LED PATTERN PROJECTORS

For more information please contact:

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Advanced structured lighting.

Opto Engineering® LED pattern projectors have been designed for 3D profiling/reconstruction and for the measurement of objects with complex structures or inclined planes.

They are successfully used in a variety of applications like quality control in food and packaging to check for correct volume, reverse engineering, dimensional measurement of electronic components, planarity control of products, robot guidance for pick and place and alignment applications.

When compared to laser emitters, LED technology ensures more homogeneous illumination in addition to sharp edges and no speckle effect.

Many 3D machine vision applications require structured light to be projected onto inclined surfaces, i.e. at a certain angle from the vertical axis. In such cases, the focus is maintained only within a small area close to the center of the field of view and the rest of the image shows relevant defocusing, thus making 3D measurement inaccurate.

For this reason, our family of pattern projectors includes special projectors equipped with a highprecision tilting mechanism that allows the pattern of the light source to meet the Scheimpflug condition so that the projected light is properly and evenly focused across the entire sample surface.

All Opto Engineering® LED projectors feature a wide selection of interchangeable patterns. Furthermore, the size of the projection area can be easily modified by interchanging different 2/3" C-mount lenses. To achieve the best results we suggest to use bi-telecentric lenses or zero distortion macro lenses.

Refer to specific datasheets available at www.opto-e.com
for product compliancy with regulations, certifications and safety labels.

www.opto-e.com

LTPR series

LED pattern projectors

KEY ADVANTAGES

LED technology for perfectly sharp edge
LTPR series ensures thinner lines, sharper edges and more homogeneous illumination than lasers.

With laser emitters the illumination decays both across the line cross section and along the line width.

Laser emitters lines are thicker and show blurred edges; diffraction and speckle effects are also present.

3W, 10W or 90W strobe options.

Wide selection of projection patterns available (custom made upon request).

Compatible with any C-mount optics.

LTPR series consists of different LED pattern projectors available with three power intensities and four wavelengths designed for the most demanding structured light applications including 3D profilometry, stereovision, and alignment.
LTPR series consists of LTPRHP3W models featuring = 3W power intensity, LTPRXP models featuring = 10W power intensity designed for continuos mode operation and LTPRUP models designed for strobe-only operation with peak power intensity of = 90W.

Unlike laser sources, our LED pattern projectors ensure sharp edges and homogeneous light without scattering and diffraction effects. Several projections patterns can be easily interchanged to project any kind of shape. Additionally LTPR fetaures built in phase-adjustment for easy alignment of the pattern. Any C-mount optics can be interfaced with LTPR series to project areas with different sizes.

	Optical specifications			Electrical specifications							
Part number	**Light color**	**Spectral FWHM** (nm)	**Illuminance 1** (klux)	**Operation mode**	**Supply voltage** (V)	**LED driving current, max** (mA)		**Power consumption**	**Pulse width**	**Estimated MTBF 4**	**Connection Type**
LTPRHP3W											
LTPRHP3W-W	White	n.a.	30	continuous and pulsed mode 2	12 - 24 3	720 4	2000 5 6	<4.5	≤10 7	> 100.000 9	M8 industrial male connector 12
LTPRHP3W-R	Red, 630 nm	15	9								
LTPRHP3W-G	Green, 520 nm	40	14								
LTPRHP3W-B	Blue, 460 nm	20	3								
LTPRXP											
LTPRXP-W	White	n.a.	85	continuous mode only	24 3	700 4	n.a.	<13	n.a.	> 65.000 10	M8 industrial male connector 13
LTPRXP-R	Red, 630 nm	20	40								
LTPRXP-G	Green, 520 nm	40	68								
LTPRXP-B	Blue, 460 nm	25	9								
LTPRUP											
LTPRUP-W	White	n.a.	170	strobe only, constant current driving	n.a.	n.a.	17000 6	≈90 (stobe peak LED source power)	≤1 8	> 50000 11	M12 industrial male connector 14
LTPRUP-R	Red, 618 nm	20	65								
LTPRUP-G	Green, 525 nm	40	220								
LTPRUP-B	Blue, 460 nm	30	20								

1 With a 35 mm lens, F/N 1.4 at 100 mm working distance without projection pattern at maximum driving current. Estimated value.
2 To pulse LTRPHP3W, models built-in electronics must be bypassed in order to drive the LED directly.
3 Tolerance ± 10%.
4 Max continuous LED driving current is supplied through the built-in electronics. No external controller is required.
5 At max LED pulsed current, max LED foward voltage (V) = 3.00 for LTRPHP3W-R, 4.00 for LTRPHP3W-G/B, 3.4 for LTRPHP3W-W.
6 To directly drive the LED, current control is necessary. External compatible controller from LTDV series must be used.
7 At pulse width ≤ 10 ms, duty cycle ≤ 10% condition. Built-in electronics must be bypassed.
8 At 25°C. At max pulse width (1 ms), max pulse frequency = 15 Hz. Contact us to check other allowable combinations of duty cycle-frequency-temperature.

LTPRHP3W-x models featuring built in electronics with multi-turn trimmer for light intesity dimming and ≈ 3W power intensity.

LTPRXP-x models featuring built in electronics, fixed current output and ≈ 10W power intensity

LTPRUP-x models for strobe-only operation featuring ≈ 90W peak power intensity. These models are compatible with CMHO016 clamping mechanics, alternatively three M4 and one M6 threads are available as fixing options.

LTPRHP3W and LTPRXP models are designed for continuous mode and integrate built-in electronics that control the current flow through the LED.

LTPRHP3W models integrate a multi-turn trimmer for light intensity dimming while LTPRXP models have fixed current and cannot be dimmed. For LTPRHP3W models, the built-in electronics can be bypassed in order to directly drive the LED through an external controller.

LTPRUP series are the most powerful LED pattern projectors available from Opto Engineering®. These models are used in high speed applications where camera exposure time must be set to the minimum, including planarity control of opaque products and 3D profiling. LTPRUP models are designed for strobe-mode only and can be precisely controlled using compatible LTDV strobe controllers series. LTDV controllers are designed to drive the LED of LTPRUP pattern projectors with perfectly constant current, ensuring repeatable results even when low exposure time is required.

Mechanical specifications				Compatibility				
External Ø (mm)	**Length 15** (mm)	**Width** (mm)	**Height** (mm)	**Strobe controllers**	**Lenses**	**Cable**	**Clamping mechanics**	**Projection patterns**
37.5	130.4	-	-	LTDV1CH-17V, LTDVE8CH-20, LTDVE4CH-20	EN2MP series, EN5MP series, TC series, TCLWD series, TCHM series	CB244P1500, CB244P1500L	-	PTPR series
105	158.8	-	-		EN2MP series, EN5MP series	CB244P1501, CB244P1501L	-	PTPR series
37.7	108.9	46	93	LTDV1CH-17V, LTDV6CH, LTDVE8CH-20, LTDVE4CH-20	EN2MP series, EN5MP series, ENVF series,TC series, TCLWD series, TCHM series	CBLT001, CBLT002	CMHO016	PTPR series

9 At 55 °C, 720mA.
10 At 110 °C.
11 At 25° C.
12 2 m cable with straight female connector included (CB244P1500). Optional cable with right angled connector (CB244P1500L) is also available and must be ordered separately
13 2 m cable with straight female connector included (CB244P1501). Optional cable with right angled connector (CB244P1501L) is also available and must be ordered separately
14 5 m cable with straight female connector included (CBLT001). Optional cable with right angled connector (CBLT002) is also available and must be ordered separately
15 Including connector.

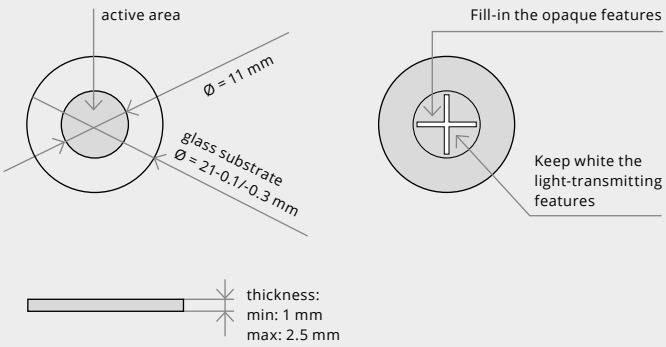
LTPR series

LED pattern projectors

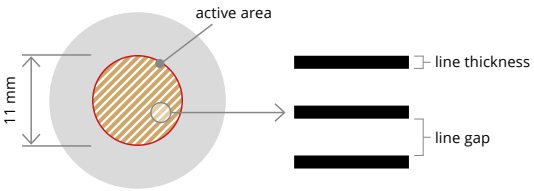
Pattern selection

Custom-made pattern

Custom-made patterns can be supplied on request.
A drawing with accurate geometrical information must be submitted (please refer to the instructions here below).



The projection pattern can be easily interchanged by unscrewing the retaining ring that holds the pattern.
The pattern outer diameter is 21 mm, while the active projection area is a circle of Ø 11 mm.



The pattern drawing could either cover the entire 11 mm diameter area or be of any shape inscribed within this area (such as a square whose side is 7.78mm or a 8.8x6.6mm rectangle).

The projection accuracy depends both on the pattern manufacturing accuracy and the distortion of the projection optics mounted on LTPR models.

The edge sharpness of the projected pattern depends on both the lens resolution and the engraving technique: laser-engraved patterns (part numbers ending in “L”) or photolithography-engraved patterns (part numbers ending in “P”) can be chosen depending on the type of application.

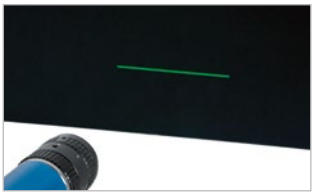
Every kind of shape can be projected

Standard patterns

Stripe 0.5 mm line thickness.

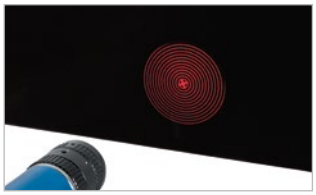
Edge.

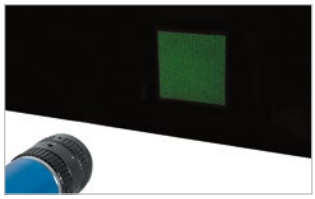
Grid 0.05 mm line thickness.

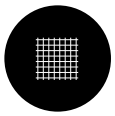
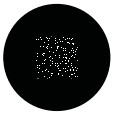
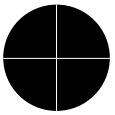
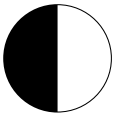
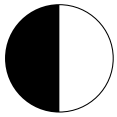


Line 0.5 mm line thickness.

Custom patterns





Format	Photolithography patterns		Laser engraved patterns
3D profilometry			
Line & stripes	 **PT 0000 0100 P** format: line line thickness 0.05 mm	 **PT 0000 0300 P** **8 lines in projection area** line gap 0.95 mm line thickness 0.05 mm line length 7.78 mm	 **PT 0000 0100 L** format: line line thickness 0.5 mm
	 **PTST 050 450 P** **16 lines in projection area** line gap 0.45 mm line thickness 0.05 mm	 **PTST 050 200 P** **32 lines in projection area** line gap 0.20 mm line thickness 0.05 mm	 **PT 0000 0300 L** format: stripe line gap 0.5 mm line thickness 0.5 mm line length 7.78 mm
	 **PTST 050 100 P** **53 lines in projection area** line gap 0.10 mm line thickness 0.05 mm	 **PTST 050 050 P** **80 lines in projection area** line gap 0.05 mm line thickness 0.05 mm	
	 **PTST 010 010 P** **550 lines in projection area** line gap 0.01 mm line thickness 0.01 mm	 **PTST 020 020 P** **275 lines in projection area** line gap 0.02 mm line thickness 0.02 mm	
Stereovision			
Grids	 **PT 0000 0400 P** **8 x 8 lines in projection area** line gap 0.95 mm line thickness 0.05 mm line length 7.78 mm	 **PTGR 050 450 P** **16 x 16 lines in projection area** line gap 0.45 mm line thickness 0.05 mm	 **PT 0000 0400 L** format: grid line gap 0.8 mm line thickness 0.2 mm line length 7.78 mm
	 **PTGR 050 200 P** **32 x 32 lines in projection area** line gap 0.20 mm line thickness 0.05 mm	 **PTGR 050 100 P** **53 x 53 lines in projection area** line gap 0.10 mm line thickness 0.05 mm	
	 **PTGR 050 050 P** **80 x 80 lines in projection area** line gap 0.05 mm line thickness 0.05 mm		
Cloud of dots	 **PTCD 010 P** **Format:** Cloud of dots pattern, density 10.5%	 **PTCD 020 P** **Format:** Cloud of dots pattern, density 20%	
	 **PTCD 035 P** **Format:** Cloud of dots pattern, density 35%		
Alignment			
Cross	 **PT 0000 0200 P** format: cross line thickness 0.05 mm		 **PT 0000 0200 L** format: cross line thickness 0.5 mm
Edge	 **PT 0000 0500 P** format: edge line gap 0.10 mm line thickness 0.05 mm		 **PT 0000 0500 L** format: edge line gap 0.10 mm line thickness 0.5 mm

Pattern specifications

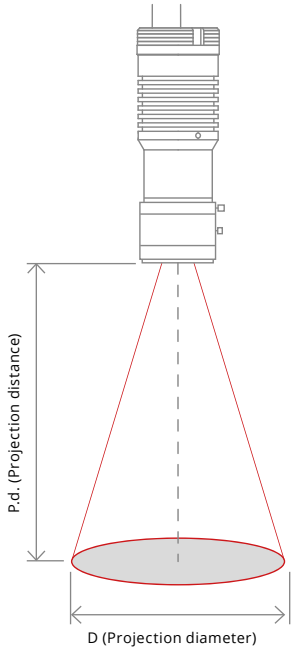
	Photolithography	Laser engraved
Substrate	Soda lime glass	Borofloat glass
Coating	Chrome	Dichroic mirror
Geometrical accuracy	2 µm	50 µm
Edge sharpness	1.4 µm	50 µm

LTPR series

LED pattern projectors

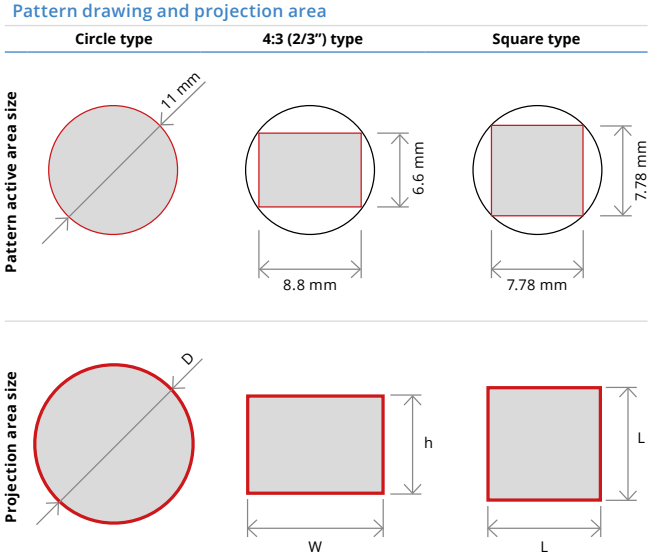
Projection lens selection

Any C-mount optics for 2/3" detectors (11 mm image diagonal) can be interfaced with LTPR series to project areas with different sizes by means of the mount adaptor included.
Unless the projection optics introduces significant distortion, the shape of the projected pattern will preserve the features and aspect ratio of the engraved pattern.



The projected area dimensions will be "M" times the original dimensions of the pattern, where M is the optical magnification at which the selected projection lens is operating.
Telecentric lenses for 2/3" detectors can also be interfaced with LTPRHP3W and LTPRUP models, thus providing telecentric projection of the pattern and enabling unparalleled performance in 3D measurement applications.

Pattern drawing and projection area



Below follows a list of the projection diameters (D) and the recommended projection distances (P.d.) achieved with different types of optics.

	LTPRHP3W	LTPRXP 1	LTPRUP
2 / 3" C-mount lenses			

P.d.	@50 mm	@75 mm	@100 mm	@150 mm	@200 mm	@250 mm	@300 mm	@400 mm	@500 mm
Focal length	D (Projection diameter) (mm)								
6 mm	81	127	172	264					
8 mm	58 (*)	92	127	195	264	333			
12 mm	35 (*)	58 (*)	81	127	172	218	264		
16 mm		41 (*)	58 (*)	92 (*)	127	161	195	264	333
25 mm				55 (*)	77 (*)	99 (*)	121 (*)	165	209 (*)
35 mm						68 (*)	83 (*)	115	146

(*) = spacers may be needed to compensate back focal length.

Standard C-mount lenses.

Standard C-mount lenses.

Standard C-mount lenses.

Telecentric lenses

	TC 23 004	TC 23 007	TC 23 009	TC 23 016	TC 23 024	TC 23 036
P.d. (mm)	57.1	61.2	63.3	45.3	69.2	103.5
D (mm)	5.5	8.3	11.0	20.8	31.4	45.2
	TC 23 048	TC 23 056	TC 23 064	TC 23 072	TC 23 080	TC 23 096
P.d. (mm)	134.6	159.3	182.3	227.7	227.7	279.6
D (mm)	59.8	70.0	80.0	89.9	99.7	117.8

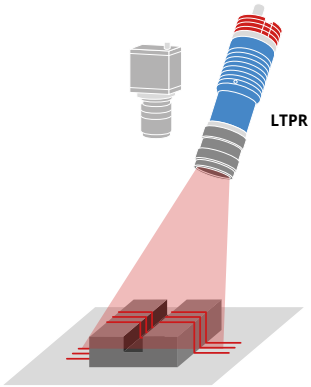
Bi-telecentric lenses.

Bi-telecentric lenses.

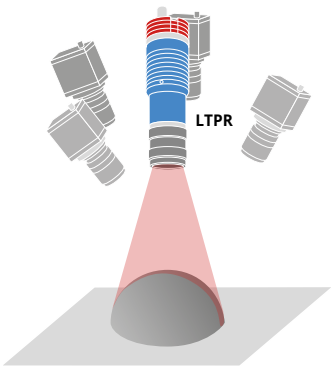
1 Use of LTPRXP in combination with telecentric lenses is not suggested due to non-homogeneus projection (the light source is a multi-die LED). Contact us to discuss your application and find the most suitable pattern projector.

FULL RANGE OF COMPATIBLE PROJECTION OPTICS		
	EN5MP series	p. 110
FULL RANGE OF COMPATIBLE ACCESSORIES		
	Projection patterns PTPR series	p. 252
	Strobe controllers LTDV series	p. 256
	Clamping mechanics CMHO016	p. 228

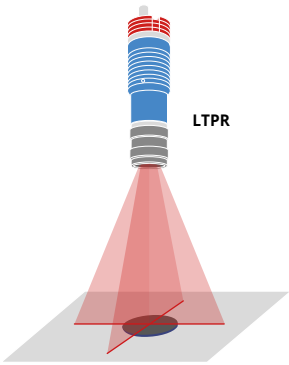
Application examples



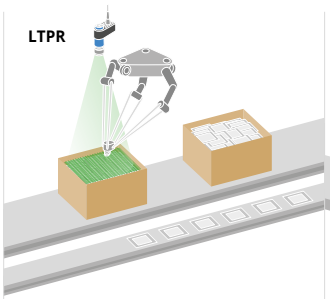
3D profilometry



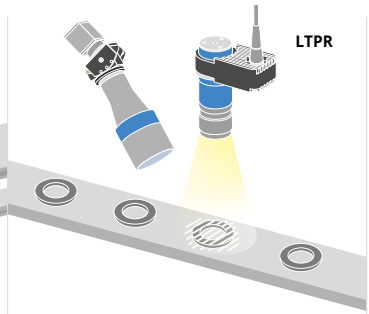
Stereovision



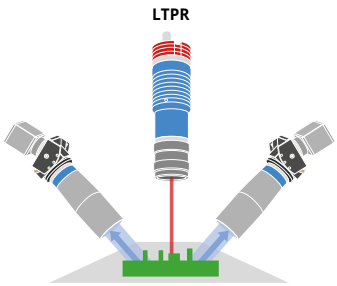
Alignment



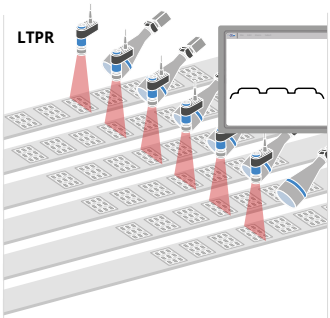
Bin picking
(robot guidance for fast pick and place)



Planarity control of black products
(LTPRUP strobe projector suggested)



3D inspection of the height
of connector pins



Pharmaceutical blister volume
vision control

LTPRSMHP3W series

3W tilting LED pattern projectors

KEY ADVANTAGES

Scheimpflug tilt adjustment compatible with C-mount optics
Focus is maintained even when the pattern is tilted.

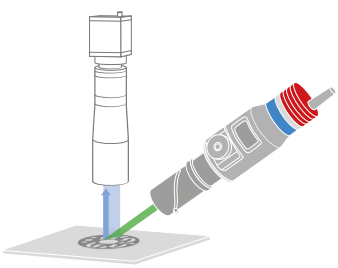
Light condenser focusing mechanism
For excellent optical coupling and light throughput.

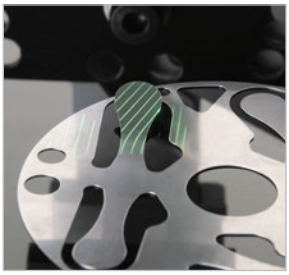
Enhanced optical power
High numerical aperture condenser lens.

LTPRSMHP3W series are LED pattern projectors specifically designed for the most demanding 3D profiling and measurement applications. Triangulation techniques require that structured light is directed onto a sample at a considerable angle from vertical. Tilting the light source pattern becomes essential to ensure that the patterned light is properly focused across the entire sample surface.

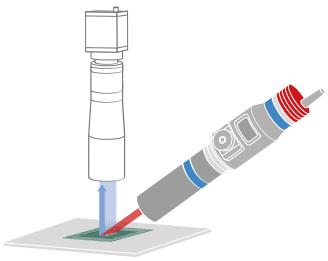
LTPRSMHP3W pattern projectors integrate a precision tilting mechanism based on the Scheimpflug condition. This ensures that focus is maintained across the entire part, and reconstruction of the 3d surface is as accurate as possible. Moreover, the internal focus mechanism offers the maximum optical throughput.

Examples of setup and applications

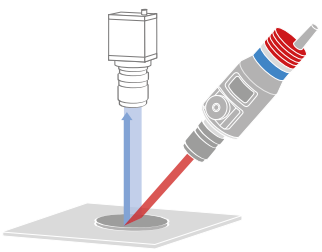


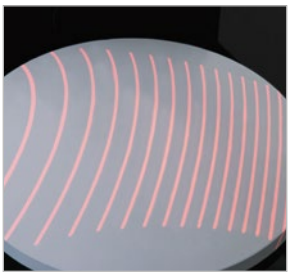


Configuration with zero distortion macro lenses.

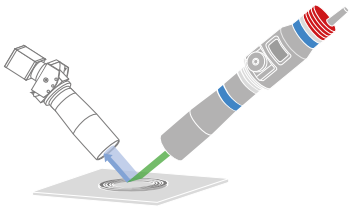


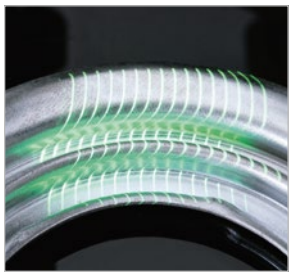
Configuration with bi-telecentric lenses.





LTPRSM pattern projector with a standard C-mount lens.

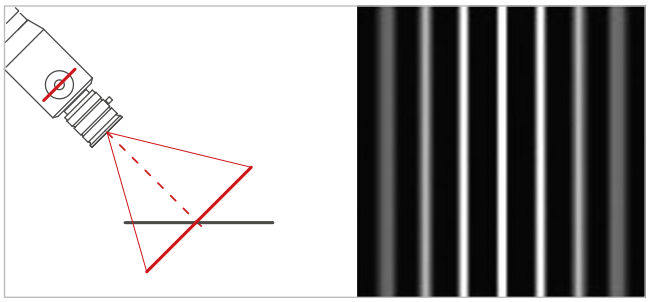




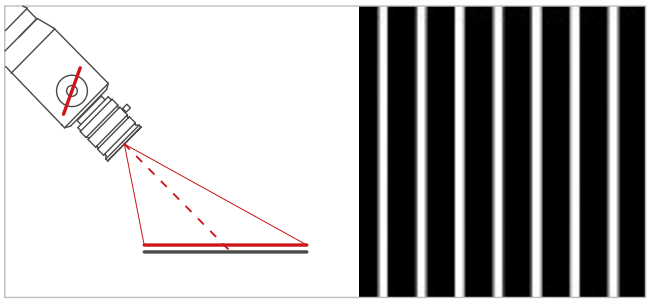
Scheimpflug telecentric optics for both projection and imaging at 90°.

LIGHT SOURCE

- **Higher efficiency**
- **Precise light intensity adjustment**
- **Easy LED source replacement**



Without tilt adjustment the pattern features are only partly focused.

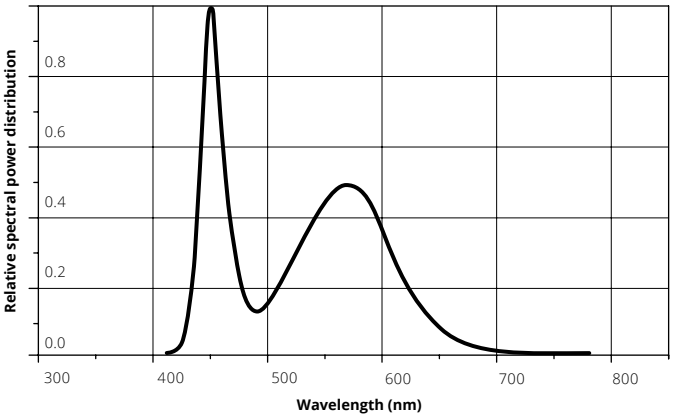


With the Scheimpflug adjustment focus is maintained across the entire plane.

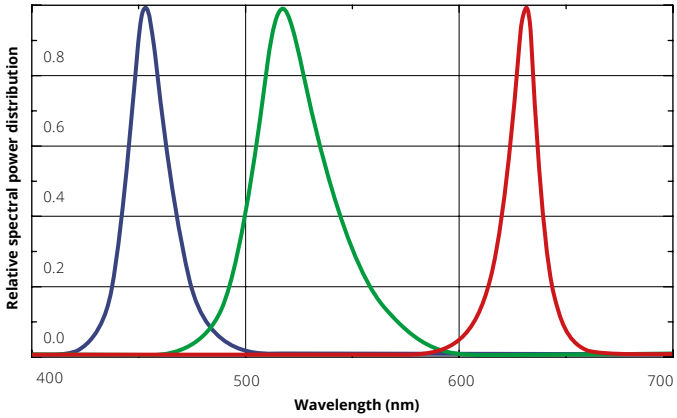
Electrical features

These LED devices integrate built-in switching electronics that control the current flow through the LED and which can be easily tuned by the user. This ensures both light stability and longer lifetime of the product.
The inner circuitry can be bypassed to directly drive the LED. Simply connect the black and blue wires to your power supply instead of the black and brown ones, ensuring that maximum rates are not exceeded.

Typical emission spectrum of white LEDs



Typical emission spectrum of R,G,B LEDs



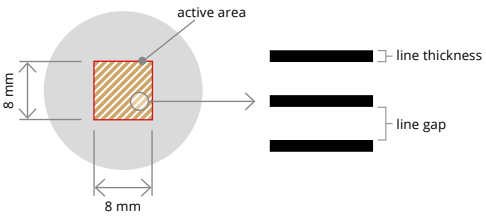
	Light	Device power ratings				LED power ratings		
Part number	**Light color, wavelength peak**	**DC Voltage**		**Power consumption**	**Max LED forward current**	**Forward voltage**		**Max pulse current**
		Minimum (V) 1	Maximum (V)	(W)	(mA) 2	Typical (V)	Maximum (V) 3,4	(mA) 5
LTPRSMHP 3W-R	red, 630 nm	12	24	< 4.5	720	2.4	3.00	2000
LTPRSMHP 3W-G	green, 520 nm	12	24	< 4.5	720	3.3	4.00	2000
LTPRSMHP 3W-B	blue, 460 nm	12	24	< 4.5	720	3.3	4.00	2000
LTPRSMHP 3W-W	white	12	24	< 4.5	720	2.78	n.a.	2000

1 Tolerance ± 10%.
2 Used in continuous (not pulsed) mode.
3 At max forward current.
4 Tolerance is ±0.06V on forward voltage measurements.
5 At pulse width <= 10 ms, duty cycle <= 10% condition.
Built-in electronics board must be bypassed (see tech info online).

LTPRSMHP3W series

Product insight

Pattern selection



The projection pattern placed inside the unit can be changed with ease: just remove the C-mount adaptor by loosening the set-screws and fix the pattern by securing the retaining ring.

Different types of stripe and grid patterns are available; the chart shows the line thickness (0.05 mm) and the gap between neighboring lines for each pattern type.

When these features are projected, they become 1/M times larger, with "M" being the magnification of the projection lens. The number of lines mentioned after each part number indicates the number of features on the active area of the pattern.

Photolithography stripe patterns

PT 0000 0300 P
8 lines in projection area

line gap	0.95 mm
line thickness	0.05 mm
line length	7.78 mm

PTST 050 450 P
16 lines in projection area

line gap	0.45 mm
line thickness	0.05 mm

PTST 050 200 P
32 lines in projection area

line gap	0.20 mm
line thickness	0.05 mm

PTST 050 100 P
53 lines in projection area

line gap	0.10 mm
line thickness	0.05 mm

PTST 050 050 P
80 lines in projection area

line gap	0.05 mm
line thickness	0.05 mm

Photolithography grid patterns

PT 0000 0400 P
8 x 8 lines in projection area

line gap	0.95 mm
line thickness	0.05 mm
line length	7.78 mm

PTGR 050 450 P
16 x 16 lines in projection area

line gap	0.45 mm
line thickness	0.05 mm

PTGR 050 200 P
32 x 32 lines in projection area

line gap	0.20 mm
line thickness	0.05 mm

PTGR 050 100 P
53 x 53 lines in projection area

line gap	0.10 mm
line thickness	0.05 mm

PTGR 050 050 P
80 x 80 lines in projection area

line gap	0.05 mm
line thickness	0.05 mm

Pattern specifications

Photolithography patterns	
Substrate	Soda lime glass
Coating	Chrome
Geometrical accuracy	2 µm
Edge sharpness	1.4 µm

FULL RANGE OF COMPATIBLE PROJECTION OPTICS

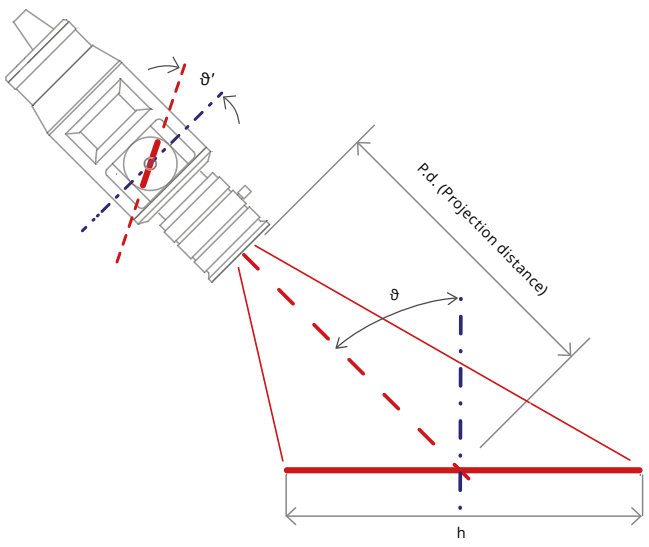

TC series p. 16


MC series p. 92

FULL RANGE OF PROJECTION PATTERNS


PTPR series p. 252

Projection lens selection

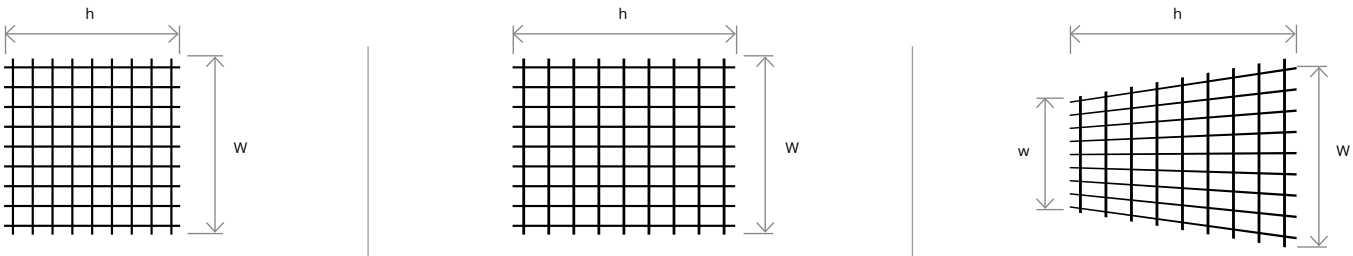


LTPRSMHP3W series units can be interfaced with any type of optics, but the best results are achieved with bi-telecentric lenses. The projection area is undistorted since tilting the pattern causes a linear extension along only one direction.

Excellent results can also be obtained with zero distortion macro lenses; here, the magnification changes along both axes, but image resolution and distortion still easily allows for 3D reconstruction.

With non bi-telecentric lenses, a square pattern becomes a trapezoid in the projection plane, whose parallel sides are indicated as "w" and "W" in the drawings below.

The projection area shown in the chart are also a good approximation for standard C-mount lenses used as macro lenses.



Original pattern features

Projection area with a bi-telecentric lens

Projection area with a macro lens

Projection area with bi-telecentric lenses (TC series)

		ϑ = 0°		ϑ = 15°		ϑ = 30°		ϑ = 45°	
Part number	**Projection distance P.d.** (mm)	**Projection area** W x h (mm x mm)	**Pattern tilt** ϑ' (deg)	**Projection area** W x h (mm x mm)	**Pattern tilt** ϑ' (deg)	**Projection area** W x h (mm x mm)	**Pattern tilt** ϑ' (deg)	**Projection area** W x h (mm x mm)	**Pattern tilt** ϑ' (deg)
TC 23 009	63.3	8.0 x 8.0	0	8.0 x 8.0	15.0	8.0 x 8.0	30.0	8.0 x 8.0	45.0
TC 23 016	45.3	15.2 x 15.2	0	15.2 x 15.4	8.1	15.2 x 16.8	17.0	15.2 x 20.0	27.8
TC 23 024	69.2	22.9 x 22.9	0	22.9 x 23.6	5.4	22.9 x 26.0	11.4	22.9 x 30.5	19.3
TC 23 036	103.5	32.9 x 32.9	0	32.9 x 34.0	3.7	32.9 x 37.7	8.0	32.9 x 45.3	13.6
TC 23 048	134.6	43.3 x 43.3	0	43.3 x 44.7	2.8	43.3 x 49.8	6.1	43.3 x 60.3	10.5
TC 23 056	159.3	51.0 x 51.0	0	51.0 x 52.8	2.4	51.0 x 58.6	5.1	51.0 x 71.3	8.8
TC 23 064	182.0	58.2 x 58.2	0	58.2 x 60.3	2.1	58.2 x 67.1	4.5	58.2 x 81.7	7.8
TC 23 080	227.0	72.7 x 72.7	0	72.7 x 73.8	1.7	72.7 x 83.6	3.6	72.7 x 102.0	6.3
TC 23 096	279.0	85.6 x 85.6	0	85.6 x 88.6	1.4	85.6 x 98.7	3.1	85.6 x 120.9	5.3

Bi-telecentric lenses.

Projection area with macro (MC3-03x and MC series) and standard lenses

		ϑ = 0°			ϑ = 15°			ϑ = 30°			ϑ = 45°		
Mag. (x)	**Projection distance P.d.** (mm)	**Projection area w** (mm)	**(W) x h** (mm x mm)	**Pattern tilt ϑ'** (deg)	**Projection area w** (mm)	**(W) x h** (mm x mm)	**Pattern tilt ϑ'** (deg)	**Projection area w** (mm)	**(W) x h** (mm x mm)	**Pattern tilt ϑ'** (deg)	**Projection area w** (mm)	**(W) x h** (mm x mm)	**Pattern tilt ϑ'** (deg)
1	46.0	8.0	(8.0) x 8.0	0	7.7	(8.3) x 8.0	15.0	7.5	(8.6) x 8.1	30.0	7.3	(8.9) x 8.1	45.0
0.75	48.0	10.7	(10.7) x 10.7	0	10.3	(11.1) x 10.9	11.4	10.0	(11.6) x 11.4	23.5	9.6	(12.1) x 12.3	37.0
0.5	60.0	16.1	(16.1) x 16.1	0	15.5	(16.7) x 16.5	7.6	14.9	(17.5) x 17.9	16.2	14.3	(18.4) x 20.7	26.7
0.33	92.0	24.3	(24.3) x 24.3	0	23.4	(25.3) x 25.1	5.1	22.5	(26.5) x 27.8	10.8	21.4	(28.1) x 33.3	18.3
0.2	136.0	40.1	(40.1) x 40.1	0	38.6	(41.6) x 42.1	3.1	37.0	(43.6) x 46.2	6.6	35.1	(46.6) x 56.8	11.4
0.1	275.0	79.5	(79.5) x 79.5	0	76.6	(82.6) x 82.4	1.6	73.5	(86.6) x 92.3	3.4	69.6	(92.6) x 114.2	5.8

Standard C-mount lenses.

Macro lenses.

LTPKIT case

High power lighting kit

The **LTPKIT** is a selection of some of the Opto Engineering® high-power LED lighting solutions, including three different strobe illuminators and an ultra-bright strobe LED pattern projector. The case also includes a 6 channel strobe controller, designed to precisely control the lights and easily manage the trigger signals, in addition to a DIN rail industrial power supply.

This versatile and portable light kit is ideal for system integrators dealing with machine vision applications that require high power strobe illumination. The LTPKIT also benefits from our special educational price: you should seriously consider buying one for your laboratory to discover the advantages of our strobe lights!

Part number	Products included		Quantity	Description
LTPKIT		**LTLAB2-W**	1	Diffuse strobe low angle ring light illuminator - medium size high power white
		**LTDMLAB2-W**	1	Diffuse strobe dome + low angle illumination system - medium size high power white
		**LTBP096072-W**	1	High power strobe LED backlight, 96 x 72 mm lighting area, white
		**LTPRUP-W**	1	90W strobe LED pattern projector white
		**LTDV6CH**	1	Strobe controller 6 channels
		**RT-SDR-120-24**	1	24VDC DIN rail power supply
		**ADPT001**	1	Adapter RS485-USB + cable with 3 elements for LTDV6CH connection

LTKITRY-FH-OR-V1

Continuous lighting kit

NEW

Opto Engineering® **LTKITRY-FH-OR-V1** case includes a selection of some our commonly used LED illuminators working in continous mode, including two lighting controllers for dimming, brackets and diffusers.
The continuous lighting kit case is a very helpful tool for system integrators that are frequently dealing with new machine vision applications requiring different type of lights.

The LTKITRY-FH-OR-V1 case also benefits from our special educational price: you should seriously consider to buy this kit for your laboratory in order to be able to perfom feasibility tests with many different types of lights!

Part number	Products included		Quantity	Description
LTKITRY-FH-OR-V1		**LTICGR1000-D1-PS-EU**	2	Analogue lighting controller unit, 1 channel, 24V, 2A, constant mode, EU power cord, power adaptor 24V plug
		**LT4WRG100-00-1-W-24V**	1	LED dome light, 118 mm outer diameter, white, 24V
		**LT2QOG040-00-X-W-24V**	1	LED coaxial light, 48x48 mm light emitting area, white, 24V
		**LTZPFL160-00-6-W-24V**	1	LED bar light, 6 LED rows, 160X26.3 illumination area, white, 24V
		**LTZGK070-15-3-W-24V**	1	LED ringlight, 3 LED rows, outer diameter 70 mm, 15°, white, 24V
		**LTZGK070-45-3-W-24V**	1	LED ringlight, 3 LED rows, outer diameter 70 mm, 45°, white, 24V
		**LTZZO130-75-3-W-24V**	1	LED low angle ringlight, 3 LED rows, outer diameter 131 mm, 75°, white, 24V
		**LTPVRG070-00-1-W-24V**	1	Flat side-emitting LED backlight, thin borders, 70X70 mm illumination area, white, 24V
		**LTPVR070-00-1-W-24V**	1	Flat side-emitting LED backlight, 70X70 mm illumination area, white, 24V
		**LT2RZF100-60-2-W-24V**	1	LED ringlight, 2 LED rows, 100 mm outer diameter, 60°, white, 24V
		Diffusers	-	Diffuser for LTZGK070-15-3, LTZGK070-45-3, LTZZO170-75-3
		Brackets	-	Brackets for LT4WRG100-00-1, LT2QOG040-00-X, LTZPFL160-00-6
		Polarizer	1	Polarizer for LTZPFL160-00-6