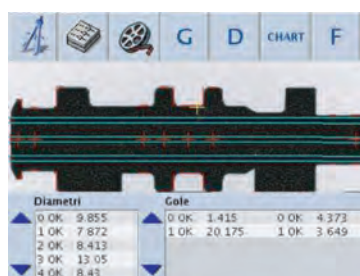


## BI-TELECENTRIC LENSES

Opto Engineering® **Collimated Light (CL)** LED illuminators have been specifically designed for back-illuminating objects imaged by telecentric lenses. This type of illumination is strongly recommended for high accuracy measurement of round or cylindrical parts where diffusive back lighters would offer poor performances.

### MEASUREMENTS WHERE LTCL ILLUMINATORS ARE NEEDED



tubes and shafts



seals and o-rings



coils and springs



screws and nuts



## LTCL SERIES

### Collimated (telecentric) led illuminators



### OPTICAL AND MECHANICAL FEATURES

for every telecentric lens format, a perfectly fitting collimated source is available...

part number	beam diameter (mm)	available colours						mechanical specs		opto-mechanical specs					
		/R	/G	/B	/W	/IR 890	/IR 940	length (mm)	outer diameter (mm)	TC13yyy yyy=	TC12yyy yyy=	TC23yyy yyy=	TC4Myyy yyy=	TC2Myyy yyy=	TC16M yyy=
LT CL 23/x	16	x	x	x	x	x	x	88,6	28	n.a.	n.a.	0x,12	04,07,09	n.a.	n.a.
LT CL 16/x	20	x	x	x	x	x	x	86,7	38	n.a.	16	16	16	16	n.a.
LT CL 24/x	30	x	x	x	x	x	x	100,0	44	n.a.	24	24	24	24	n.a.
LT CL 36/x	45	x	x	x	x	x	x	138,9	61	36	36	36	36	36	36
LT CL 48/x	60	x	x	x	x	x	x	174,0	75	n.a.	48	48	48	48	48
LT CL 56/x	70	x	x	x	x	x	x	197,3	80	n.a.	56	56	56	56	56
LT CL 64/x	80	x	x	x	x	x	x	219,5	100	64	64	64	64	64	64
LT CL 80/x	100	x	x	x	x	x	x	264,2	116	n.a.	80	72, 80	72, 80	80	80
LT CL 96/x	120	x	x	x	x	x		309,6	143	96	96	85, 96	85, 96	96	96
LT CL 120/x	150	x	x		x			395,2	180	n.a.	120	110, 120	110, 120	120	120
LT CL 144/x	180	x	x					454,7	200	n.a.	144	130, 144	130, 144	144	144
LT CL 192/x	250	x	x					595,1	260	n.a.	192	172, 192	172, 192	192	n.a.
LT CL 240/x	300	x	x					756,8	322	n.a.	n.a.	200, 240	200, 240	n.a.	n.a.

### ... and different source colours can be selected:

The illuminator light colour can be defined according to the following options:

- /R = red
- /G = green
- /B = blue
- /W = white
- /IR890 = infrared, peak at 890 nm
- /IR940 = infrared, peak at 940 nm

For example the Part Number "LT CL 64 /G" defines a LT CL 64 type collimated source equipped with green (/G) LEDs. /G (green) light sources are recommended for high precision measurement applications: green light ensures the lowest distortion and the highest telecentricity also delivering the highest signal/noise ratios and the best image resolution.

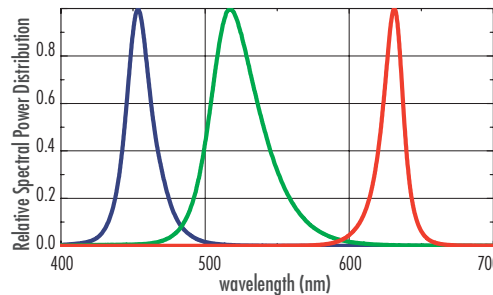
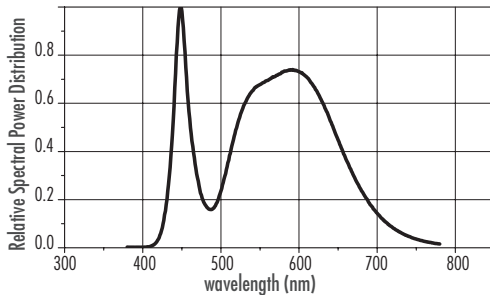
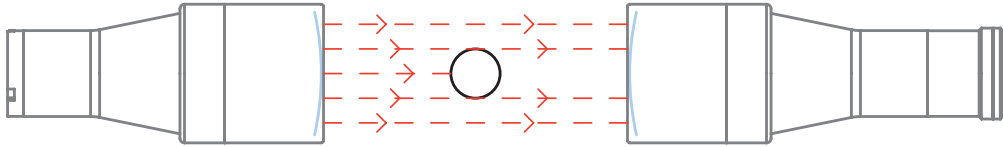
## KEY ADVANTAGES

- 1 Complete Light Coupling:** all the light emitted by a LTCL source is collected by a telecentric lens and transferred to the camera detector, ensuring very high signal-to-noise ratios.
- 2 Border effects removal:** diffused back-illuminators often make objects seem smaller than real because of light reflections on the object sides, while collimated rays are typically much less reflected.
- 3 Field depth and telecentricity improvement:** collimated illumination geometry increases a telecentric lens natural field depth and telecentricity far beyond its nominal specs.



## LTCL SERIES

## BI-TELECENTRIC LENSES



/IR890 version: peak emission wavelength 890 nm, optical bandpass +/- 30 nm FWHM (class IIb)

/IR940 version: peak emission wavelength 940 nm, optical bandpass +/- 30 nm FWHM (class IIb)

### EASY AND PRECISE ALIGNMENT OF TELECENTRIC LENS AND ILLUMINATOR

Every collimated source (up to LTCL96 format) can be mounted on the same clamping mechanics - *Teleclamps* - used to fix and align our telecentric lenses. The combination of a TC Series Bi-Telecentric lens and a LTCL Collimated Illuminator interfaced by means of this precise mechanics creates the perfect optical bench for any precision measurement application.

### ELECTRICAL FEATURES



#### BUILT-IN ELECTRONICS

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

#### DIRECT LED CONTROL

The inner circuitry can be bypassed in order 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 the maximum rates are not exceeded.

		device power rating			led power rating		
part number	light color, wavelength peak	minimum DC voltage (volt)	maximum dc voltage (volt)	power consumption (watt)	forward voltage (volt)	forward current (mA)	pulse ratings @0,1 duty/1kHz (mA)
VIS COLLIMATED ILLUMINATORS							
/R type	red, 630 nm	12	24	< 2	2,5	350	< 1800
/G type	green, 520 nm	12	24	< 2	3,5	350	< 1800
/B type	blue, 460 nm	12	24	< 2	3,5	350	< 1800
/W type	white	12	24	< 2	3,5	300	< 1800
IR COLLIMATED ILLUMINATORS							
/IR890 type	IR, 890 nm	12	24	< 2	1,6	500	n.a.
/IR940 type	IR, 940 nm	12	24	< 2	1,6	500	n.a.

