

ANGLE CHANGERS

ANGLE CHANGERS ADD FLEXIBILITY TO EBAR PRODUCTS

For Machine Vision, Industrial Automation, Robotics and Identification applications including:

DIRECT ILLUMINATION

DIFFUSE ILLUMINATION

DOME EFFECT

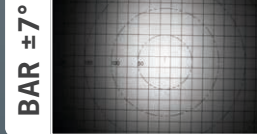
DARKFIELD

LOW ANGLE

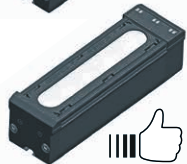
NEW

Start with $\pm 7^\circ$ lenses (ultra-narrow) on your EBAR & add Angle Changers

No Angle Changers



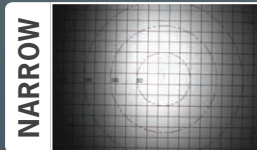
ANGLE CHANGERS



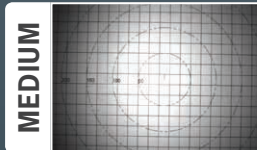
- Allow you to change the illumination angle,
- Designed to securely clip on top of the BAR,
- Sustain 100g acceleration,
- No change in the BAR IP level.



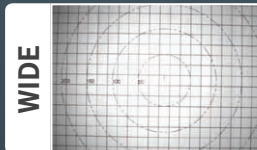
AC-EBAR-N



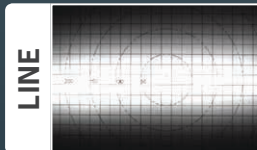
AC-EBAR-M



AC-EBAR-W



AC-EBAR-L



✓ INDUSTRIAL DESIGN:

- Protected IP65 integrity
- No need to dismantle the product to change the illumination angle

✓ ELIMINATE HOTSPOTS WITH THE CURVE EFFECT

✓ HUGE FLEXIBILITY

- Quick & easy to change illumination angle when your project changes

✓ RAPID FEASIBILITY TESTING

- Quickly & easily identify the best illumination solution with our Angle Changer Combos
- Have confidence in your product selection
- Eliminate delays from awaiting loan products for testing



24V
 $\pm 10\%$

CE

RoHS

IP65

ISO9001

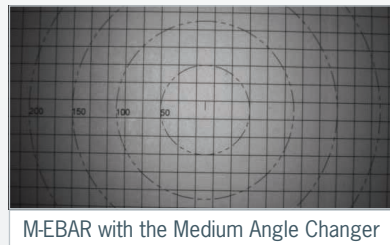
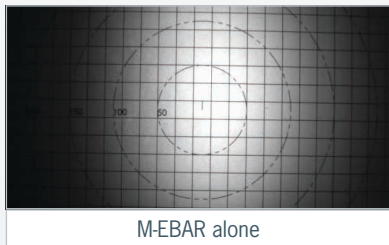
CERTIFIED MANUFACTURER

PRODUCTS SUITABLE FOR ANGLE CHANGER USE



- Maximum EBAR length: **1250mm**
 - $\pm 7^\circ$ (UN) lens only
 - Colours:
 - WHI
 - 470
 - 525
 - 630
 - 850
- NOTE:** Not suitable for UV use.

INCREASING THE HOMOGENEITY WITH ANGLE CHANGERS



By increasing the light output angle, Angle Changers also **diffuse the light** and help achieve a **better homogeneity** across the FoV.

HIGH BRIGHTNESS EVEN WITH ANGLE CHANGERS:

The table below shows the high brightness output of the M-EBAR alone, and with the Angle Changers.

M-EBAR No Angle Changer	M-EBAR + AC-EBAR-N	M-EBAR + AC-EBAR-M	M-EBAR + AC-EBAR-W	M-EBAR + AC-EBAR-L
87,000 Lux	43,500 Lux	34,500 Lux	17,400 Lux	43,000 Lux

(Measurements made at WD=500mm with M-EBAR-250-WHI, measured in the middle of the FoV - Strobe and Overdrive operation).

IMPACT ON EXPOSURE TIME:

The table below shows the equivalent exposure times required to achieve the same grey level on the image, assuming all other parameters remain fixed.

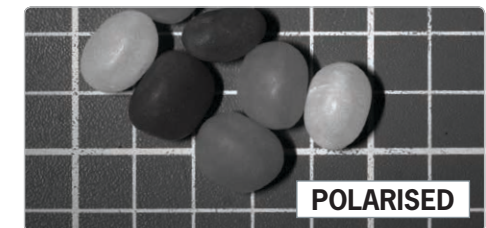
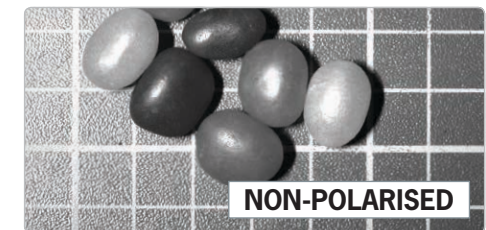
M-EBAR No Angle Changer	M-EBAR + AC-EBAR-N	M-EBAR + AC-EBAR-M	M-EBAR + AC-EBAR-W	M-EBAR + AC-EBAR-L
100 μ s	200 μ s	250 μ s	500 μ s	200 μ s
x1	x2	x2.5	x5	x2

POLARISED ANGLE CHANGERS AVAILABLE

(See page 5)



NOTE: polarisers reduce the brightness output of illumination by around 50%.

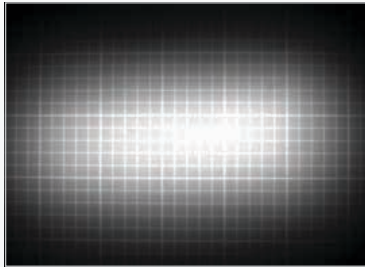


NOTE: the rough and specular surface in the background is made more uniform by the polarisation effect.

COMPARISON OF ANGLE CHANGERS, LENS ANGLES AND DIFFUSERS

NOTE: For customers familiar with existing EBAR lens angles and diffusers, the examples below will help you to select the closest equivalent Angle Changer and recommended exposure times.

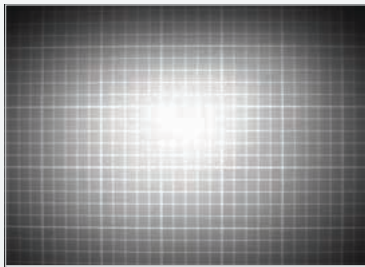
EBAR+ 7° LENS (UN)



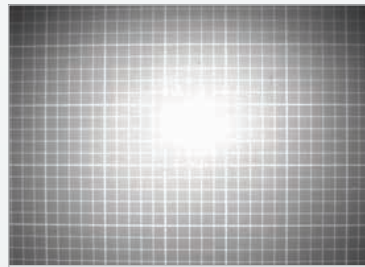
EBAR-250-7-WHI @ 0.36ms



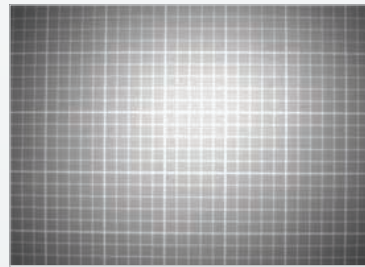
OTHER LENS ANGLES



EBAR-250-10-WHI @ 0.85ms

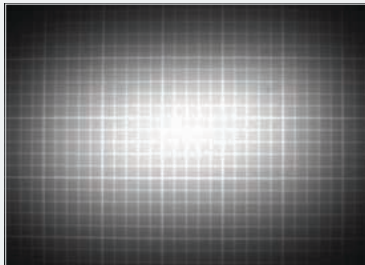


EBAR-250-17-WHI @ 2.4ms

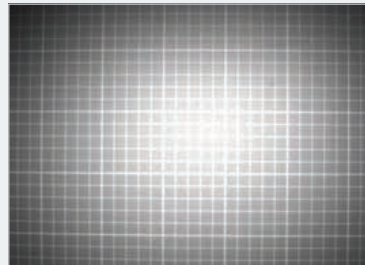


EBAR-250-25-WHI @ 3ms

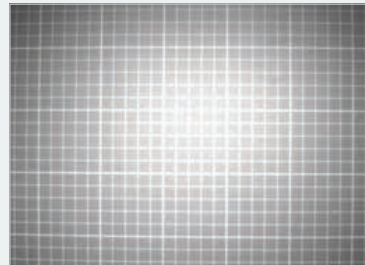
EQUIVALENT WITH AC



EBAR-250-7-WHI + AC-EBAR-N @ 0.55ms



EBAR-250-7-WHI + AC-EBAR-M @ 1.1ms



EBAR-250-7-WHI + AC-EBAR-W @ 3ms

COMPARISON TABLE WITH EXPOSURE TIME ADJUSTMENTS

	Old reference @ 1ms exposure time	EBAR + AC reference @ new exposure time
EBAR 7° lenses	EBAR-7° @ 1ms	EBAR-7° @ 1ms
	EBAR-7°+ DS @ 1ms	EBAR-7°+ AC-EBAR-N @ 0.4ms
	EBAR-7°+ DO @ 1ms	EBAR-7°+ AC-EBAR-W @ 0.25ms
EBAR 10° lenses	EBAR-10° @ 1ms	EBAR-7°+ AC-EBAR-N @ 0.80ms
	EBAR-10°+ DS @ 1ms	EBAR-7°+ AC-EBAR-M @ 0.65ms
	EBAR-10°+ DO @ 1ms	EBAR-7°+ AC-EBAR-W @ 0.25ms
EBAR 17° lenses	EBAR-17° @ 1ms	EBAR-7°+ AC-EBAR-M @ 0.6ms
	EBAR-17°+ DS @ 1ms	EBAR-7°+ AC-EBAR-W @ 1ms
	EBAR-17°+ DO @ 1ms	EBAR-7°+ AC-EBAR-W @ 0.25ms
EBAR 25° lenses	EBAR-25° @ 1ms	EBAR-7°+ AC-EBAR-W @ 0.9ms
	EBAR-25°+ DS @ 1ms	EBAR-7°+ AC-EBAR-W @ 0.65ms
	EBAR-25°+ DO @ 1ms	EBAR-7°+ AC-EBAR-W @ 0.25ms

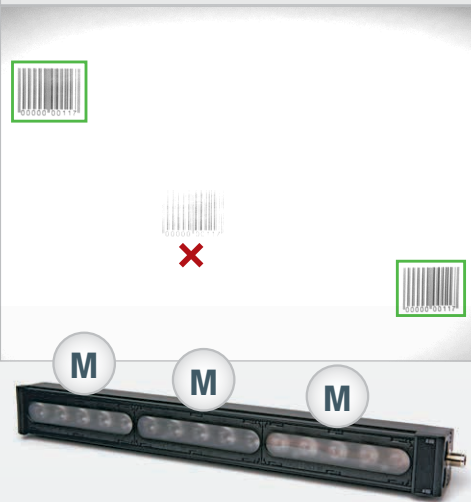
DS = Satin Diffuser DO = Opaque Diffuser



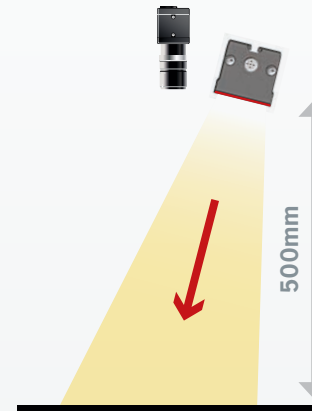
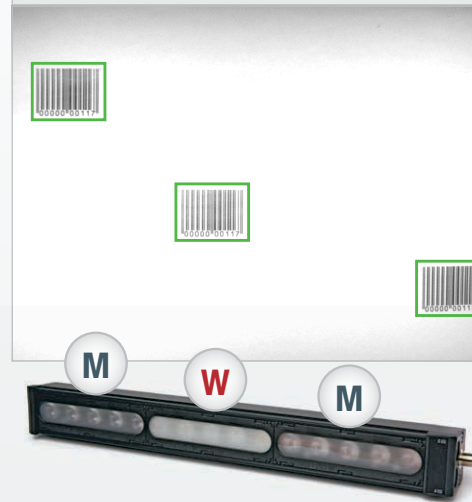
ELIMINATING HOTSPOTS WITH THE CURVE EFFECT

1x EBAR-375-WHI-7 + 3 ANGLE CHANGERS

EBAR-375-WHI-7 with 3x AC-EBAR-M



...with 2x AC-EBAR-M + 1x AC-EBAR-W

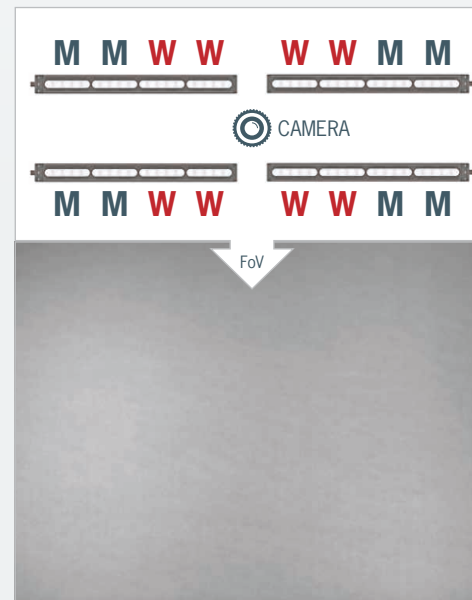
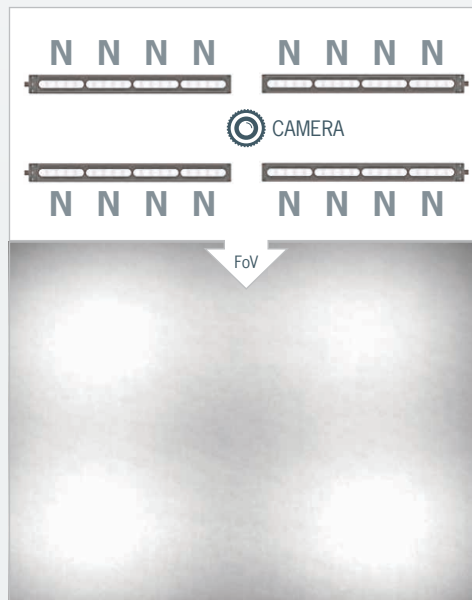


FoV size:
250 x 187.5mm

EXAMPLE:

- 2000mm Working Distance,
- 1300 x 900 FOV,
- 4x EBAR-500-WHI-7 + Angle Changers (AC).

AC's marked at each 125mm by **N** (**M**) or **W**. Schematic Views show a plan of the system from «behind the camera».



- INCREASE HOMOGENEITY
- IMPROVE READ RATE
- REDUCE HOTSPOTS
- REDUCE COSTS BY USING SMALLER LIGHTS

FULL TECH-NOTE
on how to create the **Curve Effect** with **AC** (including more examples) can be found here



ORDERING CODES

ANGLE CHANGERS

AC-EBAR	ANGLE	EXAMPLES:
N	(Narrow)	• Narrow Angle Changer ➔ AC-EBAR-N
M	(Medium)	• Medium Angle Changer ➔ AC-EBAR-M
W	(Wide)	N° of Angle Changers needed = bar useful length/125
L	(Line)	
T	(Transparent)	

POLARISED ANGLE CHANGERS

AC-EBAR	ANGLE	POLARISER	EXAMPLE:
N	(Narrow)	P1	• Narrow Angle Changer with polariser ➔ AC-EBAR-N-P1
M	(Medium)		
W	(Wide)		
L	(Line)		

POLARISER ONLY

AC-EBAR	POLARISER	RESULT:
	POL1	➔ AC-EBAR-POL1

STANDARD COMBO

AC	CO	B
----	----	---

CONTENT OF THE COMBO:

- 16x AC-EBAR-N
- 16x AC-EBAR-M
- 16x AC-EBAR-W
- 16x AC-EBAR-L
- 8x AC-EBAR-T
- 8x AC-EBAR-BK*
- 1x AC-EBAR-B**

SMALL COMBO

AC	CO	SM	B
----	----	----	---

CONTENT OF THE COMBO:

- 8x AC-EBAR-N
- 8x AC-EBAR-M
- 8x AC-EBAR-W
- 8x AC-EBAR-L
- 4x AC-EBAR-POL1
- 4x AC-EBAR-T
- 4x AC-EBAR-BK*
- 1x AC-EBAR-B**

SMALL POLARISED COMBO

AC	CO	POL	SM	B
----	----	-----	----	---

CONTENT OF THE COMBO:

- 8x AC-EBAR-N-P1
- 8x AC-EBAR-M-P1
- 8x AC-EBAR-W-P1
- 8x AC-EBAR-L-P1
- 8x AC-EBAR-POL1
- 4x AC-EBAR-BK*
- 1x AC-EBAR-B**

* AC-EBAR-BK = Black Angle Changer. Only available as part of the Angle Changer Combo AC-CO-B or Small Polarised Combo AC-CO-POL-SM-B. ** AC-EBAR-B = Briefcase.

M-EBAR

M-EBAR	LENGTH (mm)	COLOUR	ANGLE
	125	WHI (white)	UN (ultra-narrow)
	250	630 (red)	
	375	850 (IR)	
	500		

EXAMPLES:

- M-EBAR 125mm white LED ➔ M-EBAR-125-WHI-UN
- M-EBAR 500mm red LED ➔ M-EBAR-500-630-UN

EBAR

EBAR	VERSION	LENGTH (mm)	COLOUR	ANGLE
	(Standard)	125	WHI (white)	7 (±7°)
	L (Link)	250	630 (red)	
	O (Overdrive)	375	525 (green)	
		500	470 (blue)	
		625	850 (IR)	
		750		
		875		
		1000		
		1125		
		1250		



NOTE: Angles Changers are **not suitable** for use with IP69K Waterproof Washdown Bars.

EXAMPLES:

- EBAR standard 125mm white LED ➔ EBAR-125-WHI-7
- EBAR Overdrive 500mm red LED ➔ EBAR-O-500-630-7