



FGR Series 27mm Diameter Reflectors *for Luxeon Rebel & Rebel ES¹*

- **High efficiency**
- **Faceted designs provide homogeneous focused spot and spilled/direct light**

The FGR RE reflectors are specifically designed for the Rebel and Rebel ES LEDs from Philips Lumileds.

A software-optimized aspheric profile combined with precision facets provides a homogeneous central spot as well as useful peripheral spilled light.

The high collection efficiency exceeds 90% of the total flux emitted by the LEDs.

Typical applications are:

- Flashlights/Torches
- General Illumination
- Reading Lamps
- Architectural Lighting
- Entertainment Lighting



(1) LUXEON® Rebel ES and Rebel are trademarks of Philips Lumileds. For technical specification on LEDs please refer to the LUXEON® Rebel ES and Rebel datasheet or visit www.philipslumileds.com

For ordering information, please contact:

| | |
|------------------------------|------------------------------|
| FRAEN Corporation OMG | FRAEN Corporation Srl |
| 80 Newcrossing Road | Via delle Querce, 26 |
| Reading MA 01867 | 27020 Trivolzio (PV) |
| USA | Italy |
| Phone: +1 781.205.5300 | Phone: +39 0382 1933.1 |
| Fax: +1 781.942.2426 | Fax: +39 0382 1933.239 |

Inquiries: optics@fraen.com
Website: FraenOMG.com

For ordering or sales information in your region, please contact one of our offices listed above or visit www.FraenOMG.com/Contact.



General Characteristics

Materials

| | |
|-----------------------------|---|
| Reflector Material | Black polycarbonate with vacuum deposited aluminum coating and a clear lacquer protective coating |
| Operating Temperature range | -40° C / + 95° C |
| Storage Temperature range | -40° C / + 95°C |

Please note that small defects in the reflective coating, and flow lines and weld lines on the surfaces of the reflectors are acceptable if the optical performance of the reflector is within the specification described in the section “OPTICAL CHARACTERISTICS”.

IMPORTANT NOTE – Reflector handling and cleaning:

- **Handling:** Always handle the reflectors by the outside surfaces or flange. Never touch the inside surfaces of the reflector with fingers; finger oils and contamination will absorb or refract light.
- **Cleaning:** Clean reflectors only if necessary. Use only soap and water to clean the surfaces and reflectors. CAUTION - Never expose the reflectors to alcohol or solvents, as they could damage the plastic.

Scope

This datasheet provides information about the FGR reflector for Philips LUXEON Rebel and Rebel ES LEDs.

- FGR-N1-RE-0R narrow beam reflector

Optical Characteristics – On-axis Intensity¹, Beam Angle², Field Angle³

| LED | Beam Shape | On-axis Intensity (peak) | Beam Angle (FWHM) | Field Angle (FW10%) |
|---|------------|--------------------------|-------------------|---------------------|
| Rebel ES Cool White  | Narrow | 22.5 cd/lm | 7.5° | 14° |
| Rebel Cool White  | Narrow | 40.5 cd/lm | 5° | 10° |
| Rebel Red  | Narrow | 39.0 cd/lm | 4.3° | 10° |
| Rebel Green  | Narrow | 41.7 cd/lm | 5° | 11° |
| Rebel Blue  | Narrow | 29.7 cd/lm | 5.8° | 13° |

- (1) To calculate the on-axis intensity (cd), multiply the on-axis value, above, of the lens (cd/lm) by the total flux (lm) of the LED used. See “Illumination Calculations” below.
- (2) Luminous intensity depends on the flux binning and tolerances of the LEDs. Please refer to the LED datasheets for more details on flux binning.
- (3) FWHM is the full angle where the beam intensity is half the on-axis peak intensity
- (4) Field angle is the full angle where the beam intensity is 10% of the on-axis peak intensity



Illumination Calculations

To calculate intensity (cd): Find the central spot “on-axis intensity” value in the table above, then multiply this value by the luminous flux (lm) from your LED (refer to the LED datasheet for nominal lumen values.) For a more accurate calculation, refer to the intensity “ranking” (binning) tables on the datasheet for the specific LED.

Example calculations:

If a Fraen a reflector is used on a LUXEON Rebel Cool White LED driven at 350 mA, the typical luminous flux of the LED is 80 lumens.

The calculation is: $(40.5 \text{ cd/lm}) \times (80 \text{ lumens}) = 3240 \text{ candela on-axis intensity}$.

One candela at 1-meter distance produces 1 Lux. This means the peak illuminance at 1 meter will be 3240 lux. The illuminance decreases as a function of the distance squared, so at 2 meters the peak illuminance will be $3240 / (2^2) = 810 \text{ lux}$. At 3 meters distance, the peak illuminance will be $3240 / (3^2) = 360 \text{ lux}$.

The beam angle specified in the table above is 5 degrees FWHM (full angular width measured where the beam intensity equals half the on-axis maximum intensity.) This means at ± 2.5 degrees off-axis (half of 5 degrees), the intensity should be half of 3240 candela or 1620 candela.

The field angle specified in the table above is 10 degrees FW10% (full angular width measured where the beam intensity equals 10% of the on-axis maximum intensity.) This means at ± 5 degrees off-axis (half of 10 degrees), the intensity should be 10% of 3240 candela or 324 candela.

Mechanical Characteristics

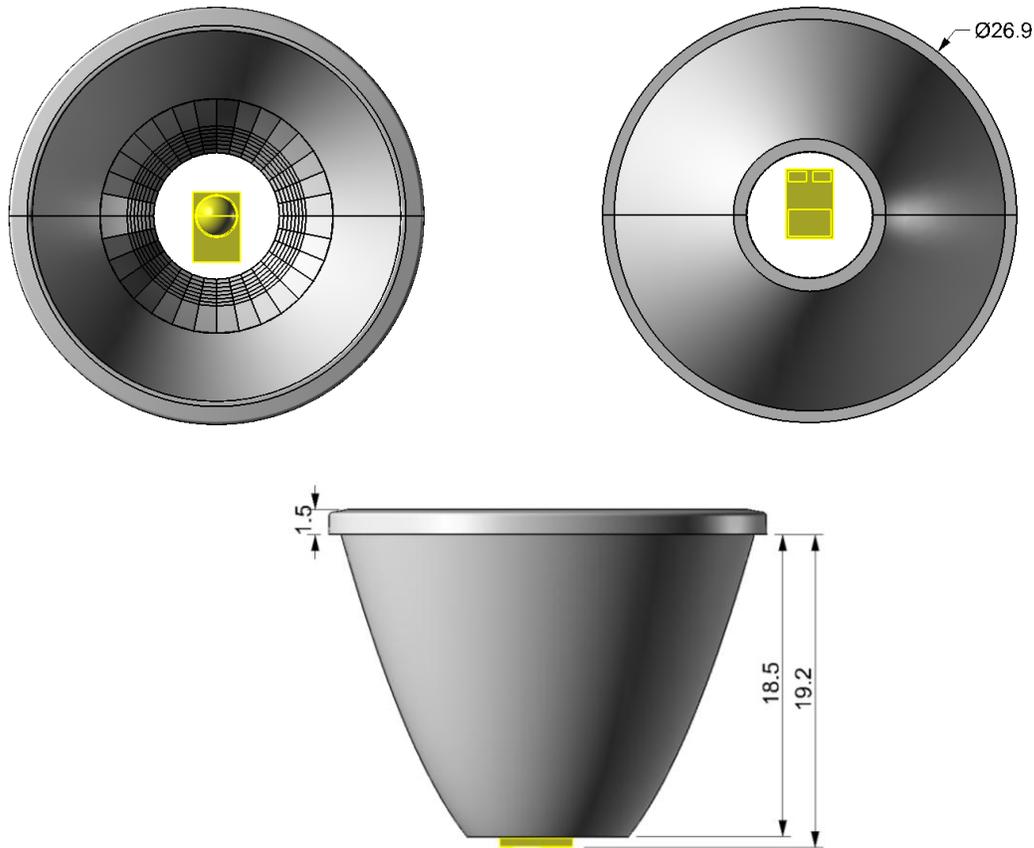


Figure 1. Front, side and rear views, with main dimensions.

CAUTION: For the best performance and beam appearance, the FGR reflector should be positioned so that the reflector's base is aligned with the top of the LED package, as shown above. The emitting surface or dome of the LED should be aligned with the center of the reflector cone.

The FGR reflector does not have any mechanical mounting features. It is designed with a mounting flange, allowing the designer to properly align and secure the reflector in their assembly.

Ordering Part Numbers

FGR-N1-RE-0R

(The last two characters are 'zero R')