

MY REQUIREMENTS

**Faxback for notes and your requirements for the 238 Series:**

Quantity Required:

Colour:

Voltage:

My Reference:

Delivery Required:

My Name:

Company Name:

Contact Telephone / Email:

If you would like a quotation for the above requirements,  
please photocopy this sheet and fax it back to Marl International on:

**FAX: 01229 585155**

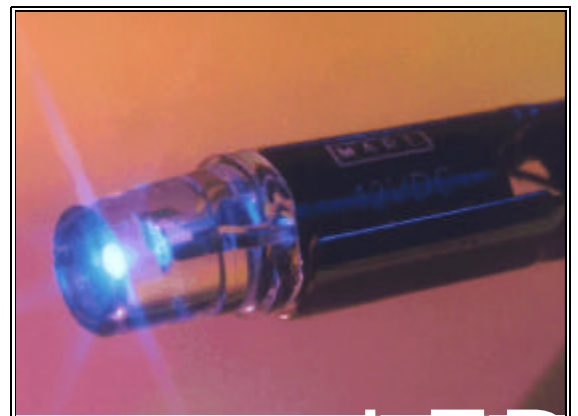
for a prompt reply

## NEW PRODUCT DATA

*Signalling Panel & Console  
Filament Replacement  
LED Technology*

**Fit and Forget LED  
Signalling Panel Indicators**

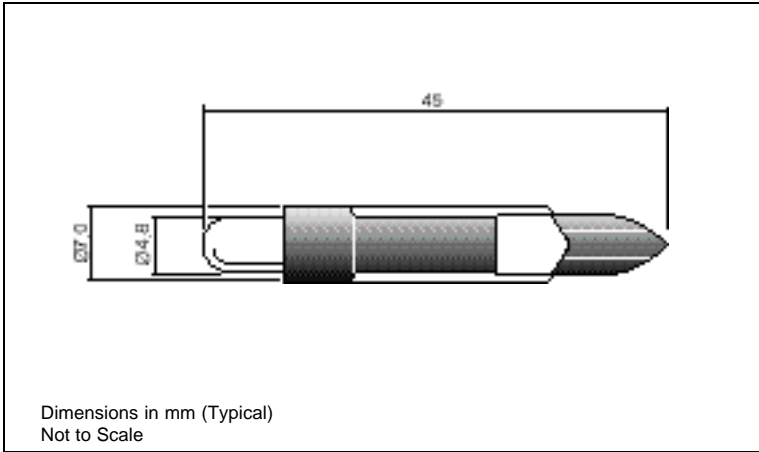
- MTBF: 100, 000 Hours (11 Years)
- Reliable: Flicker-free & shock resistant
- Railtrack Approved



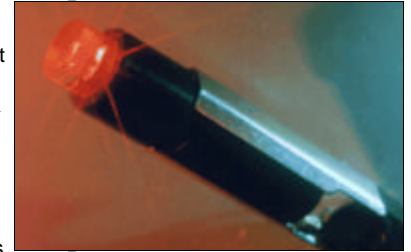
*LEDs:- offer greatly extended life and reliability in comparison to filament bulbs, in addition to reduced heat generation and power consumption. They are readily available in all the main signal and status defined colours and base styles, for immediate retro-fit.*

LEDs

**FILAMENT REPLACEMENT LEDs - T6.8SB Bi-Polar**



- Direct replacement for T6.8 SB
- Resistant to shock and vibration
- Bi-Polar: ac/dc operation
- Massive reductions in maintenance costs
- Railtrack Approved ^
- Flat-topped version available for increased viewing angle



**238 SERIES**

**Pack Size = 20**

**Ordering Information & Typical Technical Characteristics (Ta = 15 - 25°C)**

Mean Time Between Failure = 100,000 Hours. Luminous intensity figures refer to the unmodified discrete LED.

PART NUMBER	COLOUR	LENS	VOLTAGE AC/DC Vopr	CURRENT Iopr	LUMINOUS INTENSITY Iv@20mA	WAVE LENGTH λp	VIEWING ANGLE	OPERATING TEMP Topr	STORAGE TEMP Tstg
<b>HIGH INTENSITY</b>									
238-501-98	Red	Water Clear	24	17	2750	660	Narrow	-20 ~ +50	-30 ~ +80
238-521-98	Yellow		24	17	4500	590			
238-532-98	Green		24	16	6000	525			
238-930-98	Blue		24	16	2000	470			
238-997-98	White		24	16	3000	*			
238-501-93	Red		28	17	2750	660			
238-521-93	Yellow		28	17	4500	590			
238-532-93	Green		28	16	6000	525			
238-930-93	Blue		28	16	2000	470			
238-997-93	White		28	16	3000	*			
UNITS			Vdc	mA	mcd	nm		°C	°C

\* = Typical emission colour: x = 0.31, y = 0.32. Colour temperature 8000K.  
Intensities (Iv) and colour shades of white (x,y co-ordinates) may vary between LEDs within a batch.

^ Railtrack Approval: PA05/697

**SAMPLES AVAILABLE**

● TECHNICAL INFORMATION

OVERVIEW

Product Description

Filament replacement LEDs have been available for many years, and there has been a transition from the use of multi-LED products to the use of high performance, high reliability single LED products. Marl has always been at the forefront of designing and manufacturing LED indicators for harsh and difficult environments with demanding performance expectations. The new 238 series LED lamp replacement allows the user to exchange the standard tungsten filament bulb to BS1050 or black-tip as it is sometimes known, with a high brightness low current consumption cool, reliable alternative. This follows extensive trials by Railtrack on Westinghouse M3 and M5 signalling panels and consoles. Internal circuitry specifically designed for rail applications allows for operation at either AC or DC voltages allowing polarity free replacement, and while also providing the benefit of not producing a distracting flicker, like some lower specification LED replacement devices when used on AC voltage supplies.

With an MTBF of 100,000 hours, routine maintenance costs are minimised and overall system reliability and safety enhanced.

Samples and technical support are now available upon request.

MATERIALS

Contacts	Nickel Plated Brass
Extension Sleeve	Acetal
LED Lens	Water Clear Epoxy

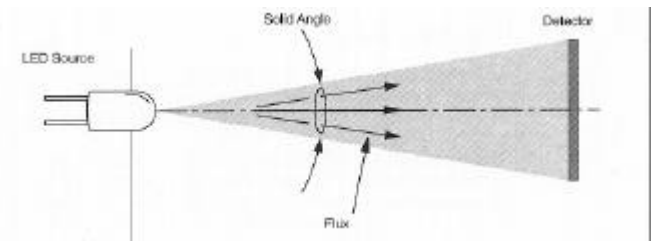
APPLICATIONS

Replacement tungsten filament bulbs with the approved Marl 238 series eliminates maintenance costs and improves signal indication recognition by the signaller, improving safety. This is due to the cool running of the LED, which does not deteriorate the panel filter, obscuring visibility, while also the enhanced brightness and colour definition of the LEDs also increases this recognition. When used on a console within operator buttons, again the low heat generation does not cause the button to become brittle, eliminating the possibility of a fracture. Signallers also can now operate buttons that are cool to the touch, compared with tungsten bulbs. The trials have clearly shown that for white signal indications, the use of yellow LEDs provides the best visual performance compared to true white LEDs.

Marl provide the full range of approved colours for use within signalling panels and consoles for rail use. The 238 series forms part of a family of bulb replacements available from Marl.

INTENSITY

The small physical size of an LED chip means that it can be regarded as a point source to a very good approximation. The light output of an LED is therefore expressed in terms of luminous intensity, which is defined as the flux, in lumens (lm), emitted per unit solid angle in steradians (sr). The SI unit of luminous intensity is the candela (cd).



RELATED DOCUMENTS

These products are designed and manufactured in the UK to International Quality Standard BS EN ISO9001 : 1994.

