Stroboscope

Digital, LED Flash

LB3806-001

The IEC Design Has Many Special Useful Features:

- Microprocessor based design for reliability.
- Extremely accurate and stable.
- Very high resolution.
- Crystal locked frequency - calibration is not required.
- Bright digital LED display for easy reading in darkness.
- Cold running of the solid state bright LED flash.
- Very compact and small enough to fit a pocket. .
- Very robust and rugged construction. No glass tube to break.
- Display selectable to be either in Flashes per second or Revs per minute.
- Flash brightness self-adjusts to maximum at all frequencies.
- One single broad range from 1Hz to 500Hz frequency (60 to 30,000 RPM).
- Very robust design, suitable for workshop abuse.
- Operates at 12V.AC or DC via 4mm sockets provided at the end of the housing or from a 220/240V.AC. 50/60Hz. mains Plug-Pak.
- Can be triggered by remote contact closure or voltage signal source.
- Includes convenient digital TACHOMETER function.
- Modern press button control:
- Selection for flash ON/OFF.
- Selection for flash trigger by internal control (normal operation)
- Selection for flash trigger from an external signal.
- Selection for synchronising the flash to mains frequency. This is at 50Hz when on AC and at 100Hz when used on unfiltered DC. If battery or smooth DC supply is used, there is no mains synchronising possible.
- Designed and made in Australia.

Length: 180mm	Width: 300mm	Height: 35mm	Weight: 350g

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Description:

This unique IEC **Digital LED Stroboscope** is specially designed for the mechanical engineer or consultant or for student personal use in the classroom. The flashing white LED is pointed at a device in motion and, regardless of the type of motion, when the visible image appears to be stationary, the exact speed of the motion is displayed on the digital display. Often, rather than measuring the speed, only the visual examination of the 'Frozen' Image is required.

Operation of Instrument:

Power Up:

When 12V.AC or DC power is first applied from a battery or power supply or from a Plug-Pak, the LED display will show I.E.C. then a quick display test. The display will show the flash rate that was set atr the last time the unit was used but the flashing will be OFF. The small LED indicating 'flash off' will be ON. To initiate flashing, press the FLASH ON/OFF button momentarily. NOTE: Accuracy and stability of the instrument, long or short term, is absolute and future calibration is not required.

Adjust Flash Frequency:

To raise the flash rate, press the UP ARROW button. Each press of the button increments the flash rate only slightly by one least significant digit. When the button is held depressed, after a very short delay, the rate increments faster. If the DOWN button is **also** pressed while still depressing the UP button, the frequency rises very quickly. The same is true for the DOWN ARROW button.

To Stop Flashing:

Momentarily press the button marked FLASH ON/OFF. The flashing will stop but the display will remain active. Note the display window indicates and a small LED on the panel reminds the user that the flashing has been switched off. If desired, the new flash frequency can be preset with the flashing off. When ready, press the button momentarily again and the flashing will be ON.

The LED Flash:

The set of Ultra Bright White LEDs are arranged in the end plate so that they focus to a bright spot about 300mm away from the instrument. The LEDs are controlled so that the maximum flash brilliance is maintained at all frequencies. Flash duration is about 2% of the time between flashes to a maximum of 1 millisecond duration.

Modes:

The MODES can be selected ONLY when the flash is off.

Internal:
Means that the flashing of the Stroboscope is controlled by the press buttons on the panel.

External:
Means that the flashing is controlled by external pulse source connected to the sockets provided.

Mains Lock:
Means that the display will indicate and the flash will occur exactly at the rate of the mains frequency. When powered from AC power supply or by 12V.AC Plug Pak, the mains lock is 50Hz. When powered from unfiltered DC, mains lock is 100Hz. When powered from a 12V battery or from smooth DC, mains lock is not possible.

Units:

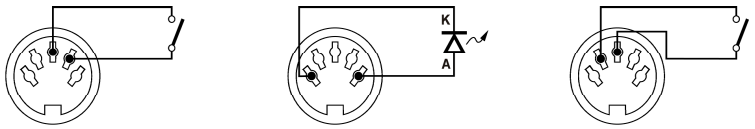
The UNITS can be selected ONLY when the flash is off.

Hz:
Means Hertz which is the unit of frequency of events occurring per second. In this case it means Flashes per second.

RPM:
Means revolutions per minute of the device being observed. Used mainly in engineering and automotive fields.

Socket for Trigger and Measurement of External Frequencies.

The 5 pin DIN socket is common to audio systems so that cables can easily be made by the user. Two pins are for trigger signals to cause the strobe to flash and two other pins provide a signal out to a miniature extension flash LED. This is very useful for providing a strobe flash in small and inaccessible places.



EXTERNAL SYNCH SIGNAL | EXTERNAL FLASH HEAD | TURN ON/OFF INTERNAL FLASH

Signal required:

A short circuit of the two pins will produce a single flash so that a simple external mechanical switch can trigger the strobe. A moving device can be arranged to operate a simple switch and the Stroboscope flash will be synchronised exactly with the motion. The speed of the motion will be displayed in the selected unit and the image viewed will be perfectly stationary.

Alternatively, an electrical signal or square wave trigger pulse driving from less than 500mV low rising to 1.5V high (up to 20V.max) will also trigger the flash. Duration of signal should be at least 1 millisecond.

Taking Measurements: Techniques

Tachometer:

If an external signal is used to trigger the LED flash, the digital display also indicates the flash rate being triggered. If the flash is turned OFF, the display continues to display the flash rate either in RPM or Hz as selected. This means the instrument can be used to produce a perfectly synchronised "Frozen Image" or can be used as a Tachometer from an external signal source.

Multiple Images:

In the case of symmetrically shaped objects such as a fan or a hexagonal nut and almost all wheels and gears, care must be taken to ensure that the stationary image seen is caused by one single flash per revolution.

Consider a four bladed fan rotating at 3000 RPM or 50 RPSecond. A stationary image will be observed when the flash frequency is 50 per second, that is one flash per revolution. Since there are four symmetrically positioned blades, there will be another stationary image at 100 flashes/second (each half turn) and also at 200 flashes/second (each quarter turn).

To overcome this confusion, a temporary mark with adhesive tape or chalk should be placed on one blade to upset the optical symmetry so that multiple images can easily be distinguished from the 1:1 direct reading image.

However, after marking the blade, it will be found that another stationary image will be found at 25FPS (two turns per flash) and 16-2/3FPS (three turns per flash) and 12-1/2FPS (four turns per flash) and so on.

The 'Golden' Rule:

Using a distinguishing mark on a rotating object, viewed from the front, the first single image observed whilst reducing the flash rate from maximum is the true direct reading image.

Using Multiple Images:

Higher Frequency:

At high flash frequencies you can see double and triple and higher image multiples because the flash may occur several times per single motion. Sometimes, when the object is slow in motion, the stationary image might appear difficult to view especially in illuminated surroundings. If the frequency is raised to two or three multiple images, the image will appear with less flicker and will be more steady to the eye. The true speed is the displayed reading divided by the number of images.

Lower Frequency:

If the flash rate is slower than the moving object, the object could be moving several times between each successive flash but the image will appear to be stationary. This can be confusing. To be sure the image you see is the true 1:1 synchronised image, always begin at a higher frequency and adjust downwards towards the actual frequency. Then, the first single image you see is the true 1:1 image synchronised with the moving object.

In some cases the moving object might be much faster than the range of the instrument (300/second or 30,000 RPM). The RPM can be extended up to about 250,000 RPM by using the following technique:

Run the Stroboscope at maximum frequency and reduce it slowly to find the first stationary image. Note the reading. Continue to reduce the frequency to the NEXT stationary image. Note the reading. Apply the following formula:

(lower reading / difference between readings) x higher reading

Example: An object rotating at very high speed. First two stationary images were found at instrument readings of 17,000 RPM and 13,600 RPM.

The difference between the readings is 3,400

True speed of object is: (13,600 / 3,400) x 17,000 = 68,000 RPM

Accessories:

(NOT supplied with unit)

PA3806-010	Cable for external signal
PA3806-020	Extension LED Flash Head complete with 1000mm long cable

Designed and manufactured in Australia