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Health and safety

Every effort has been made to ensure the accuracy of the information given in our publications, but in accordance with our policy of continually improving our products we reserve the right to modify designs and specifications whenever necessary. All equipment is designed to conform to relevant British and International standards. Every care is taken to ensure that, as far as reasonably practical, it will perform without risk to health. It is essential that accepted codes of professional practice are followed in the assembly, installation and commissioning of the equipment. If in doubt with respect to any of these instructions, please consult DORMAN before installing the device.

Dorman reserves the right to vary any component part to meet the required specifications without prior notice.



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LED Colour Light Signal Light Measuring Tool (LMT 03) Operating Instructions

To be read before commencing
Operation



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Disclaimer

When using the Light Measuring Tool (LMT) to measure the light output of a Colour Light Signal (CLS), in the field, the LMT accuracy may vary by up to $\pm 10\%$. The reason for this variation is that the CLS is operating in a changeable environment.

i.e. The ambient temperature that the CLS is being tested at affects the light output of the CLS; also the length of time the CLS has been switched on before it is tested will affect the light output.

NB: When testing the degradation of a CLS using the LMT, a variation in accuracy due to environmental change must be taken into account.

CE Conformity



INTRODUCTION:

The digital lux meter is a precision instrument to measure illuminance of a Dorman signal in the field.

It is fully cosine corrected for the angular incidence of light. The illuminance meter is compact, tough and easy to handle owing to its construction. It is however not waterproof and therefore should not be operated in an unsuitable environment.

The light sensitive component in the meter is a very stable, long life Silicon Photo Diode.

FEATURES:

- Light-measuring range from 0.01 lux to 20,000 lux.
- High accuracy and rapid response.
- Data Hold function for holding the measured values.
- Unit and sign display for easy reading.
- Automatic zeroing.
- Meter corrected for Luminous Efficiency function.
- Correction factor need not be manually calculated for non-standard light sources.
- Short rise and fall times.

SPECIFICATIONS:

- Display: 3-1/2 Digit LCD.
- Measuring range: 20, 200, 2,000 and 20,000 lux
(20,000 lux range reading $\times 10$)
- Overrange Display: Highest digit of "1" is displayed.
- Spectral Response: CIE Photopic. (CIE human eye response curve)
- Spectral Accuracy: CIE V_{λ} function $f'_{\lambda} \pm 6\%$
- Cosine Response: $f'_{\theta} \pm 2\%$
- Accuracy: $\pm 3\%$ of reading $\pm 0.5\%$ f.s. ($\pm 4\%$ rdg ± 10 dgt as $> 10,000$ lux range).
(Calibrated to standard incandescent lamp at colour temperature 2856K)
- Repeatability: $\pm 2\%$
- Temperature Characteristic: $\pm 0.1\% / ^\circ\text{C}$
- Measuring rate: Approximately 2.0 time / sec.
- Photo detector: One silicon diode with filter.
- Operating temperature and humidity: 0°C to 40°C (32°F to 104°F)
10 to 80% RH.

- Storage Temperature and Humidity: -10°C to 60°C (14°F to 140°F)
10 to 70% RH.
- Power Source: 9 Volt battery , NEDA 1604 or JIS 006P
or IEC 6F22
- Battery Life (typical): 200 hours (Alkaline Battery)
- Photo detector Lead Length: 150cm (approx.)
- Photo Detector Dimensions: 100L x 60W x 27H (mm)
3.94"L x 2.36"W x 1.06"H
- Dimensions: 135L x 72W x 33H (mm)
5.31"L x 2.83"W x 1.3"H
- Weight : 250g (8.8oz)

* Also refer to disclaimer in this document.

**TAKE EXTREME CARE WHEN REPLACING THE BATTERY
TO ENSURE THE COVER IS PRESSED DOWN INTO POSITION
BEFORE SLIDING CLIPS INTO PLACE**

If the reading is less than 70% of the light output noted on the rear of the module, then the Local Manager must be informed. Arrangements must be made to test the light output more frequently.

Colour Light Signals that have a light output lower than 60% of the original manufacture value should be replaced in accordance with Network Rail practice.

All Dorman LMT products have been individually calibrated, and for each colour, multiplication values have been given. On each LMT there is a label giving the multiplication factor that is to be applied to the measured values so as to establish the lux output of the light source under observation.

An example of how this multiplication factor is implemented to establish the corrected lux reading and degradation percentage of the light source is demonstrated below.

Formula:

$$\frac{(MV) \times (F) \times 100}{(OFR)} = \% \text{ OFR}$$

Where: OFR = Original Factory Reading

MV = Measured Value

F = Correction Factor as indicated on LMT Label

Example Only:

To test a 'RED' CLS Module with an original factory Reading (OFR) of 102 (Printed on Rear Label of Module):- The correction factor (F) for the LMT02 might be 0.56 (Printed on the side of the 'Light Collector Tool')

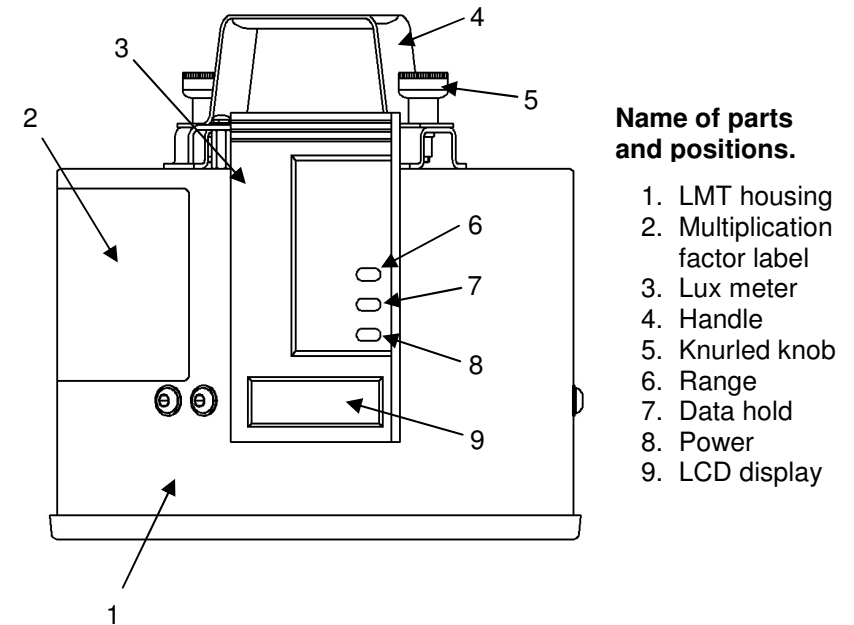
The measured value (MV) taken for the 'RED' light source could be 170 LUX. Therefore from the above formula:-

$$170 \times 0.56 = 95$$

To calculate the Light Efficiency :-

$$\frac{95}{102} \times 100 = 93\% \text{ Light Efficiency.}$$

Note: 100% = The Original Factory Reading (OFR).



Light Measuring Tool (LMT 03)

Colour Light Signal Light Output Testing using the Dorman Light Measuring Tool (LMT 03)

General: -

The LMT tool is supplied as an Instrument to monitor the degradation of a Colour Light Signal. The meter, photo-sensor and enclosure form the complete unit and should therefore not be separated from or interchanged between other units.

Prior to any work commencing, local working procedures and practices should be followed.

The use of the LMT obscures the light aperture during operation and testing of the lamp output.

The LMT consists of a Photo Detector connected to a battery-operated precision Digital Light Meter. The Photo Detector is mounted to an aluminium housing which during operation is placed over the lamp lens. The complete assembly is supplied in a rugged equipment case.

Operation:

Optical Measurements: - Only suitably qualified and competent authorised persons should undertake electrical and optical testing of the Colour Light Signal.

Prior to operation it should be established that the Light Measuring Tool is within calibration. The date of the last calibration is printed on the label fixed to the front of the LMT housing.

The calibration period is **12 MONTHS**. The complete unit must be returned to Dorman for calibration prior to expiry.

The light measuring tool should be available complete with suitable documentation to record the light output measurements and a means of performing the multiplication factor operation.

EQUIPMENT REQUIRED

- LMT INSTRUMENT
- SIGNAL RECORD CARD
- CALCULATOR

using the Dorman Light Measuring Tool cont....

LMT Operating Instruction

- Observe and record the light outputs of the CLS at manufacture, this is recorded on the label at the rear of the signal module.
- Remove the LMT from its equipment case.
- Secure the handle to the housing with the two knurled knobs.
- Clip the lux meter onto the housing bracket.
- Turn on the lux meter, and select the 2000 lux range. *See lux range note.*
- Arrange with the signaller to display an agreed aspect.
- Offer the LMT housing into the hood and place over the illuminated light source, making sure the housing is seated firmly down against the domed lens of the signal module.
- Take a note of the reading from the lux meter LCD display.
- Using the appropriate multiplication factor printed on the LMT housing label, calculate the corrected lux value and record on the appropriate record card.
- Repeat the above steps illuminating all the other light sources.
- Remove the lux meter and handle prior to replacing the LMT in the equipment case.

Lux range note.

Over range.

If when in use the instrument only displays one "1", the input signal is too strong, and a higher range should be selected.