

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.

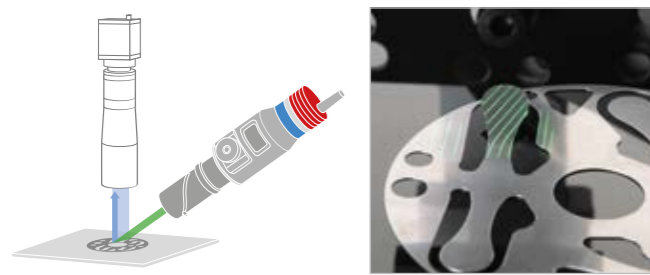
Enhanced optical power

High numerical aperture condenser lens.

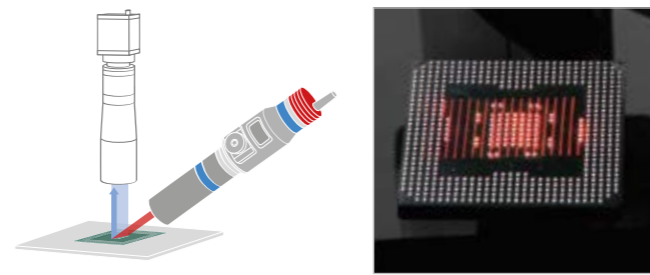
LTPRSMHP3W series are LED pattern projectors specifically designed for the most demanding 3D profiling and measurement applications. Triangulation techniques require that structured light is directed onto a sample at a considerable angle from vertical. Tilting the light source pattern becomes essential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

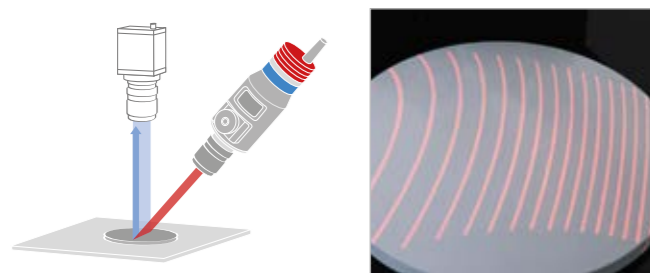
Examples of setup and applications



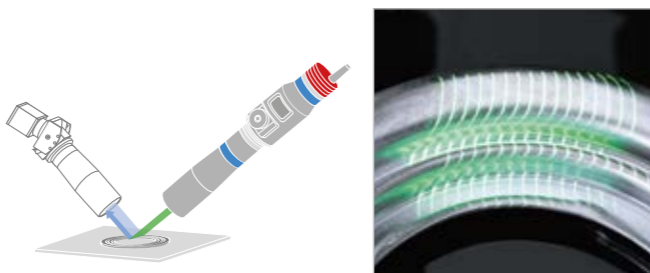
Configuration with zero distortion macro lenses.



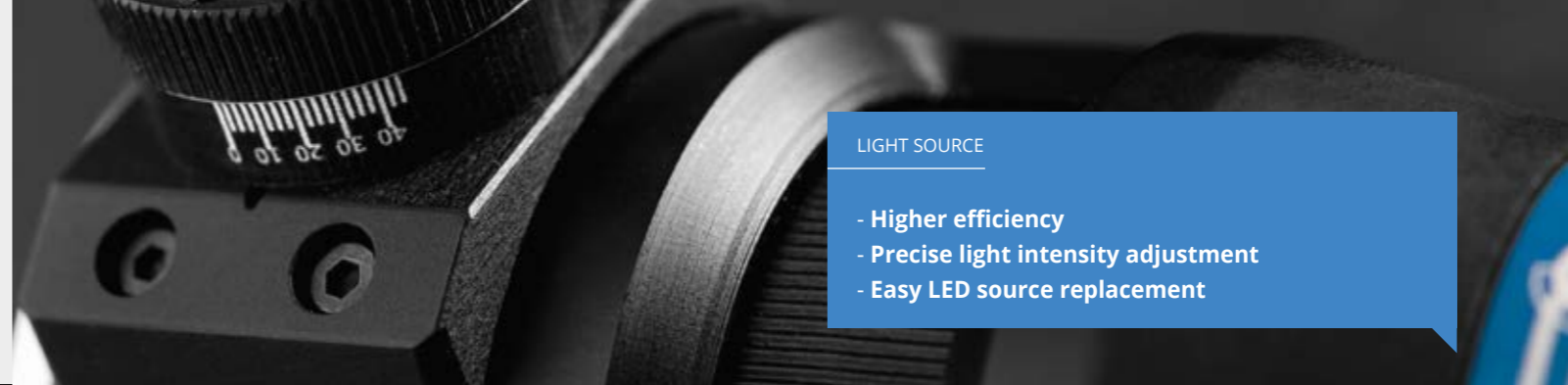
Configuration with bi-telecentric lenses.



LTPRSM pattern projector with a standard C-mount lens.

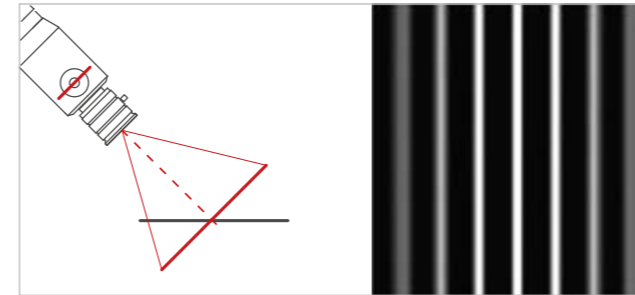


Scheimpflug telecentric optics for both projection and imaging at 90°.

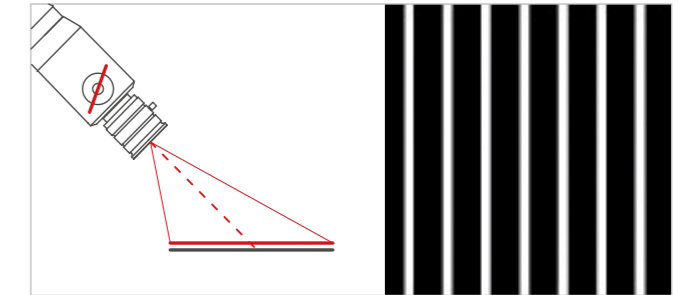


LIGHT SOURCE

- 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.

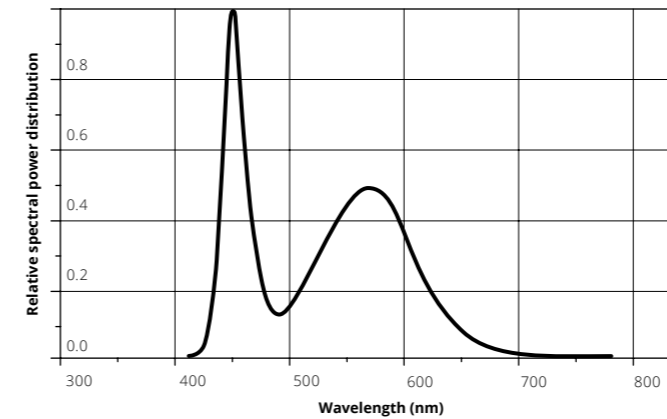


Electrical features

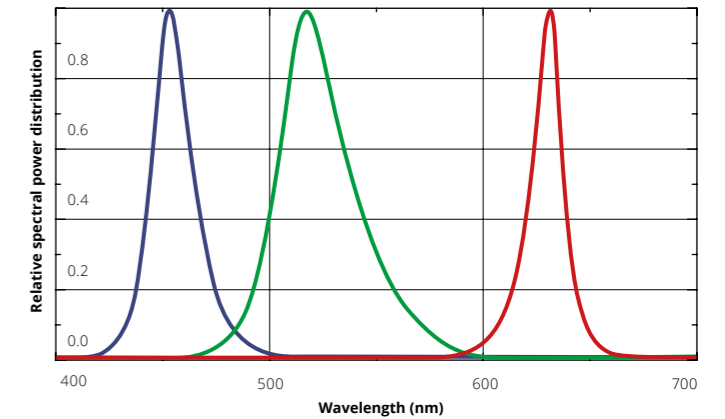
These LED devices integrate built-in switching electronics that control the current flow through the LED and which can be easily tuned by the user. This ensures both light stability and longer lifetime of the product.

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



Part number	Light color, wavelength peak	Device power ratings				LED power ratings		
		DC Voltage		Power consumption (W)	Max LED forward current (mA)	Forward voltage		Max pulse current (mA)
		Minimum (V)	Maximum (V)			Typical (V)	Maximum (V)	
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.

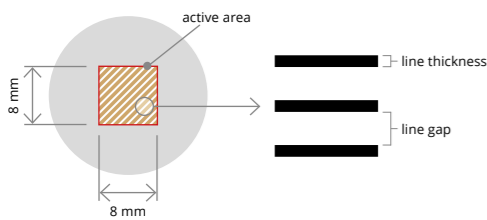
4 Tolerance is ±0.06V on forward voltage measurements.
 5 At pulse width ≤ 10 ms, duty cycle ≤ 10% condition.
 Built-in electronics board must be bypassed (see tech info online).

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.

Pattern specifications

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

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

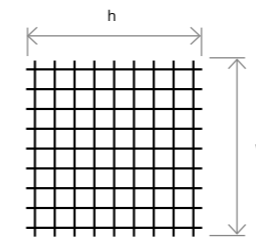
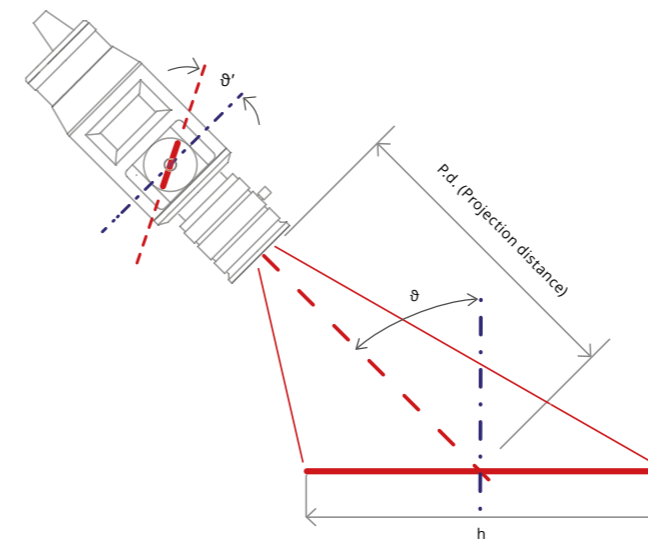
PTGR 050 200 P
32 x 32 lines in projection area
line gap 0.20 mm
line thickness 0.05 mm

PTGR 050 100 P
53 x 53 lines in projection area
line gap 0.10 mm
line thickness 0.05 mm

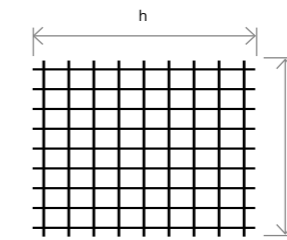
PTGR 050 050 P
80 x 80 lines in projection area
line gap 0.05 mm
line thickness 0.05 mm

FULL RANGE OF COMPATIBLE PROJECTION OPTICS		
	TC series	p. 8
	MC series	p. 70
FULL RANGE OF PROJECTION PATTERNS		
	PTPR series	p. 218

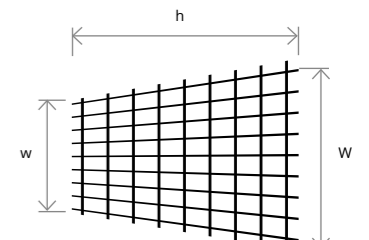
Projection lens selection



Original pattern features



Projection area with a bi-telecentric lens



Projection area with a macro lens

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.

Projection area with bi-telecentric lenses (TC series)

Part number	Projection distance P.d. (mm)	θ = 0°		θ = 15°		θ = 30°		θ = 45°	
		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

Mag. (x)	Projection distance P.d. (mm)	θ = 0°			θ = 15°			θ = 30°			θ = 45°		
		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.