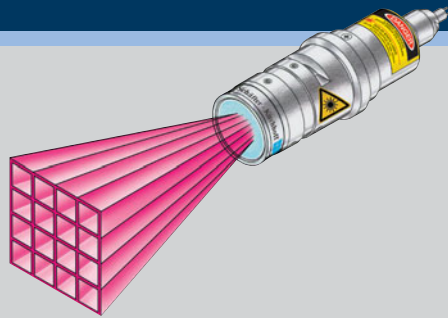
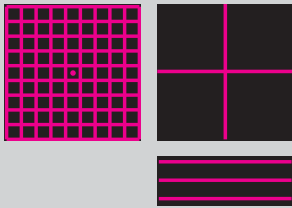


# Laser Pattern Generator 13P...+55CM...

Laser modules with diffractive beam-shaping optics



- Miscellaneous patterns of numerous single laser spots
- High diffractive efficiency
- Spectral range 635–660 nm
- Laser output power up to 58 mW
- Optics for various working distances
- Focussable with integrated focussing mechanism
- External TTL modulation up to 250 kHz, analog modulation up to 10 Hz
- Metal casing, Ø 25/28 mm
- Integrated power control
- Adjustable output power <math><1 - 100\%</math>
- Supply voltage 5 V DC

Diffractive beam shaping is based on the diffraction of periodic and non-periodic micro-structures (synthetic hologram). The diffractive optical elements used by Schäfter+Kirchhoff are multi-level or analogous phase structures with high transparency, generating line patterns with the finest structure, such as grids, circles, crosses or multiple lines. The grid sizes, diameters, or line distances specified in the left table are valid for the standard working distance of the beam-shaping optic. Different working distances within the given focussing range can be achieved by refocussing. The size of the generated patterns then increases in proportion with the

changed working distance. The more complex structures (grid, circle or cross) consist of a large number of single laser spots. In principle, all diffractive beam-shaping optics show small deviations from the geometrical ideal (distortion). In applications like 3D profile measurements, calibration techniques are used to account for pattern distortion. The diffractive optical elements used by Schäfter+Kirchhoff have a high diffraction efficiency and the desired pattern contains approximately 85% of the laser power. The residual laser power appears as an undiffracted central spot (0<sup>th</sup> diffraction order) in the center of the pattern.

**13P+55CM**

**Two-part Order Code**

Example: Order Code 13PG-9x9-M125 + 55CM - 635 - 10 - B07 - M12 - P - 6

**Pattern Optics**

**Laser Diode Collimator**

All combinations of beam shaping optics and laser module are possible.

Beam Parameters 13P	Line Length Diameter L/D [mm]	Line Distance d [mm]	Line width B [mm]	Working Distance A [mm]	Rayleigh Range $Z_{r,R}$ [mm]	Focussing range [mm]	Diffraction Efficiency at 635 nm	Order Code	
								13P	55CM
grid 40° 	91	9.7	0.074	120	0.3	100-400	n.a.	13PG40-9x9-M125	55CM - 635 - 10 - B07 - M12 - P - 6
	364	39	0.30	496	52	400-800		13PG40-9x9-S500	55CM* - 658 - 21 - B09 - M12 - P/PS - x
	728	78	0.59	977	208	800-2000		13PG40-9x9-S1000	55CM* - 658 - 63 - B29 - M12 - P/PS - x
7 lines rectangular 7°x5° 	15.3	1.8	0.074	120	0.3	100-400	99.5%	13PL7x5-7-M125	55CM - 635 - 10 - B07 - M12 - P - 6
	61	7.2	0.30	496	52	400-800		13PL7x5-7-S500	55CM* - 658 - 21 - B09 - M12 - P/PS - x
	122	14.5	0.59	977	208	800-2000		13PL7x5-7-S1000	55CM* - 658 - 63 - B29 - M12 - P/PS - x
7 lines square 21° 	47	7.9	0.074	120	0.3	100-400	99%	13PL21-7-M125	55CM - 635 - 10 - B07 - M12 - P - 6
	189	31.5	0.296	496	52	400-800		13PL21-7-S500	55CM* - 658 - 21 - B09 - M12 - P/PS - x
	378	63	0.59	977	208	800-2000		13PL21-7-S1000	55CM* - 658 - 63 - B29 - M12 - P/PS - x
11 lines square 30° 	67	6.7	0.15	120	0.3	100-400	99%	13PL30-11-M125	55CM - 635 - 10 - B07 - M12 - P - 6
	268	26.8	0.60	496	52	400-800		13PL30-11-S500	55CM* - 658 - 21 - B09 - M12 - P/PS - x
	536	53.6	1.2	977	208	800-2000		13PL30-11-S1000	55CM* - 658 - 63 - B29 - M12 - P/PS - x
cross hairs, 5° 	10.7	-	0.074	120	0.3	100-400	96%	13PX5-M125	55CM - 635 - 10 - B07 - M12 - P - 6
	42.8	-	0.30	496	52	400-800		13PX5-S500	55CM* - 658 - 21 - B09 - M12 - P/PS - x
	85.6	-	0.59	977	208	800-2000		13PX5-S1000	55CM* - 658 - 63 - B29 - M12 - P/PS - x
cross hairs, 45° 	103	-	0.074	120	0.3	100-400	95%	13PX45-M125	55CM - 635 - 10 - B07 - M12 - P - 6
	414	-	0.30	496	52	400-800		13PX45-S500	55CM* - 658 - 21 - B09 - M12 - P/PS - x
	828	-	0.59	977	208	800-2000		13PX45-S1000	55CM* - 658 - 63 - B29 - M12 - P/PS - x
Circle, 21° 	46	6.5	0.074	120	0.3	100-400	n.a.	13PC21-9x9-M125	55CM - 635 - 10 - B07 - M12 - P - 6
	185	26	0.30	496	52	400-800		13PC21-9x9-S500	55CM* - 658 - 21 - B09 - M12 - P/PS - x
	371	52	0.59	977	208	800-2000		13PC21-9x9-S1000	55CM* - 658 - 63 - B29 - M12 - P/PS - x

**Dimensions** A5 13P... + 55CM

A = working distance      L = line length  
B = line width              \* = Clamping region for mounting

**Adjustment Tools**

Hex key WS 1.5  
**Order Code 50HD-15**  
(For correction and fixing of the focus setting)

Screwdriver WS 1.2  
**Order Code 9D-12**  
(Potentiometer for laser power setting)

**Correction factor F:** Properties of the laser diode, such as divergence angle and wave-length, affect the width and Rayleigh range/depth of focus of the laser pattern:

Line Width: multiply by  $F$  (right table last column)  
Rayleigh Range: multiply by  $F^2 \cdot 660 \text{ nm} / \lambda$  [nm]

**Crosshair 13PX-...**

Two perpendicular lines  
Fan angle 5°–60°

**Multi-line 13PL-...**

3–65 lines  
Fan angle 20°–30°

**Grid 13PG-...**

Grid with 9x9 areas  
Fan angle 40°

**Circle 13PC-...**

Concentric about a central spot  
Fan angle 20°, 34°