA00D92R4IR850-24V	BGSD28X46IR850-24V-C	YKBWGD103IR940-25MM-24V
HBGLXD120X300IR850-24V-C	YKBWGD420W-IR850-50MM-H-24V-C	BGLXD160X240IR850-24V
HXA60D202R3IR850-24V	BGLXD178X178IR850-24V	HXA30D70R3IR850-BY-24V-C
HXA60D66R2RGBIR940-FS-24V-C1	LS3D180IR1300-FAW-24V-C	TX2D144X19R3IR850-24V
PXBGD40X134IR940-GL-24V-C	TZ2D130IR850-24V	HXA60D74R2IR940-24V
BGSD100X150IR850-24V-C	BGSD150X200IR850-24V-C	BGLD59X194IR-12V-C
HXA15D92R4IR940-24V	LS3D600IR-24V	HXA00D92RGBIR850-24V
YKBWGD165IR850-40MM-24V	BGLXD160X400IR850-24V	BGLXD320X480IR850-24V
TZ3D50IR940-24V	BGSD45X145IR940-24V-C	TX2D50X19R3IR940-24V
YKBGLXD400X400IR850-50MM-CT-24V	LSD825IR850-CT-DF-FN-HL-24V-C	BGLXD200X250IR940-24V
BGSD50X50IR940-24V	HBGLXD120X120IR940-24V-C	BGLXD195X326IR850-24V-C
TX3D150X29R6IR850-24V	HXA45D230IR940-24V	TX2D50X19R3IR850-24V
BGLXD160X320IR850-24V	TXX2D408X21R3IR850-24V	HXA15D70R3IR940-12V
BGLXD150X200IR850-24V-C	BGSD80X80IR850-24V	TZD25IR940-12V
LS3D900IR80-CT-FS-HL-24V	BGD134X40IR940-24V-C	TX2D100X19R3IR940-12V
YKBGLXD268X394IR850-50MM-24V	BGSD100X100IR850-24V	BGLD53X218IR850-24V
TXX2D408X21R3IR940-24V	LSD750IR850-CT-DF-FN-HL-24V-C	HXA60D90R2IR850-24V
HXA15D103R5IR850-24V	TX2D144X19R3IR940-24V	FTXD190R3IR850-24V
HXA00D130R5IR850-24V	TX2D190X19R3IR940-24V	TXX2D1008X21R3IR940-24V-C
LS2D600IR80-CT-FC-FS-24V	BGSD100X100IR940-24V	TX3D86X29R6IR940-24V
BGLXD100X200IR850-24V	BGLXD160X320IR940-24V-C	HXA15D50R2IR850-24V
BGLD120X120IR940-24V	BGLXD160X240IR940-24V	BGSD20X20IR940-12V

Line-up UV Lights

- Provides image recognition at high contrast especially for items that are difficult to view invisible light
- Effective in detection of dirt on glass substrates and dust on elements



UV Lights

Part number	Part number	Part number
TX2D80X19R2UV-24V	HXA30D124R2-A45D124R1-UV2-24V	TX2D100X19R2UV-24V
HXA60D90R2UV-24V	HXA45D103R3UV-24V-C	ZR308UV-24V
HXA60D60UV-24V-C	HXA30D60R2UV-24V-C	HXA15D80R2W-R1UV-24V-C
HXA15D70R2UV-24V	HXA45D60R2UV-24V-C	HYTD60UV-C-24V
HXA60D74R2UV-24V	TX3D86X29R4UV365-24V	FTXD144R3UV365-24V
YKBWGD103UV-25MM-24V	HXA15D50UV2-24V	ZR208UV-24V
HXA75D70R2UV-24V	TX2D100X19R2UV365-24V	HXA60D132R3UV-24V-C
HXA30D70R2UV-24V	HXA60D132R3UV365-24V	HYT80124UV-C-24V
TX2D50X19R2UV-24V	HXA60D132R3UV385-24V	HXA30D120R3UV-24V
HXA15D60R2UV-24V	HXA15D110R3UV-24V-C	TX2D100X19R2UV-12V
TX2D190X19R2UV-24V	TX3D67X29R4UV375-24V	TZD40UV-24V
TX2D144X19R2UV-24V	HXA30D92R2UV-24V-80MM	HXA30D97R3UV385-24V
TX3D200X29R4UV375-24V	HXA60D90R2UV-12V	TX3D86X29R4UV-24V-C
TX3D150X29R4UV-24V	HXA15D50R2UV-24V	TX3D86X29R4UV-24V
HXA60D90R2RGBUV-24V-C	HXA30D92R3UV-24V-80MM	HXA15D70R2UV-12V
TX3D400X29R4UV-24-C	TXX2D340X21R3UV365-24V	HXA15D43R1UV-24V
TX3D400RGBUV-DF-C	TZ2D150UV-24V	TX3D300X29R4UV375-24V
HXA15D92R3UV-24V	TX3D220X29R4UV365-24V	HXTD90UV-C-24V
HXA15D48R1UV-24V	HXA30D92R3UV-24V	HXA15D70R2UV-24V-C
HYTD90UV-C-24V	HXA30D90R3UV-24V	HXA60D90R2UV-24V-C

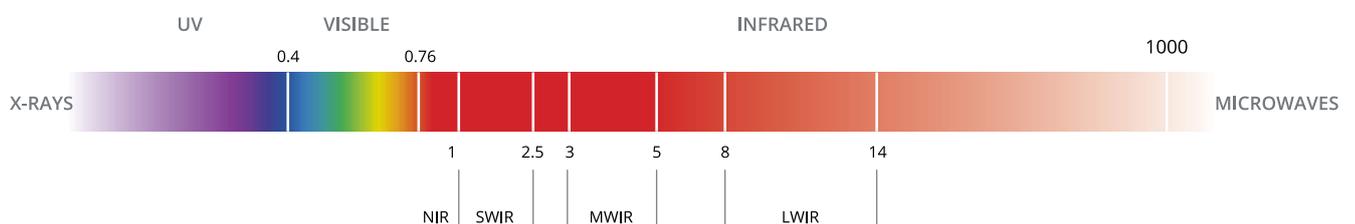
Light Spectrum

In machine vision, light is mostly characterized by its wavelength, which is generally expressed in nm (nanometers).

Basically light is electromagnetic radiation within a certain portion of the electromagnetic spectrum as following figure: it can be quasi-monochromatic (which means that it is characterized by a narrow wavelength band, i.e. with a single color) or white (distributed across the visible

spectrum, i.e. it contains all colors).

Light visible to the human eye has wavelengths in the range of 400-700 nm, between the infrared (with longer wavelengths) and the ultraviolet (with shorter wavelengths): some special applications will require IR or UV light instead of visible light.



LIGHT INTENSITY CONTROLLERS

Part number	Electrical specifications								Mechanical specifications		
	Input Supply voltage	Output voltage	Output Current	Ch	Output Mode	Current adjustable	Remote control	CANBus	Brightness control	DIN slot	Shell material
ANALOG CONTROLLERS											
 VLA VLA2402 VLA2404 VLA2404-100W	AC 100-240V	DC 24V	1A for each; 35/65/100W in total	2/4	Continunous	No	No	No	Knob	No	Metal
 VLSS VLSS2401	DC 24V	DC 24V	1A	1	Continunous	No	No	No	Knob	Yes	Metal
 VLD VLD-24V1A-CH2 VLD-24V1A-CH4 VLD-24V2A-CH1 VLD-24V2A-CH2 VLD-24V4A-CH1	AC 100-240V	DC 24V	1A/2A/4A	1/2/4	Continunous	No	No	No	Knob	No	Metal
STROBE CONTROLLERS											
 LC-22 LC-22-4CH-R1 LC-22-2CH-R2-2A LC-22-1CH-R2-4A LC-22-4CH-R2-4.5A LC-22-4CH-R2-5V LC-22-4CH-R1-80	DC 12-24V	DC 5-24V	1A/2A/4A/4.5A 300mA/800mA	1/2/4	Constant & Strobe & Auto-strobe	Yes	RS232/USB	Yes	Button/ Software	Yes	Plastics
 LC-31 LC31-2CH2 LC31-4CH	DC 12-24V	DC 5-24V	1A/2A	2/4	Constant & Strobe & Auto-strobe	Yes	RS232/USB	Yes	Button/ Software	Yes	Metal
 LC-51 LC-51-4CH	AC 100-240V	DC 24V	1A	4	Constant & Strobe	Yes	RS232	No	Button/ Software	No	Metal
 LC-61 LC61-24X2-3WX2 LC61-24X2-5WX2	AC 100-240V	DC 24V	1A/350mA	4	Constant & Strobe	Yes	RS232	No	Button/ Software	No	Metal
 VLAT VLAT2404	AC 100-240V	DC 24V	1A for each; 2.7A (65W) in total	4	Constant & Strobe	No	No	No	Knob	No	Metal
 LCLP LCLP-4CH-R1 LCLP80-4CH LCLP2-4CH-R1	DC 12-24V	DC 5-24V	500mA/600mA	4	Constant & Strobe & Auto-strobe	No	RS232/USB	Yes	Button/ Software	Yes	Plastics
 LCLP61 LCLP61DG(for point lights)	AC 100-240V	Constant Current	1W/3W/5W	4	Constant & Strobe	No	RS232	No	Button/ Software	No	Metal
 VLE VLE2404 VLE2404-120W VLE2404DG(for point lights)	AC 100-240V	DC 24V DC 24V DC 5V	2.7A (65W) total 5A (120W) total 5A (25W) total	4	Constant & Strobe	No	RS232	No	Button/ Software	No	Metal
 DDY-1CH-CT DDY51CT24V DDY101CT24V DDY201CT24V	AC 100-240V	DC 24V	5A, 10A, 20A	1	Constant & Strobe	No	RS232	No	Button/ Software	No	Metal
 STB STB-2CH-24V-R1-C STB-2CH-T-24V-R1 STB-2CH-T-24V-R1-2A	DC 24-30V DC 24V	DC 24V	2A for each 1A for each 2A for each	2	Constant & Strobe	No	No	No	Knob	No	Metal
OVERDRIVE CONTROLLERS											
 HLC-21 HLC-21-2CH-R2 HLC-21-4CH-R0 HLC-21-4CH-R1	AC 200-240V	DC 24V Constant DC 48V Strobe	1A for each	2/4	Constant & Strobe	No	RS232	Yes	Button/ Software	Yes	Metal
 HLCO HLCO-4CH-R0	AC 200-240V	DC 24V Constant DC 48V Strobe	1.0A Constant Max 20A (Pulsed)	4	Constant & Strobe	No	RS232	Yes	Button/ Software	No	Metal



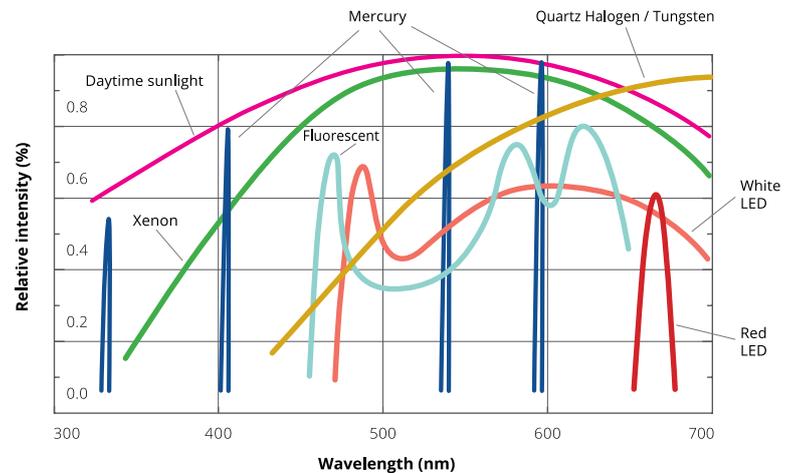
LED illumination

There are many different types of light sources available including the following:

- Incandescent lamps
- Fluorescent lamps
- LED lights

LED lights are by far the most commonly used in machine vision because they offer a number of advantages, including:

- Fast response
- Suitable for pulse and strobe operations
- Mechanical resistance
- Longer lifetime, higher output stability
- Ease of creating various lighting geometry



Emission spectra of different light sources

Incandescent lamps are the well-known glass bulbs filled with low pressure, inert gas (usually argon) in which a thin metal wire (tungsten) is heated to high temperatures by passing an electric current through it. The glowing metal emits light on a broad spectrum that goes from 400 nm up to the IR. The result is a white, warm light (corresponding to a temperature of 2870 K) with a significant amount of heat being generated.

Fluorescent lamps are vacuum tubes in which UV light is first produced (by interaction between mercury vapor and highly energetic electrons produced by a cathode) and then is adsorbed by the tube walls, coated with fluorescent and phosphorescent material. The walls then re-emit light over a spectrum that again covers the whole visible range, providing a “colder” white light source.

LEDs (Light Emitting Diodes) produce light via the annihilation of an electronhole pair in a positive/negative junction of a semiconductor chip. The light produced by an LED depends on the materials used in the chip and is characterized by a narrow spectrum, i.e. it is quasi-monochromatic. White light is produced as in the fluorescent lamps, but the blue light is absorbed and re-emitted in a broad spectrum slightly peaked in the blue region.

Interaction of light with materials

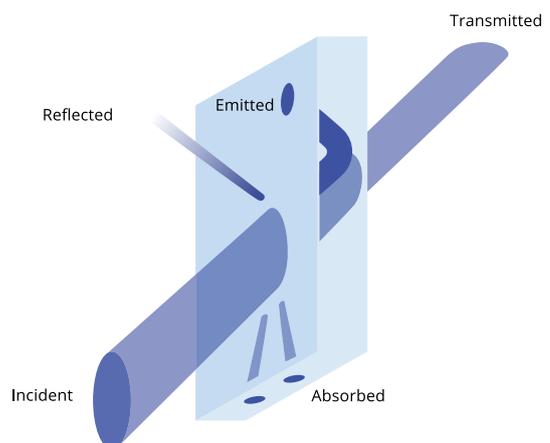
Basically, light interacts with materials by being

- Reflected and/or
- Transmitted and/or
- Absorbed

Additionally, when light travels across different media it refracts, i.e. it changes direction. The amount of refraction is inversely proportional to the light wavelength; i.e. violet light rays are bent more than red ones.

This means that light with short wavelengths gets scattered more easily than light with long wavelengths when hitting a surface and is therefore, generally speaking, more suited for surface inspection applications.

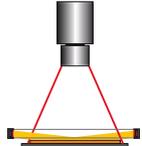
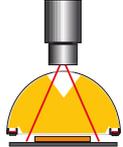
In fact, if we ideally consider wavelength as the only parameter to be considered from the previous list, blue light is advised for applications such as scratch inspection while longer wavelengths such as red light are more suited for enhancing the silhouette of transparent materials.



Interaction of light with matter: reflection, adsorption and transmission.



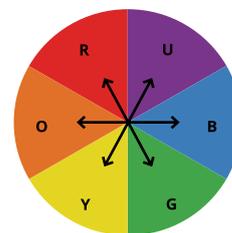
Lighting techniques

Illumination	Structure
<p>Bright field light</p> <p>Light is aimed directly at an object, often creating distinct shadows. This type of lighting is effective when used on objects requiring high degrees of contrast, but creates specular reflections when used with shiny or reflective materials.</p>	
<p>Dark field light</p> <p>Light is projected at an angle to the surface, causing any variations to deflect light up into the camera, creating bright spots on a dark background or field. Nothing is seen by the vision system if there are no aberrations on the surface.</p>	
<p>Back Lighting</p> <p>An even field of illumination is projected from behind an object, which is seen as a silhouette by the camera. Backlighting is most commonly used for taking measurements or determining part orientation.</p>	
<p>Diffuse Light: (Dome/Tunnel)</p> <p>Reflected light, providing a non-directional, soft illumination free of harsh shadows that is well suited for highly specular objects. This illumination effect is similar to the type of light found on an overcast day.</p>	
<p>Co-Axial Illumination:</p> <p>A variation of diffuse light in which light is aimed at an angled beam splitter that reflects the light down. The object is viewed from above through the beam splitter. This light type is particularly helpful on highly reflective objects or in situations where the area of inspection is obscured by shadows from its surroundings.</p>	

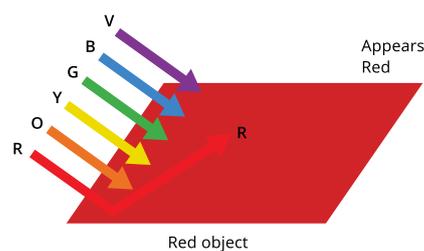
Each light type has a specific purpose, but is also adaptable for a range of applications not immediately related to its function. For example, a spotlight, which provides bright field illumination, can be placed at an angle to create a dark field effect. For some applications, the best results are achieved by combining multiple light types.

Wavelength and optical performance

In the field of image processing, the choice of the proper light wavelength is key to emphasize only certain colored features of the object being imaged. Using a wavelength that matches the color of the feature of interest will highlight this specific feature and viceversa, i.e. using opposite colors to darken non relevant features. For example green light makes green features appear brighter on the image sensor while red light makes green features appear darker on the sensor. On the other hand, white light will contrast all colors, however this solution might be a compromise. Additionally it must be considered that there is a big difference in terms of sensitivity between the human eye and a CMOS or CCD sensor. Therefore it is important to do an initial assessment of the vision system to determine how it perceives the object, in fact what human eyes see might be misleading.



One way to maximize contrast is to select the light color that is on the opposite side of the wheel of the feature color. In such case, features will appear dark on the image sensor.





www.mstarvision.com

Mstar Technologies, Inc.

4/F, Building 19, No. 998 Wenyi West Road, YuHang District

Hangzhou Zhejiang 311121 China

Web: www.mstarvision.com

Tel: 86-571-26280523

E-Mail: fangjl@hc-vision.cn