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2014

# Accessories/spare parts



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Accessories / spare parts

No product is an island

We are fully aware that Opto Engineering products live in complex ecosystems where optics must be mechanically supported, calibrated and serviced: we strive to provide complete solutions for easy deployment of our optical products, ranging from clamping supports to a wide array of light sources, filters and patterns.

Of course, optical and electrical replacement parts are provided, as well as the online documentation needed for the most common service tasks.

Please refer to our website www.opto-engineering.com to browse our complete product range.

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Accessories | CMHO series

# CMHO series

Clamping mechanics



The accurate alignment of optical components is crucial when designing measurement systems. Besides optical components stability, the mechanical system layout should assure that the optical axis is orthonormal to the measurement plane.

For this purpose, Opto Engineering supplies **CMHO series** clamping mechanics, suitable for most Opto Engineering telecentric lenses and collimated illuminators.

Three-point mounting grants a very precise and stable alignment of the optical components, also making the assembling procedure quick and simple.



### Assembling a telecentric lens on a CMHO clamping support











Part Part<		Compatibility			Mechanical specifications			
number   Image: Problem in the second sec	Part	Opto Engineering optics	Teleplates	Length	Width	Height	Optical axis	
CMM 0 023   C 12 300, TC 23 007, TC 23 009, TC 23 012, TC 4M 007, TC 4M 009, LTCL 023.×   004-009   20.0   53.0   66.5   40.0     CMM 0 024   TC 12 016, TC 23 016, TC 2M 016, LTCL 016.×   016-024   20.0   62.5   71.2   40.0     CMM 0 024   TC 12 024, TC 23 036, TC 4M 024, LTCL 024.×   016-024   20.0   62.5   71.2   40.0     CMM 0 024   TC 12 024, TC 23 036, TC 4M 036, TC 10	number		СМРТ				height	
CMM 0023   TC 23 00, TC 23 007, TC 23 007, TC 23 007, TC 24 007, TC 4M 007, TC 4M 009, LTCL 023-X   004-009   20.0   52.0   71.2   40.0     CMM 0016   TC 120 16, TC 23 016, TC 4M 004, TC 2M 016, LTCL 016-X   016-024   20.0   62.5   71.2   40.0     CMM 0036   TC 120 302, TC 4M 004, TC 2M 004, TC 10 036, LT CL 036-X   016-024   10.0   97.0   12.5   80.0     CMM 0036   TC 120 48, TC 23 048, TC 4M 036, TC 10 036, LT CL 036-X   048   14.00   111.0   132.5   80.0     CMM 0046   TC 120 48, TC 23 048, TC 4M 036, TC 10 036, LT CL 036-X   048   14.00   111.0   132.5   80.0     CMM 0054   TC 12 048, TC 23 048, TC 4M 048, TC 4M 043, TC 4M 048, LT CL 056-X   048   152.0   150.0   80.0     CMM 0056   TC 30 50, TC 13 080, TC 12 080, TC 2M 080, TC 4M 080, TC				(mm)	(mm)	(mm)	(mm)	
CMM0 0161   TC 12 016, TC 23 016, TC 2M 016, LTC U016-X   016-024   20.0   6.2.5   7.1.2   40.0     CMM 024   TC 12 024, TC 23 024, TC 2M 024, LTCL 0024, X   016-024   20.0   62.5   7.1.2   40.0     CMM 036   TC 12 036, TC 12 036, TC 23 036, TC4M 036, TC1M 036, LTCL 036-X   048   14.00   111.0   132.5   80.0     CMM 048   TC 12 056, TC 23 056, TC4M 036, TC2M 036, TC1M 036, LTCL 036-X   064   14.00   111.0   132.5   80.0     CMM 045   TC 12 056, TC 23 056, TC4M 036, TC2M 036, TC1M 036, LTCL 036-X   064   140.0   111.0   132.6   80.0     CMM 048   TC 12 056, TC 12 056, TC 23 050, TC4M 035, TC1M 056, LTCL 036-X   064   120.0   152.0 <th>CMHO 023</th> <th>TC 23 004, TC 23 007, TC 23 009, TC 23 012, TC4M 004, TC4M 007, TC4M 009, LTCL 023-X</th> <th>004-009</th> <th>20.0</th> <th>53.0</th> <th>66.5</th> <th>40.0</th>	CMHO 023	TC 23 004, TC 23 007, TC 23 009, TC 23 012, TC4M 004, TC4M 007, TC4M 009, LTCL 023-X	004-009	20.0	53.0	66.5	40.0	
CMM 0024   C12 1224, TC2 3024, TC2 M024, LTCL 2024X   016-024   20.0   6.2.5   71.2   4.00     CMM 0036   TC1 20 305, TC 23 036, TC4 M024, TC2 M036, TC1 M036, LTCL 036-X   036   11.00   97.00   12.5.5   88.0     CMM 0048   TC 12 048, TC 23 036, TC4 M036, TC1 M036, LTCL 036-X   048   14.00   11.0   13.5.5   88.0     CMM 0056   TC 13 064, TC 12 064, TC 23 064, TC4 M048, TC1 M064, LTCL 064-X   064   17.5.0   137.0   145.0   88.0     CMM 0054   TC 13 064, TC 12 064, TC 23 064, TC4 M064, TC2 M064, TC1 M064, LTCL 064-X   064   17.5.0   137.0   145.0   88.0     CMM 0054   TC 23 072, TC 13 080, TC 12 080, TC 24 080, TC 21 080, TC 10 080, TC 10 080, LTCL 096-X   064   17.5.0   17.30   183.0   10.0     CMM 0124   TC 23 072, TC 12 080, TC 24 080, TC 24 080, TC 24 080, TC 12 096, TC 24 096, TC	СМНО 016	TC 12 016, TC 23 016, TC4M 016, TC2M 016, LTCL 016-X	016-024	20.0	62.5	71.2	40.0	
CMM 0 036T 11 3 036, TC 12 3 036, TC 21 3 036, TC 2M 036, TC 2M 036, TC 16M 036, LTCL 036 ×910.0110.097.0125.580.0CMM 0 048T 21 048, TC 23 048, TC 4M 048, TC 16M 048, LTCL 048 ×048140.0111.0132.580.0CMH 0 054T 21 205, TC 23 055, TC 4M 055, TC 16M 056, LTCL 056 ×056161.0137.0145.080.0CMH 0 050T 21 306, TC 12 036, TC 23 056, TC 4M 056, TC 16M 056, LTCL 056 ×064175.0137.0145.080.0CMH 0 050T 22 307, TC 13 080, TC 12 080, TC 23 080, TC 4M 097, TC 4M 080, TC 2M 080, LTCL 080 ×, PC xx030X5096230.0153.0153.080.0CMH 0 050T C23 103, TC 12 120, TC 23 109, TC 12 0309, TC 4M 096, TC 2M 096, TC 1006 ×, LT 006 ×, LT 00	CMHO 024	TC 12 024, TC 23 024, TC4M 024, TC2M 024, LTCL 024-X	016-024	20.0	62.5	71.2	40.0	
CMH 0 048 TC 12 048, TC 23 048, TC 4M 048, TC 100 464, TC 100 64, LTC 1064-X 048 140.0 111.0 132.5 80.0   CMH 0 056 TC 12 056, TC 23 056, TC 4M 056, TC 100 056, LTC 1056-X 056 162.0 116.0 135.0 80.0   CMH 0 050 TC 33 056, TC 12 056, TC 2M 056, TC 16M 054, LTC 1064-X 064 175.0 137.0 145.0 80.0   CMH 0 050 TC 33 08, TC 12 056, TC 23 050, TC 4M 085, TC 4M 085, TC 100 054, TC 10 054, X C xx030X5 050 230.0 153.0 152.0 80.0   CMH 0 056 TC 23 103, TC 12 1056, TC 23 056, TC 4M 055, TC 4M 056, TC 10 056, TC 10 056, TC 10 056, TC 10 056, TC 23 105, TC 12 056, TC 23 056, TC 4M 055, TC 4M 056, TC 10 056, TC 10 056, TC 10 056, TC 23 105, TC 12 056, TC 23 105, TC 4M 015, TC 4M 120, TC 21 102, TC 12 104, TC 23 110, TC 12 104, TC 23 100, TC 10 100, TC 12 104, TC 23 100, TC 12 104, TC 23 100, TC 10 100, TC 12 104, TC 23 100, TC 12 104, TC 23 100, TC 10 100, TC 12 104, TC 10 102, TC 10 100, TC 10 100, TC 12 104, TC 10 100, TC 10 100, TC 12 104, TC 10 100,	CMHO 036	TC 13 036, TC 12 036, TC 23 036, TC4M 036, TC2M 036, TC16M 036, LTCL 036-X	036	110.0	97.0	125.5	80.0	
CMH0 056T12 056, TC2 3056, TC4M 056, TC1M 056, TC1M 056, LTCL 056-X056162.0116.0135.080.0CMH0 054C 13 064, TC 2 3064, TC 2 3064, TC4 M 064, TC1M 064, LTCL 064-X064175.0130.0152.080.0CMH0 050TC 2 3075, TC 13 0360, TC 12 0300, TC 2 3080, TC1M 072, TC4M 080, TC1M 080, LTCL 080-X, PC xX0300S080230.0130.0180.5100.0CMH0 050TC 2 3055, TC 13 036, TC 12 0360, TC 2 3095, TC 4M 035, TC 4M 036, TC 1M 096, LTCL 096-X0200.0201.0180.5100.0CMH0 120TC 2 310, TC 12 120, TC 2 3 120, TC 4M 110, TC 4M 120, TC 2M 120, TC 110 096, LTCL 1020-X.204.0204.0202.0240.0130.0CMH0 120TC 23 100, TC 12 120, TC 23 120, TC 4M 110, TC 4M 120, TC 2M 120, TC 11 120-X.204.0204.0202.0240.0130.0CMH0 TC 12X 064TC 23 056, TC 2M 054, TC 2M 054, TC 2M 054, TC 140 056, TC 140 056, TC 140 056, TC 140 056CMH0 TC 12X 064TC 23 100, TC 12 120, TC 23 120, TC 4M 110, TC 4M 120, TC 141 42, TC 144 4X204.0204.023.024.0130.085.0CMH0 TC 12X 064TC 28 050, TC 2M 054,	CMHO 048	TC 12 048, TC 23 048, TC4M 048, TC2M 048, TC16M 048, LTCL 048-X	048	140.0	111.0	132.5	80.0	
CMH 0 064   T13 064, T12 20 64, TC2 30 64, TC4 M 064, TC2 M 064, TCL M 064, LTCL 064-X   064   175.0   132.0   145.0   80.0     CMH 0 030   TC2 30 72, TC 13 080, TC 12 080, TC 20 080, TC4 M 007, TC4 M 080, TCL 0809, LTCL 0804, NC Xx0303   080   230.0   153.0   153.0   150.0   80.0     CMH 0 030   TC2 3 085, TC 13 080, TC 12 080, TC 23 080, TC4 M 085, TC4 M 096, TC1 M 096, LTCL 096-X   096   255.0   173.0   186.5   100.0     CMH 0 120   TC 23 103, TC 12 120, TC 23 120, TC4 M 100, TCAM 120, TCCM 120, LTCL 120-X   -   204.0   230.0   240.0   130.0     CMH 0 121   TC 12 10.0, TC 12 120, TC 41 130, TC2M 144, TC16M 144, LTCL 144-X   -   204.0   230.0   150.0   85.0     CMH 0 TC12K 064   TC12K 064   TC12K 064   152.0   158.0   85.0     CMH 0 TC12K 064   TC12K 064   TC12K 064   150.0   158.0   85.0     CMH 0 TC12K 064   TC14K 064   TC14K 064   150.0   150.0   85.0     CMH 0 TC12K 064   TC14K 064   TC14K 064   150.0   150.0   50.0     CMH 0 TC12K 064   <	СМНО 056	TC 12 056, TC 23 056, TC4M 056, TC2M 056, TC16M 056, LTCL 056-X	056	162.0	116.0	135.0	80.0	
CMH0 080TC 23 072, TC 13 080, TC 12 080, TC 23 080, TC 4M 080, TC 4M 080, TC 4M 080, TC 10 080, UT CL 080-X, PC xx0300X08023.015.015.080.0CMH0 096TC 23 085, TC 13 096, TC 12 096, TC 23 096, TC 4M 096, TC 4M 096, TC 1M 096, IT CL 096-X09626.022.0024.00130.0CMH0 120TC 23 130, TC 12 144, TC 23 140, TC 4M 100, TC 4M 102, TC 4M 120, TC 1M 120, TC 141 4.X-204.023.0024.00130.0CMH0 T21X 06TC 23 130, TC 12 144, TC 23 144, TC 4M 130, TC 2M 144, TC 16M 144, LT CL 144-X204.023.0024.0085.0CMH0 T21X 06TC 28 064TC 28 064-486.015.015.0085.085.0CMH0 TC 12K 080TC 16K 005TC 16K 00510.085	CMHO 064	TC 13 064, TC 12 064, TC 23 064, TC4M 064, TC2M 064, TC16M 064, LTCL 064-X	064	175.0	137.0	145.0	80.0	
CMH0 096TC 23 085, TC 13 096, TC 12 096, TC 23 096, TC 4M 095, TC 4M 096, TC 1M 096, LT CL 096-X09626.017.0186.5100.0CMH0 120TC 23 110, TC 12 120, TC 23 120, TC 4M 110, TC 4M 120, TC 1M 120, LTC L1 120.X-204.0232.0240.0130.0CMH0 144TC 23 130, TC 12 144, TC 23 144, TC 4M 130, TC 2M 144, TC 4M 144, LT CL 144.X-2240.0232.0247.0130.0CMH0 TC 12K 064TC 12K 064-486.0152.0150.085.085.0CMH0 TC 12K 080-486.0152.0150.085.085.0CMH0 TC 16M 09TC 16M 079-143.066.581.350.0CMH0 TC 16M 012TC 16M 012-143.066.581.350.0CMH0 TC 16M 013TC 16M 013TC 16M 013-143.066.581.350.0CMH0 TC 16M 013TC 16M 013TC 16M 013-143.066.581.350.0CMH0 TC 16M 013TC 16M 013TC 16M 013110.0132.580.010.0CMH0 TC 16M 013TC 16M 013TC 16M 013110.0132.580.0CMH0 TC 16M 013TC 16M 013TC 16M 013110.0132.580.0CMH0 TC 16M 014TC 16M 013TC 16M 013110.0132.580.0CMH0 TC 16M 015TC 16M 013TC 16M 013110.0132.580.0CMH0 TC 16M 013TC 16M 013TC 16M 013132.580.0CMH0 TC 16M 014TC 16M 013TC 16M 013132	СМНО 080	TC 23 072, TC 13 080, TC 12 080, TC 23 080, TC4M 072, TC4M 080, TC2M 080, TC16M 080, LTCL 080-X, PC xx030XS	080	230.0	153.0	152.0	80.0	
RMH0 120TC 23 110, TC 12 120, TC 23 120, TC 4M 110, TC 4M 120, TC 12M 120, TC 16M 120, LT CL 120-X220.02.0.02.0.02.0.01.0.0CMH0 144TC 23 130, TC 12 144, TC 23 144, TC 4M 130, TC 2M 144, TC 16M 144, LT CL 144-X-22.0.02.3.02.4.0.01.30.0CMH0 TC 12K 064TC 12K 080TC 12K 080TS 20.01.5.01.50.08.5.08.5.0CMH0 TC 12K 080TC 16M 009TC 16M 009TC 16M 0121.4.06.6.58.1.350.0CMH0 TC 16M 018TC 16M 012TC 16M 012C.0.01.4.06.6.58.1.350.0CMH0 TC 16M 019TC 16M 012TC 16M 012C.0.01.4.01.1.01.3.2.58.0.0CMH0 TC 16M 018TC 16M 012TC 16M 013TC 16M 0131.3.2.58.0.01.3.08.0.0CMH0 TC 16M 018TC 16M 013TC 16M 013TC 16M 0131.3.2.58.0.01.3.08.0.01.3.2.58.0.0CMH0 TC 16M 018TC 16M 013TC 16M 013TC 16M 013TC 16M 0131.3.2.58.0.01.3.01.3.2.58.0.0CMH0 TC 12M 02MC12K 050-067MC12K 050-067MC12K 050-0671.3.0.01.3.2.58.0.0CMH0 TC 27KTC 28 036, TC 27 072TC 28 036, TC 27 0721.3.0.01.3.2.58.0.0CMH0 TC 27KTC 28 036, TC 27 072TC 28 036, TC 27 0721.3.0.01.3.2.58.0.0CMH0 PCCDPCD xxxTC 28 036, TC 27 072TC 28 036, TC 27 0721.3.0.01.3.2.51.3.0.01.3	CMHO 096	TC 23 085, TC 13 096, TC 12 096, TC 23 096, TC4M 085, TC4M 096, TC2M 096, TC16M 096, LTCL 096-X	096	265.0	179.0	186.5	100.0	
CMH0 144 TC 23 130, TC 12 144, TC 23 144, TC 4M 130, TC 2M 144, TC 16M 144, LT CL 144.X - 204.0 232.0 247.0 130.0   CMH0 144 TC 2X	СМНО 120	TC 23 110, TC 12 120, TC 23 120, TC4M 110, TC4M 120, TC2M 120, TC16M 120, LTCL 120-X	-	204.0	220.0	240.0	130.0	
K12KK12KCMHO TC12K064C12K 064S.0	СМНО 144	TC 23 130, TC 12 144, TC 23 144, TC4M 130, TC2M 144, TC4M 144, TC16M 144, LTCL 144-X	-	204.0	232.0	247.0	130.0	
CMHO TC12K 064 TC12K 064 152.0 150.0 85.0   CMHO TC12K 060 TC12K 080 152.0 158.0 85.0   CMHO TC16M 009 TC16M 009 143.0 66.5 81.3 50.0   CMHO TC16M 012 TC16M 012 143.0 66.5 81.3 50.0   CMHO TC16M 012 TC16M 018 66.5 81.3 50.0   CMHO MC12K 026 MC12K 008-025 143.0 66.5 81.3 50.0   CMHO MC12K 026 MC12K 008-025 MC12K 008-025 80.0 111.0 132.5 80.0   CMHO MC12K 026 MC12K 100-200 0 140.0 111.0 132.5 80.0   CMHO MC12K 026 MC12K 100-200 MC12K 100-200 1 133.0 93.6.0 113.3 66.5   CMHO TCT2K TC2R 072 TC2R 072 1 133.0 66.5 65.5   CMHO PCCD PCD xxx PCD xxx 1 13.3 66.5		тс12К						
CMHO TC12K 080 F12K 080 152.0 158.0 85.0   CMHO TC16M 02 C16M 009 143.0 66.5 81.3 50.0   CMHO TC16M 02 T16M 012 143.0 66.5 81.3 50.0   CMHO TC16M 02 T16M 012 143.0 66.5 81.3 50.0   CMHO TC16M 02 T16M 012 143.0 66.5 81.3 50.0   CMHO TC16M 02 T16M 018 143.0 66.5 81.3 50.0   CMHO TC16M 02 T150 018 111.0 132.5 80.0   CMHO MC12K 02 MC12K 008-025 MC12K 008-025 81.0 111.0 132.5 80.0   CMHO MC12K 02 MC12K 008-025 MC12K 008-025 140.0 111.0 132.5 80.0   CMHO MC12K 02 MC12K 100-200 0 140.0 111.0 132.5 80.0   CMHO MC12K 02 T2R T2R 152.0 153.0 153.0 153.0 153.0 150.0   CMHO MC12K 02 T2R T2R T2R 153.0 113.3 66.5   CMHO PCCD PCD xxx	CMHO TC12K 064	TC12K 064	-	486.0	152.0	150.0	85.0	
Trink Trink   CMHO TC16M002 TC16M009 143.0 66.5 81.3 50.0   CMHO TC16M012 TC16M012 143.0 66.5 81.3 50.0   CMHO TC16M012 TC16M012 143.0 66.5 81.3 50.0   CMHO TC16M012 TC16M012 143.0 66.5 81.3 50.0   CMHO TC16M012 TC16M013 66.5 81.3 50.0   CMHO TC16M012 TC16M013 66.5 81.3 50.0   CMHO MC12K02 MC12K06-025 MC12K06-025 81.3 50.0   CMHO MC12K02 MC12K050-067 MC12K060 111.0 132.5 80.0   CMHO MC12K02 MC12K00-020 MC12K00 111.0 132.5 80.0   CMHO MC12K02 MC12K00-020 MC12K00 111.0 132.5 80.0   CMHO MC12K02 TC2R TC2R 138.0 93.6.0 113.3 66.5   CMHO MC12K02 FCD FCD FCD 138.0 93.6.0 133.3 66.5	СМНО ТС12К 080	TC12K 080		486.0	152.0	158.0	85.0	
CMMO   143.0   66.5   81.3   50.0     CMHO TC16M 009   TC16M 019   TC16M 012   143.0   66.5   81.3   50.0     CMHO TC16M 012   TC16M 012   TC16M 012   143.0   66.5   81.3   50.0     CMHO TC16M 012   TC16M 018   143.0   66.5   81.3   50.0     CMHO MC12K 025   MC12K 008-025   MC12K 008-025   80.0   -   140.0   111.0   132.5   80.0     CMHO MC12K 027   MC12K 005-067   MC12K 005-067   140.0   111.0   132.5   80.0     CMHO MC12K 029   MC12K 100-200   MC12K 100-200   140.0   111.0   132.5   80.0     CMHO TC2R   TCZR 036, TCZR 072   TCZR   138.0   93.6.0   113.3   66.5     CMHO PCCD   PCD xxx   PCD xx   -   20.0   92.0		IC16M						
CMHO TC16M 012 TC16M 013 TC16M 012 TC16M 012 TC16M 012 TC16M 012 TC16M 012 TC16M 012 TC16M 013 50.0   CMHO TC16M 018 TC12K   CMHO MC12K 025 MC12K 008-025 MC12K 008-025 MC12K 008-025 TC12K 008-025 TC12K 008-025 S0.0 S0.0   CMHO MC12K 026 MC12K 002-0067 MC12K 002-00 T 140.0 111.0 132.5 80.0   CMHO MC12K 027 MC12K 100-200 TCZR T 140.0 111.0 132.5 80.0   CMHO TCZR TCZR 036, TCZR 072 T 138.0 93.6.0 113.3 66.5   CMHO PCCD PCCD xxx PCD xxx T 20.0 92.0	CMHO TC16M 009			143.0	66.5	81 3	50.0	
CMHO FC1M 012   FC10M 012	CMHO TC16M 012	TC16M 012		1/3.0	66.5	81.3	50.0	
CMHO PCCD   PCCD xxx   PCONCOL	CMHO TC16M 018	TC16M 012		143.0	66.5	81.3	50.0	
MC12K   MC12K <th< th=""><th></th><th></th><th></th><th>145.0</th><th>00.5</th><th>01.5</th><th>50.0</th></th<>				145.0	00.5	01.5	50.0	
CMH0 MC12K 025 MC12K 008-025 140.0 111.0 132.5 80.0   CMH0 MC12K 067 MC12K 050-067 140.0 111.0 132.5 80.0   CMH0 MC12K 200 MC12K 100-200 - 140.0 111.0 132.5 80.0   CMH0 MC12K 200 MC12K 100-200 - 140.0 111.0 132.5 80.0   CMH0 TCZR TCZR TCZR 036, TCZR 072 - 138.0 93.6.0 113.3 66.5   PCCD PCCD xxx - - 20.0 92.0		MC12K						
CMH0 MC12K 067 MC12K 050-067 140.0 111.0 132.5 80.0   CMH0 MC12K 200 MC12K 100-200 - 140.0 111.0 132.5 80.0   CMH0 MC12K 200 rCzR TCZR - 140.0 111.0 132.5 80.0   CMH0 TCZR TCZR 036, TCZR 072 - - 138.0 93.6.0 113.3 66.5   PCCD PCCD xxx - - 20.0 92.0	CMHO MC12K 025	MC12K 008-025	-	140.0	111.0	132.5	80.0	
CMHO MC12K 200 MC12K 100-200 140.0 111.0 132.5 80.0   TCZR TCZR 036, TCZR 072 - 138.0 93.6.0 113.3 66.5   PCCD PCCD xxx - - 20.0 92.0	CMHO MC12K 067	MC12K 050-067		140.0	111.0	132.5	80.0	
TCZR   TCZR 036, TCZR 072   138.0   93.6.0   113.3   66.5     PCCD   PCCD xxx   PCD xX	CMHO MC12K 200	MC12K 100-200	-	140.0	111.0	132.5	80.0	
CMHO TCZR   TCZR 036, TCZR 072   -   138.0   93.6.0   113.3   66.5     PCCD   PCCD xxx   -   -   20.0   92.0		TCZR						
PCCD   CMH0 PCCD   PCCD xxx   -   -   20.0   92.0	CMHO TCZR	TCZR 036, TCZR 072	-	138.0	93.6.0	113.3	66.5	
CMH0 PCCD PCCD xxx 20.0 92.0		PCCD						
	CMHO PCCD	PCCD xxx	-	-	-	20.0	92.0	

# CMPT series

### Mounting plates



CMPT plates are mechanical components designed to build up dimensional measurement optical benches. Most Opto Engineering telecentric lenses and collimated illuminators can be mounted on these plates by means of the compatible CMHO clamps. For very accurate measurement applications, calibration patterns can be precisely positioned in front of the lens with the CMPH pattern holders, allowing for perfect optical system calibration.

	Compati	bility	Mechanical specifications			ons
Part	<b>Clamping mechanics</b>	Pattern holders	Length	Width	Thickness	Weight
number	СМНО	о смрн				
			(mm)	(mm)	(mm)	(g)
CMPT 004-009	023	004-024	199.6	56.0	10.0	286
CMPT 016-024	016, 024	004-024	226.8	66.5	10.0	385
CMPT 036	036	036-056	477.0	103.0	15.0	1950
CMPT 048	048	036-056	596.0	117.0	15.0	2770
CMPT 056	056	036-056	631.0	122.0	15.0	3060
CMPT 064	064	064-096	783.0	143.0	15.0	4460
CMPT 080	080	064-096	868.0	158.0	15.0	5470
CMPT 096	096	064-096	1005.0	185.0	20.0	9940

Accessories | CMPH series

Pattern holders

# CMPH series



	Compatibility	Mechanical specifications				
Part number	Patterns PT	Width	Height	Thickness	Weight	
		(mm)	(mm)	(mm)	(g)	
CMPH 004-024	004-009, 016-024	45.0	68.5	18.0	78	
CMPH 036-056	036-056	81.0	123.1	22.5	257	
CMPH 064-096	064-096	129.0	145.5	25.0	611	

Software calibration is accurate if pattern placement is accurate too. To do so, Opto Engineering offers specific pattern holders to easily and precisely mount each calibration pattern on its specific holding mechanics.

The pattern is assembled on a frame held by three magnets: this floating system allows for the adjustment of the pattern phase and for proper centering.



# PT series patterns

Calibration patterns



Any machine vision lens (either telecentric or not) shows some amount of distortion. In addition to *barrel* or *pincushion* distortion, changes in the view angle or misaligned components will affect the image symmetry and generate the so called *thin prism* or *keystone* effect.

Imaging and metrology applications often require to minimize distortion, which can be software-corrected by analyzing the image of a precision pattern whose geometrical features are well known. For this reason Opto Engineering offers chrome-on-glass patterns optimized for software calibration, featuring extremely high geometrical accuracy thanks to photolithography techniques.

The range of available chessboard patterns is compatible with most Opto Engineering telecentric lenses.



	Compatibility		Mechanical specifications					
Part	Telecentric lenses	Pattern mounts	Dimensions	Thickness	Active area	Squares	Dimensional	
number	СМРН		width x height width x height		width x height	width & spacing	accuracy	
	(Part numbers ending in)		(mm x mm)	(mm)	(mm x mm)	(mm)	(µm)	
PT 004-009	004, 007, 009	004-024	33.0 x 26.0	3.0	15.0 x 13.0	0.20	1.3	
PT 016-024	016, 024	004-024	33.0 x 26.0	3.0	31.0 x 24.0	0.60	1.5	
PT 036-056	036, 048, 056	036-056	66.0 x 52.0	3.0	64.0 x 51.0	1.35	1.9	
PT 064-096	064, 072, 080, 085, 096	064-096	107.0 x 83.0	3.0	105.0 x 79.0	2.20	2.4	
PT 120-240	110, 120, 130, 144, 172, 192, 200, 240	n.a.	229.0 x 229.0	3.0	208.0 x 208.0	4.00	3.7	

Accessories | **PT series patterns** 

# PT series patterns

Patterns for LTPRSM series



### Stripe patterns

PT 0000 0300 P: 8 lines in projection area



PTST 050 450 P: 16 lines in projection area



PTST 050 200 P: 32 lines in projection area



PTST 050 100 P: 53 lines in projection area



PTST 050 050 P: 80 lines in projection area



**Grid patterns** 

PT 0000 0400 P: 8x8 lines in projection area



PRGR 050 450 P: 16x16 lines in projection area



PTGR 050 200 P: 32x32 lines in projection area



PTGR 050 100 P: 53x53 lines in projection area









Projection patterns for machine vision



8 mm

active area

8 mm

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

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# PT series patterns

Patterns for LTPR series



### **Photolithography patterns**

P/N: PT 0000 0100 P - Line pattern



P/N: PT 0000 0200 P - Cross pattern

↓ line thickness 0.05 mm

P/N: PT 0000 0300 P - Stripe pattern



#### P/N: PT 0000 0400 P - Grid pattern



P/N: PT 0000 0500 P - Edge pattern



### Laser engraved patterns

P/N: PT 0000 0100 L - Line pattern



P/N: PT 0000 0200 L - Cross pattern



P/N: PT 0000 0300 L - Stripe pattern



P/N: PT 0000 0400 L - Grid pattern



#### P/N: PT 0000 0500 L - Edge pattern





Projection patterns for machine vision

#### Pattern specifications Photolithography patterns Soda lime grass Substrate Coating Chrome Geometrical accuracy 2 µm **Edge sharpness** 1.4 µm Laser engraved patterns Substrate Borofloat glass Coating Dichroic mirror Geometrical accuracy 50 um Edge sharpness 50 µm

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# Telecentric filter kit

Telecentric lens filters and plug-in filter holder



Light filtering is a typical need in machine vision measurement applications. For instance, you may need to avoid possible interactions between your LED illuminator and other light sources in an industrial environment.

Moreover, sunlight is a cause of frequent errors in imaging systems due to unexpected reflections from the surface of the parts being measured. In these cases, a band-pass or long-pass filter matching the emission wavelength of the illuminator is usually integrated in front of the objective: this way, only the light coming from the illuminator is collected while the rest of the spectrum is cut out.



Furthermore, many machine vision applications require monochromatic illumination in order to enhance or suppress particular object features: under these conditions, only the features with a certain color are imaged and can be measured.

Putting a filter in front of a telecentric lens can be very inconvenient when the size of the lens is very big. The filter should be as large as the front element of the lens, thus becoming very expensive.

To overcome size and cost issues, Opto Engineering designed a smart filter adaptor that can be easily plugged into the rear part of the lenses. This simple and cost-effective accessory is compatible with all TC 12 yyy and TC 23 yyy bi-telecentric lenses and with the C-mount versions of TC4M and TC2M series bi-telecentric lenses.

The bi-telecentricity of the Opto Engineering lenses makes this solution very efficient, since the rays remain parallel when passing through the filter. This allows for the optical bandpass to be maintained across the entire image surface.

Since inserting the filter will increase the back focal length of the lens, spacers (included in the TC lens package) must be added to the C-mount in order to set the lens back to its nominal working distance; the overall thickness of the spacers is usually equal to 1/3 of the filter thickness. The supported filter diameter is 17.50 mm and the maximum recommended filter thickness is 4.00 mm. Opto Engineering also offers a selection of standard filters fitting

Opto Engineering also offers a selection of standard filters fitting Telecentric lenses and LTCL series collimated illuminators.

Part number	Description	Matching products
Filter mount		Telecentric lenses
TCFILTER	Filter mount for telecentric lenses	TC 12 yyy, TC 23 yyy, TC2M, TC4M 1 2 2
Filters		<b>Collimated illuminators</b>
COBP470D17.5	Blue (470 nm) bandpass filter, 17.5 mm diameter	B LED sources
COBP525D17.5	Green (525 nm) bandpass filter, 17.5 mm diameter	G LED sources
COBP635D17.5	Red (635 nm) bandpass filter, 17.5 mm diameter	R LED sources
COBP850D17.5	IR (850 nm) bandpass filter, 17.5 mm diameter	-
COBP880D17.5	IR (880 nm) bandpass filter, 17.5 mm diameter	-
COLP920D17.5	IR (920 nm) longpass filter, 17.5 mm diameter	-
COPR032D17.5	Polarizer, 17.5 mm diameter	

Except TC 23 004, TC 23 007, TC 23 009, TC 23 012

2 C-mount versions only

Accessories | TCKIT case

# TCKIT case

Telecentric optics selection for machine vision labs



The **Opto Engineering TCKIT case** includes a selection of some of the most commonly used telecentric optics in measurement applications.

A kit of four C-mount telecentric lenses covers FOVs ranging from 9 mm to 64 mm, offering good coverage of many measurement applications. These lenses are suitable for detectors up to 2/3", so that most cameras can be used in combination with this set of optics. In addition, a LTCL 036-G collimated light source (green color) is included in the box; this illuminator can be coupled with the

three smaller telecentric lenses in order to demonstrate the several benefits of collimated illumination.

The telecentric kit case is a very helpful tool for system integrators and research centers that are frequently dealing with new machine vision applications.

The TCKIT case also benefits from our special educational price: you should seriously consider to buy this kit for your laboratory and discover the advantages of bi-telecentric optics!



Part number	Products included	Description
	TC 23 064	Bi-telecentric lens for 2/3", 64 x 48 mm FOV
	TC 23 036	Bi-telecentric lens for 2/3", 36 x 27 mm FOV
тскіт	TC 23 016	Bi-telecentric lens for 2/3", 16 x 12 mm FOV
	TC 23 009	Bi-telecentric lens for 2/3", 8.8 x 6.6 mm FOV
	LTCL 036-G	Collimated LED Illuminator, green

### IDEAL FOR

- prototyping
- feasibility studies
- demo system set-up
- educational purposes

### LTRN series

LED ring illuminators for Opto Engineering optics



#### **KEY ADVANTAGES**

**Mechanically fitting Opto Engineering optics** Each lens integrates specific mechanical interfaces.

**Specific illumination geometry** Illumination path matches Opto Engineering lenses viewing angle and numerical aperture.

**High performance to price ratio** Cost-effective, without quality compromises.

**LTRN series are LED ring illuminators** specifically designed to fit Opto Engineering optics.

Every illuminator is equipped with a specific mechanical interface which makes it very easy to mount it on different types of Opto Engineering lenses. These products enable the optimal illumination geometry for the most common applications of their matching lens.



LTRN illuminator coupled with TCZR Series.

	Compatibility	Light	Dimensions		Power ratings		
Part	Opto Engineering optics	Colour, peak	Outer	Inner	Height	Voltage	Power
number		wavelength	diameter	diameter			
			(mm)	(mm)	(mm)	(V, DC)	(W)
	Straight illumination						
LTRN 023 NW	TC 23 00x, TC 23 012, TC4M 00x, TC16M 009, MC3-03X	white, 6300K	104.0	28.0	40.0	24	12
LTRN 016 NW	TC xx 016, TCxM 016, TC16M 012, TC16M 016, TCSM 016	white, 6300K	120.6	37.7	40.0	24	15
LTRN 024 NW	TC xx 024, TCxM 024, TCSM 024	white, 6300K	120.6	44.0	40.0	24	15
LTRN 036 NW	TC xx 036, TCxM 036, TC16M 036, TCSM 036, MCZR xxx-yyy	white, 6300K	157.0	61.0	40.0	24	25
LTRN 048 NW	TC xx 048, TCxM 048, TC16M 048, TCSM 048	white, 6300K	157.0	75.0	40.0	24	25
LTRN 056 NW	TC xx 056, TCxM 056, TC16M 056, TCSM 056, TCZR 036	white, 6300K	157.0	80.0	40.0	24	25
LTRN 064 NW	TC xx 064, TCxM 064, TC16M 064, TC12K 064, TCSM 064	white, 6300K	192.0	100.0	40.0	24	38
LTRN 080 NW	TC xx 080, TC 23 072, TCxM 080, TC4M 072, TC16M 080, TC12K 080, TCSM 080, TCZR 072	white, 6300K	192.0	116.0	40.0	24	38
LTRN 096 NW	TC xx 096, TC 23 085, TCxM 096, TC4M 085, TC16M 096, TCSM 096	white, 6300K	221.0	143.0	40.0	24	38
LTRN 120 NW	TC xx 120, TC 23 110, TCxM 120, TC4M 110, TC16M 120, TC12K 120	white, 6300K	290.0	180.0	40.0	24	45
LTRN 144 NW	TC xx 144, TC 23 130, TCxM 144, TC4M 130, TC16M 144, TC12K 144	white, 6300K	290.0	200.0	40.0	24	45
	Oblique illumination						
LTRN 050 W45	PCPW 0xx, MCxxxX, TCCAGE xx048	white, 6300K	53.5	15.2	22.0	24	2.5
LTRN 075 W45	TC 23 00x, TC 23 012, TC4M 00x, PCHI 0xx, MC3-03X, TCCAGE xx096	white, 6300K	75.4	28.0	32.0	24	3
LTRN 165 W45	PCCD 0xx	white, 6300K	175.0	136.0	36.5	24	18
LTRN 210 W20	PCxx030XS	white, 6300K	210.0	116.5	40.0	24	38
LTRN 245 W25	PC 1x030HP	white, 6300K	245.0	157.0	48.0	24	30
LTRN 245 W35	PCCD 0xx	white, 6300K	245.0	143.0	48.0	24	30
LTRN 245 W45	PCPW 0xx	white, 6300K	245.0	158.0	48.0	24	30

# Other products

Optics	Part number	Description	Matching Products
. 9	PCBPTIP	Replacement tip for boroscopic probes, PCBP series	PCBP series
0.0	PCCDLFAT	Interchangeable attachment for extra-wide PCCD field of view	PCCD series
and the second s	OEPL 18	18° projection lens, focal length 35 mm, for LTPR series pattern projectors	
	OEPL 25	25° projection lens, focal length 25 mm, for LTPR series pattern projectors	LTDP corios
0	OEPL 38	38° projection lens, focal length 16 mm, for LTPR series pattern projectors	LIFK Selles
	OEPL 50	50° projection lens, focal length 12 mm, for LTPR series pattern projectors	
Cables			
and a	COCB243P0600	Sheated cable with 3 different elements; length 600 mm; nominal section 2x0.35 mm² 22 AWG; max rated voltage AC:49 V; operative temperature -15/+70 $^\circ\text{C}$	TCZR series, MCZR series
	COCBUSB20	USB 2.0 cable; fully rated cable 80°C 30 V; length 2 m; standard A plug/mini-B plug	TCZR series, MCZR series
Illumination			
	LTSC 1W-R	LED source, <b>1W RED</b> , for LTPR and LTCL series products	LTPR 36-X, LTCL series
	LTSC 1W-G	LED source, <b>1W GREEN</b> , for LTPR and LTCL series products	LTPR 36-X, LTCL series
- 6	LTSC 1W-B	LED source, <b>1W BLUE</b> , for LTPR and LTCL series products	LTPR 36-X, LTCL series
	LTSC 1W-W	LED source, <b>1W WHITE</b> , for LTPR and LTCL series products	LTPR 36-X, LTCL series
30	LTSC 3W-R	LED source, <b>3W RED</b> , for LTPR and LTPRSM series products	LTPR 3W-X, LTPRSM series
C. SO	LTSC 3W-G	LED source, <b>3W GREEN</b> , for LTPR and LTPRSM series products	LTPR 3W-X, LTPRSM series
	LTSC 3W-B	LED source, <b>3W BLUE</b> , for LTPR and LTPRSM series products	LTPR 3W-X, LTPRSM series
	LTSC 3W-W	LED source, <b>3W WHITE</b> , for LTPR and LTPRSM series products	LTPR 3W-X, LTPRSM series
	LTSCHP 1W-R	LED source high stability at low light, <b>1W RED</b> , for LTPR and LTCL series products	LTPR 36-X, LTCL series
	LTSCHP 1W-G	LED source high stability at low light, <b>1W GREEN</b> for LTPR and LTCL series products	LTPR 36-X, LTCL series
	LTSCHP 1W-B	LED source high stability at low light, <b>1W RED</b> , for LTPR and LTCL series products	LTPR 36-X, LTCL series
	LTSCHP 1W-W	LED source high stability at low light, <b>1W WHITE</b> , for LTPR and LTCL series products	LTPR 36-X, LTCL series
Power supplies			
	PS1CH24V	TMS Power supply 1 channel 24 V	TCCAGE series
	PS1CH24VDIN	TMS Power supply 2 channel 24 V	TCCAGE (ringlight OR backlight), LTRN xxx NW
	PS2CH24V	TMS Power supply 1 channel 24 V DIN guide	TCCAGE (ringlight AND backlight)
Software			
C U V I S	CVTOOLS	Calibration SW library for telecentric lenses	TC series







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