elincom

FULHAM
Lighting... Global. Intelligent. Sustainable.

MARK NEEDHAM

VICE PRESIDENT, EUROPEAN SALES

LED EVENT November 2017

LED EVENT 2017

Design en engineering trends voor LED-applicaties

BE WOENSDAG 29 NOVEMBER 2017
TECHNOPOLIS, MECHELEN

NL DONDERDAG 30 NOVEMBER 2017
CONGRESCENTRUM 1931
BRABANTHALLEN, DEN BOSCH

FULHAM

Global Footprint

LED EVENT 2017

Design en engineering trends voor LED-applicaties

BE WOENSDAG 29 NOVEMBER 2017
TECHNOPOLIS, MECHELEN

NL DONDERDAG 30 NOVEMBER 2017
CONGRESCENTRUM 1931
BRABANTHALLEN, DEN BOSCH

elincom

LED Driver solutions

FULHAM LUMO SERIES

FULHAM WORKHORSE LED

LED Emergency Lighting Solutions

FULHAM HOTSPOT LED

LED EVENT 2017

Design en engineering trends voor LED-applicaties

BE WOENSDAG 29 NOVEMBER 2017
TECHNOPOLIS, MECHELEN

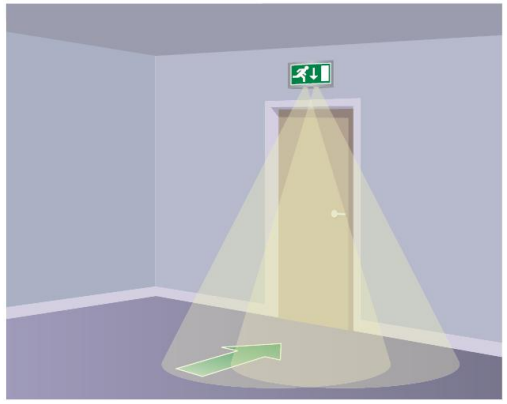
NL DONDERDAG 30 NOVEMBER 2017
CONGRESCENTRUM 1931
BRABANTHALLEN, DEN BOSCH

Emergency Lighting

Emergency LED Solutions

Emergency Lighting What is it ?

Emergency Lighting Lighting Equipment to Provide illumination in the event of Mains Power Failure

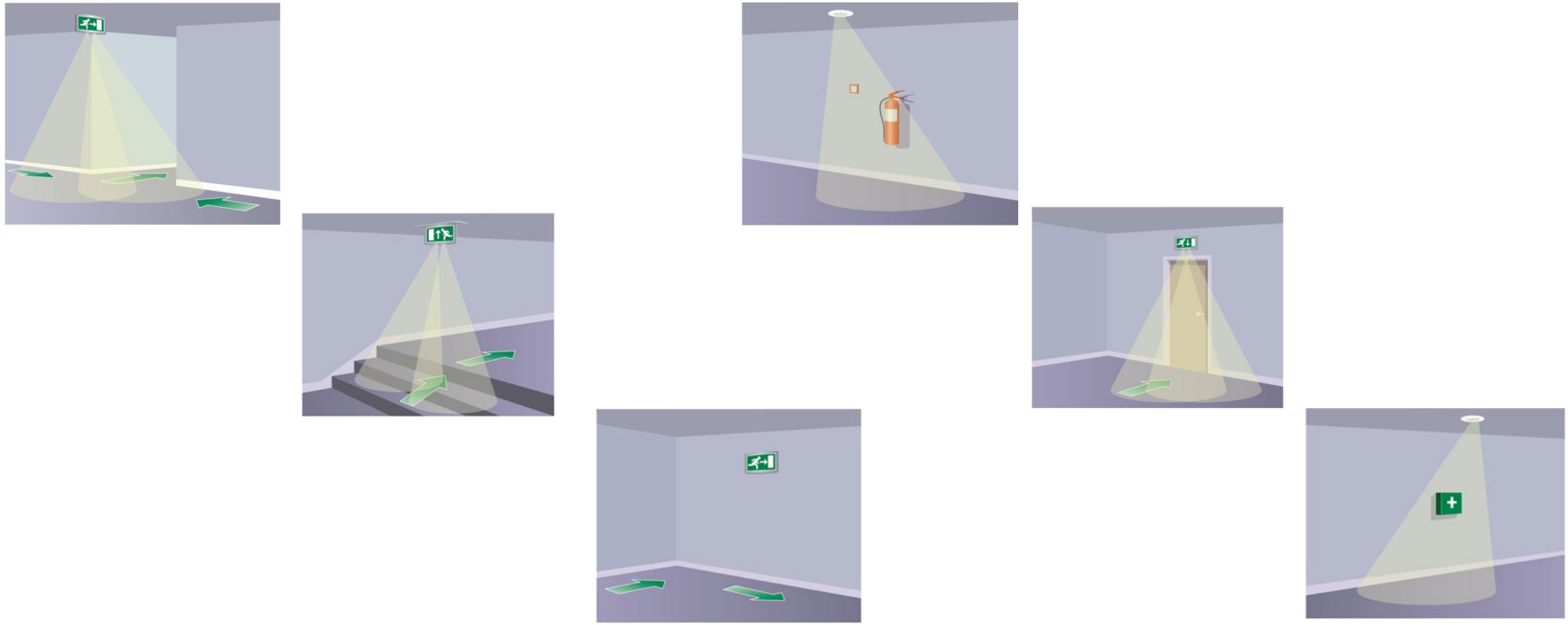


Emergency Escape Lighting

Lighting that is Provided to enable Safe Exit in the event of Mains Power Failure

Emergency Standby Lighting
Lighting that is provided to enable normal activities to continue in the event of mains power failure

Emergency Escape Lighting



Emergency Lighting

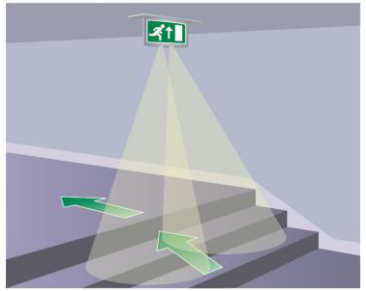
Compliance Standards, Regulations and Directives

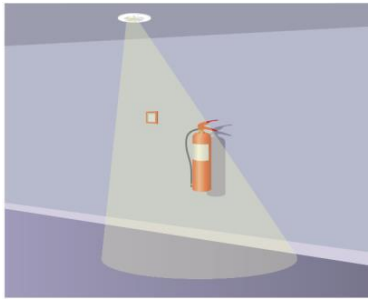
EN.50172	*(BS.5266-1)*	- Base standard - Emergency Lighting of Premises - Building Regulations, Installation, Plans & Designs - Testing, Maintenance & Records
EN.1838	*(BS.5266-7)*	- Emergency Lighting illumination levels
IEC.62034	*(BS.EN.62034)*	- Automatic Test Systems
EN.60598-2-22		- Emergency Lighting Equipment and Luminaires

Emergency Escape Lighting [1]

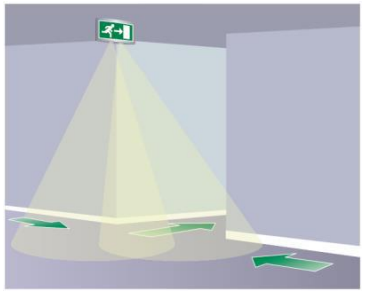
(1) Escape Route Lighting

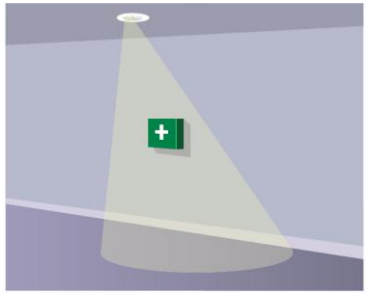
Emergency Lighting System
Swift & Safe Evacuation of a Building
Illuminating Escape Routes;





- Corridors and Stairways
- Location of Fire-Fighting Equipment
- Safety & Security Equipment





Emergency Escape Lighting [2]

(2) Large Public Buildings Significant number of Visitors Unfamiliar with Layout

Shopping malls, Museums
Exhibition Halls, etc.

Open Area / Anti-Panic Lighting

Identification of Escape Routes, Exits & Guidance Towards them

Emergency Escape Lighting [3]

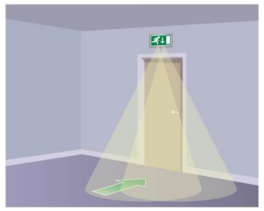
(3) High Risk Task Lighting

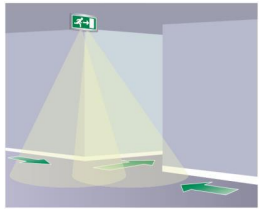
A Specific Type of Emergency Lighting
To Ensure the Safety of People who may be Involved
in a potentially Dangerous Process or Situation

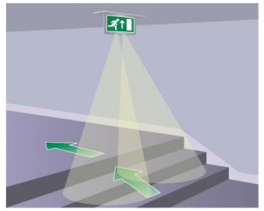
It must be Sufficient to Enable
all Shut-Down Procedures to be Implemented

This type of Emergency Lighting will only apply to a Limited
range of scenarios

Emergency Escape Lighting

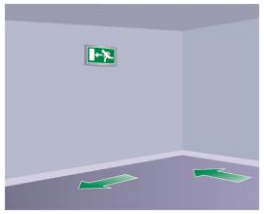


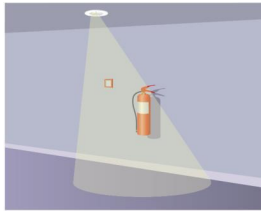


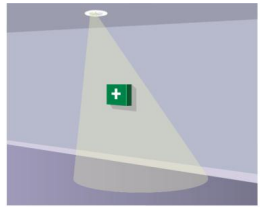


Where Necessary…

- Exit Doors & Escape Routes & Emergency Escape Signs
- Intersection of Corridors
- Stairways & Changes in Floor Level
- Lifts/Elevators and Escalators
- Windowless Rooms Exceeding 8m²
- Fire-Fighting equipment & Fire Alarm Call Points
- Equipment required to Shut-Down in an Emergency
- Areas Greater than 60m²

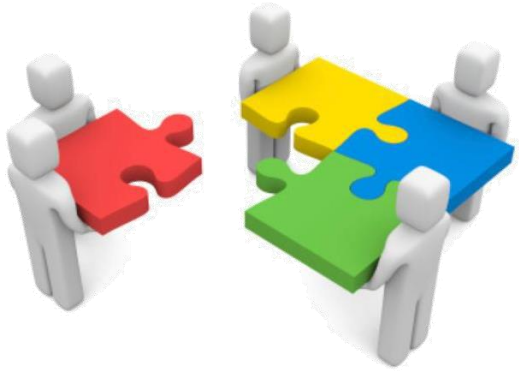


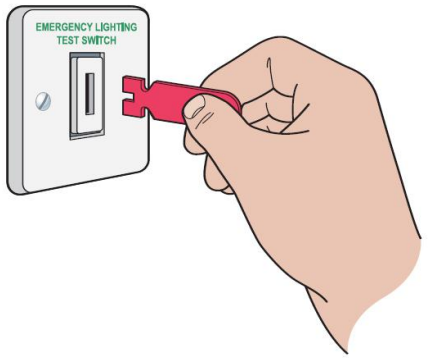




Emergency Lighting What is involved ?

- System Planning & Design
  Correct positioning of Emergency Lighting Luminaires and Signs
- Installation
- Periodic Testing & Maintenance of the Emergency Lighting System
- All in compliance with EN.50172





Emergency Lighting

- **Periodic Testing & Maintenance of the Emergency Lighting System**

Every Month – Function Test

- Operate Emergency Lighting to Ensure Lights illuminate Correctly during Mains Electrical Failure
- Log/Record Date, Results and any Maintenance or Corrective Action

Every Year – Full Function and Battery Test

- Full Battery Discharge Test to ensure that the Lights are illuminated for the Full Period (Typically 3 hours)
- Test that the Batteries recharge correctly
- Log/Record Date, Results and any Maintenance or Corrective Action

AUTOMATIC SELF TEST / SELF DIAGNOSTICS

AUTO

AUTO

Must have 2-Colour LED Status Indicator

COMPLIANCE WITH EN.50172 & IEC.62034 - AUTOMATIC TEST SYSTEMS

Emergency Lighting Luminaires

Maintained Emergency Lights

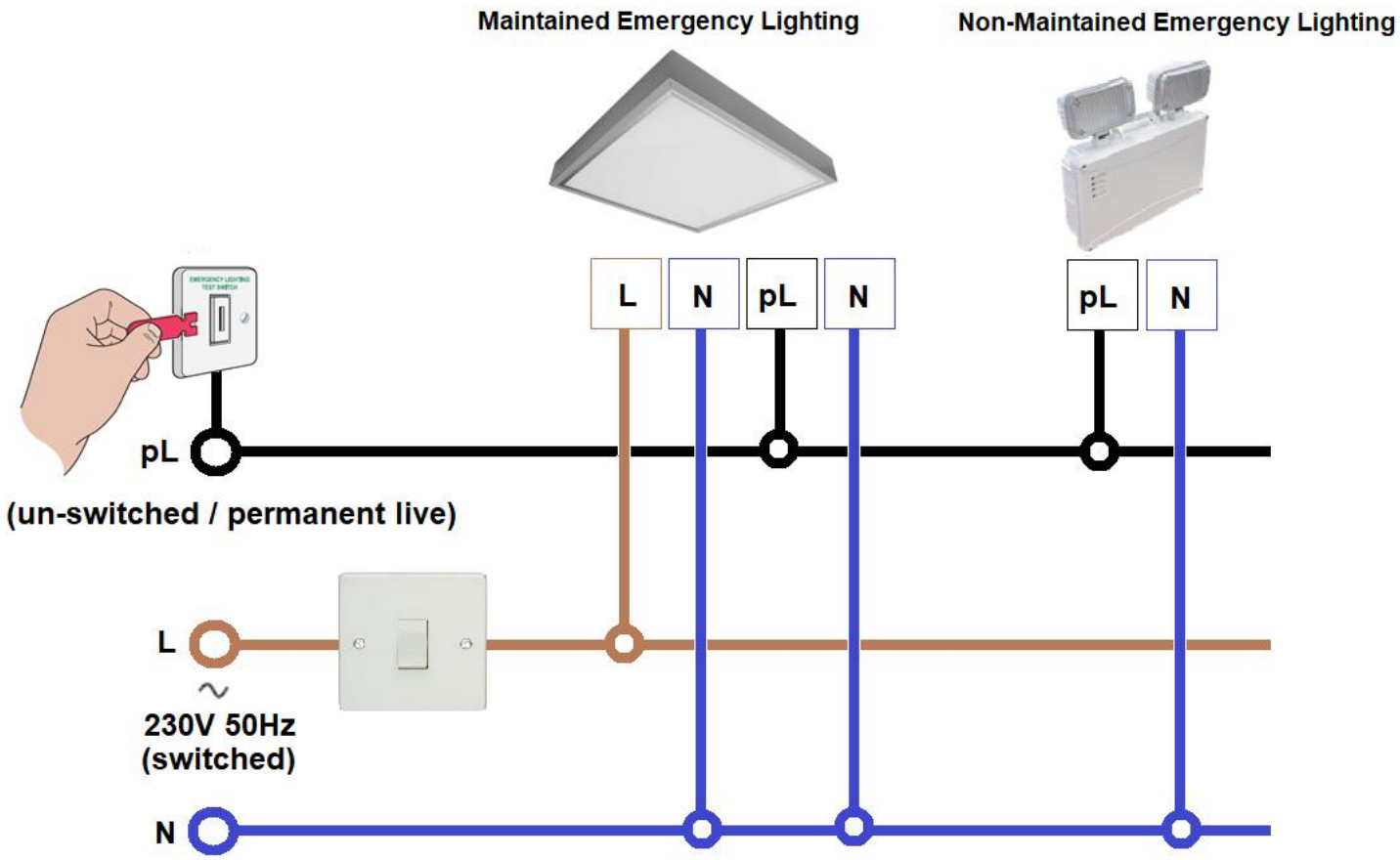
- Lighting that is used during normal conditions
- Switched On & Off during normal use
- Switches to Emergency Mode (typically a lower light level) in the event of a Mains Power Failure

Emergency Lighting Luminaires

Non-Maintained Emergency Lights

- Lighting that is NOT used during normal conditions
- Switches on in the event of a Mains Power Failure

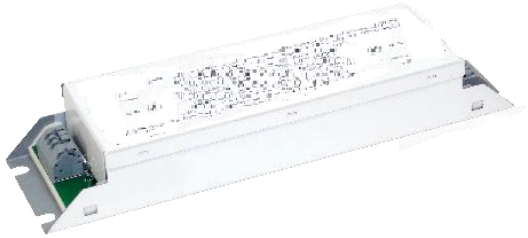
Installation



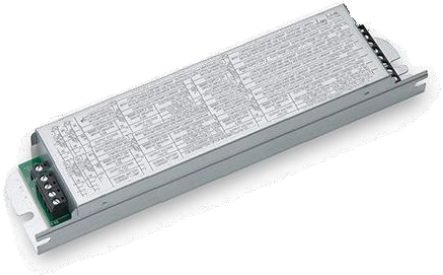
Emergency Lighting Components

Maintained Emergency Lighting

Luminaire LED Driver



Emergency LED Driver

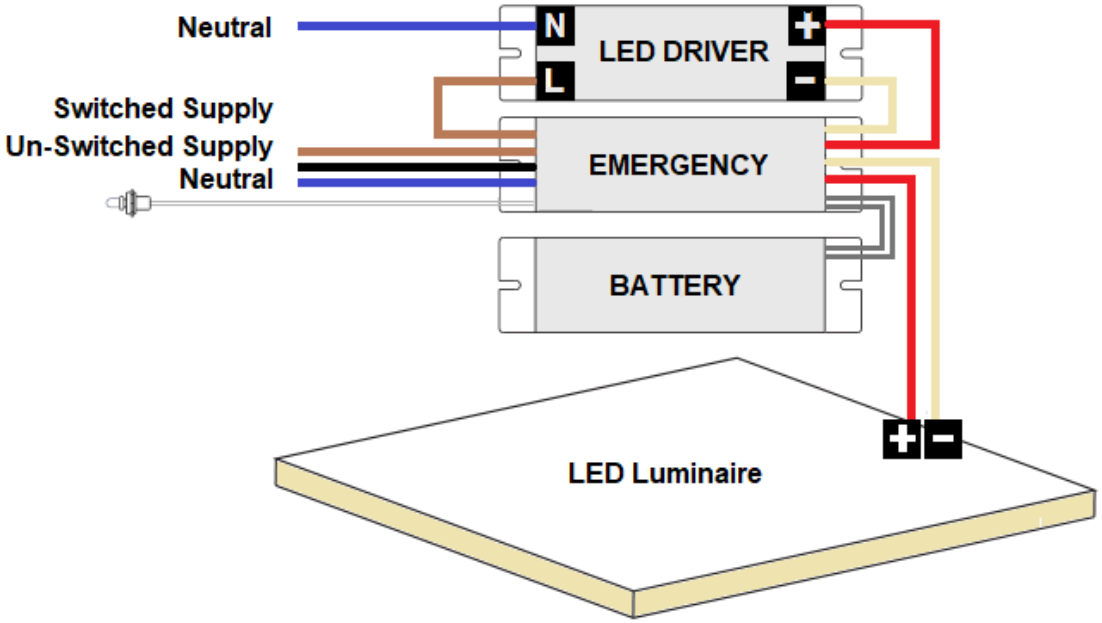


Battery

LED Luminaire

Emergency Lighting Components

Maintained Emergency Lighting

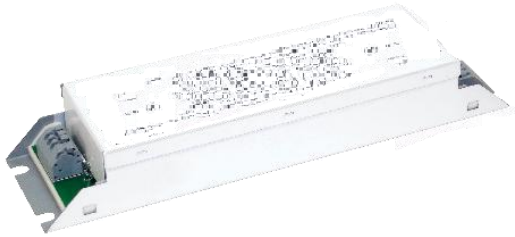


Compliance Standards

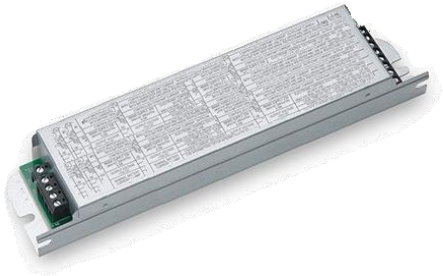
REMINDER:

EN.60598-2-22 - Emergency Lighting Equipment and Luminaires **?**

LED Driver



Emergency Driver



Battery

Compliance Standards

REMINDER:

EN.60598-2-22 - Emergency Lighting Equipment and Luminaires

Emergency Lighting Solution

CE ?

Life Saving Lighting

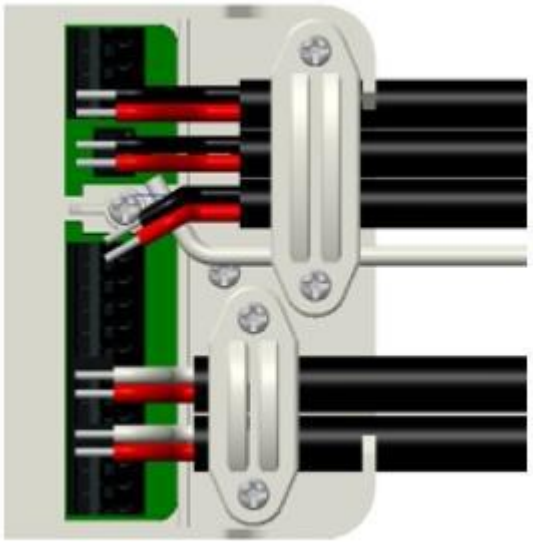
Emergency LED Solutions

EN.60598-2-22

Emergency LED Solutions

Emergency LED Solutions

Emergency LED Solutions



Battery **LED Driver & Emergency Driver** **Connector**

Emergency LED Solutions

ALL-IN-ONE EMERGENCY LIGHTING SOLUTION

EN.60598-2-22

Emergency Lighting

Emergency LED Solutions

MARK NEEDHAM

VICE PRESIDENT, EUROPEAN SALES

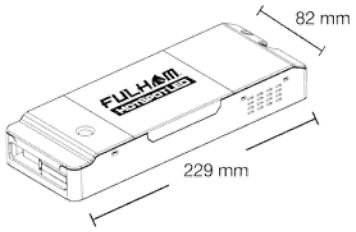
THANK YOU

HotSpot Plus LED Driver & Emergency System

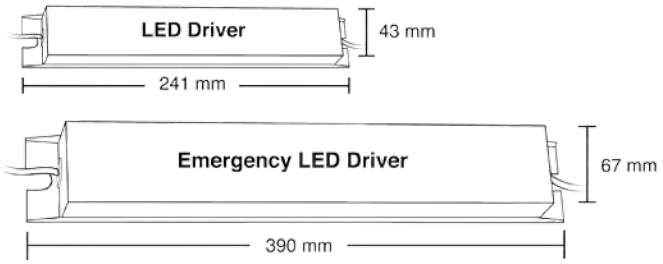
The Power of a Programmable LED Driver, the Dependability of an Integrated LED Battery Backup System

- All-in-one unit combines 0-10V dimmable LED driver, emergency LED driver, and replaceable backup battery
- Lowers costs by eliminating need to install separate emergency system
- Simple installation helps reduce assembly line confusion and wiring mistakes
- Output current programmable in 1mA increments using handheld controller
- Programmable dimming curve allows step dimming and dim-to-off
- SmartSet programming platform enables integration of more efficient modules in luminaire designs

HotSpot Plus
The Smallest Complete Emergency LED System



Traditional Emergency System
Standard LED Driver & Emergency Driver



sales.eu@fulham.com • Tel: +31.(0)72.572.3000 • Berenkoog 56, 1822 BZ Alkmaar, Netherlands • www.fulham.com

HotSpot Plus LED Driver and Emergency System								
Watts	Output Current (mA)	Output Voltage (VDC)	Model Number	Input Voltage (VAC)	Dimming Type	Ch.	Dimensions (LxWxH) (mm)	Case Type
45	250-1400	11-50	**FHSAC1-230-45CE**	220 - 240 (50/60)	0-10V	1	229 x 82 x 34	Compact w/ Terminals

Specifications	
Emergency Output	1W - 6W Constant Power Programmable; Factory set for 3W 180 minute runtime
Power Factor	>0.9
THD	<20%
Dimming Range	100% - 1%
Battery Type	LiFePO4
Recharge Time	12 Hours
Warranty	5 years. See specification sheet for details.
Advanced Features	Illuminated test switch/AC power indicator, switchable self-diagnostics, user-selectable emergency power level

The Power of Programmability

The HotSpot Plus system runs on Fulham's innovative SmartSet programming platform, giving the user the power to create the right driver for almost any almost any situation.

Programming is simple, using either the handheld TPSB-100EU SmartSet controller or feature-rich SmartSet PC Software. The driver does not need to be powered during programming, and an auto-program feature allows quick, one-touch programming of multiple units with confirmation. The same programmer can also be used with Fulham's WorkHorse LED drivers, with new features constantly being added.

To see Fulham's SmartSet Auto-Programming feature in action, visit
www.fulham.com/smartsetauto

For a demonstration of dimming curve programming, visit
www.fulham.com/smartsetdimmingcurve

SmartSet
Software

TPSB-100EU
SmartSet Controller

FULHAM ***www.fulham.com*** | REV: MAY17

Europe • North America • China • India • Latin America • Middle East

Berenkoog 56, 1822 BZ Alkmaar, Netherlands • +31.(0)72.572.3000 • sales.eu@fulham.com

FULHAM HOTSPOT LED

SELV EL-T RoHS COMPLIANT LiFePO4

SPECIFICATION SHEET: FHSAC1-230-45CE

Description: Emergency LED Driver - Output max 45W - 220-240VAC - 250-1400mA - Programmable - 0-10V Dimming - Constant Current - 11-50V Forward Voltage

This Driver Will Operate The Following LED Modules:
Any LED module designed to accept constant input current of 250-1400mA and has a forward input voltage range of 11-50VDC.

ELECTRICAL DATA

Input Voltage	220-240VAC, 50/60Hz
Input Current	0.27A @ 220VAC
Input Power	55W
Power Factor	>0.9@half load
THD	<20%@half load
Driver Type	Constant Current
Output Current	250-1400mA [TPSB-100 (Program Box), Figure 1]; Record New Setting On 1"x0.5" Label
Output Voltage Range	11-50VDC
Output Power	45W Max. (Figure 1)
	1-6W @ Emergency Mode (Min. 180 Minutes @ 3W, Min. 90 Minutes @ 6W)
Battery Type/ Model Number	LiFePO4 9.6VDC
Battery Capacity Available	1500mAh
Recharge Time	12 Hours
Number of Output Channels	1
Dimming Controller Type / Dimming Range	0-10V / 100%-1% (Figure 2) / Custom Dimming Curve / Dimmed To Off / Push-Dimming
RFI/EMI	EN55015
Output Type	Isolated, LED Class 2
Ambient Operating Temperature Range	0°C to 40°C
Max. Case Temperature	82°C
Sound Rating	A
Input Surge Protection	Line-Neutral 2kV, Line & Neutral-Ground 2kV
Protections	Input Current Protection
	Output Short Circuit Protection
	Output Open Circuit Protection
	Output To Ground Short Protection
	Overload Protection
	Over Temperature Protection
Service Life	50,000 Hours
Approvals / Class	Isolated, LED Class 2; RoHS; Pending

Figure 1

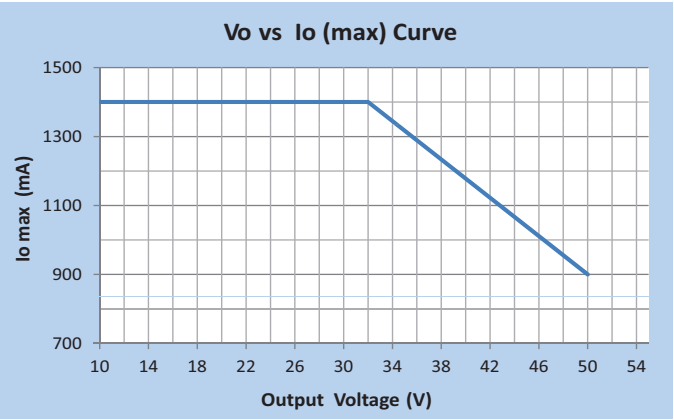
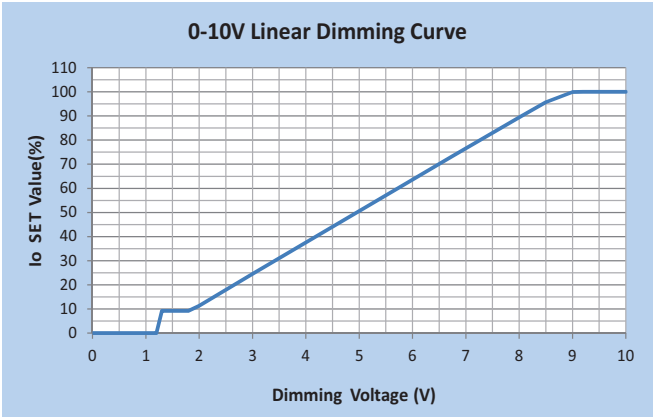


Figure 2



FULHAM HOTSPOT LED

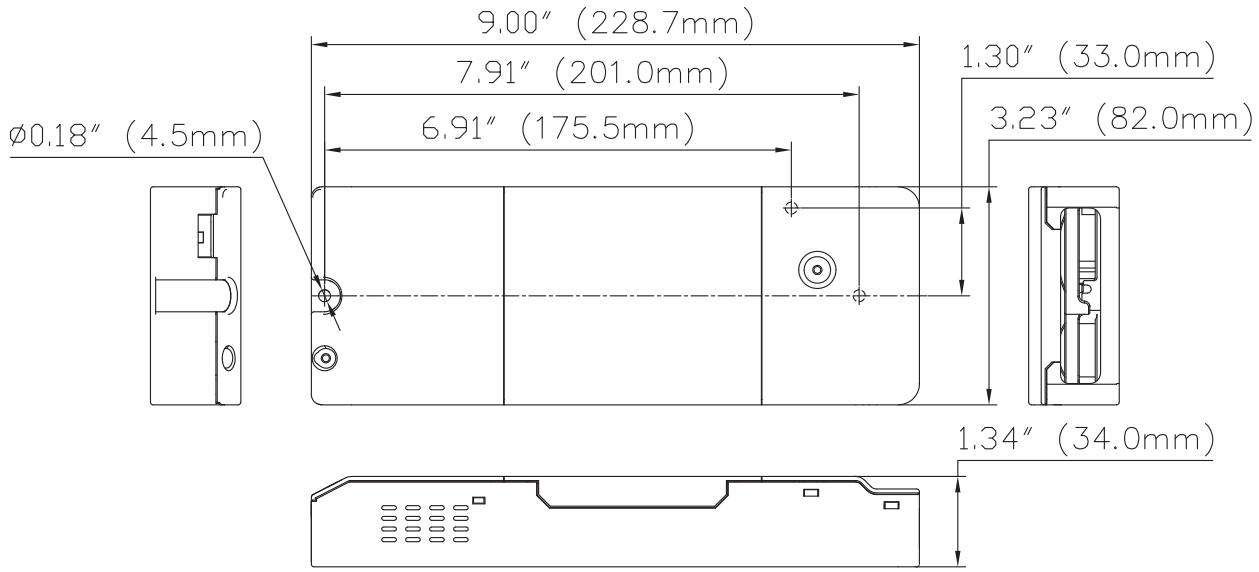
SELV EL-T

RoHS COMPLIANT

LiFePO4

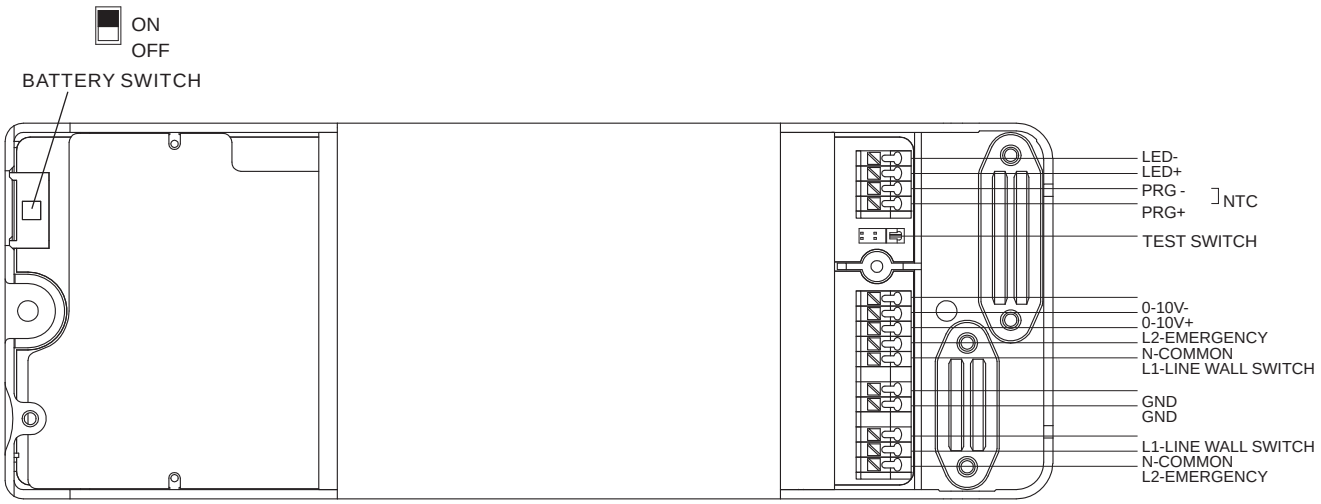
SPECIFICATION SHEET: FHSAC1-230-45CE

MECHANICAL DATA



Tolerance=±0.02"

WIRING DIAGRAMS



NOTE: 1.The driver must be grounded.
2.Once assembly, installation or servicing is complete, set the BATTERY SWITCH to the ON position.

Fulham extends a limited warranty only to the original purchaser or to the first user for a period of 5 years for driver and battery @ Tc 70°C or 5 years for driver and 3 years for battery @ Tc 80°C from the date of manufacture when properly installed and operated under normal conditions of use. For complete terms and conditions, please reference the Fulham. Product Catalog (www.fulham.com). Due to a program of continuous improvement, Fulham reserves the right to make modifications or variations in design or construction to the equipment described.

2017-695-2 REV A

SELV EL-T

RoHS COMPLIANT

LiFePO4

SPECIFICATION SHEET: FHSAC1-230-45CE

TPSB-100:

For detail information on using TPSB-100 Driver Programming Box, please consult user's manual of TPSB-100.

2017-695-3 REV A

FHSAC1-230-45CE

INSTALLATION INSTRUCTIONS

Dimmable 0-10VDC Pulse DIM

RoHS COMPLIANT

SELV

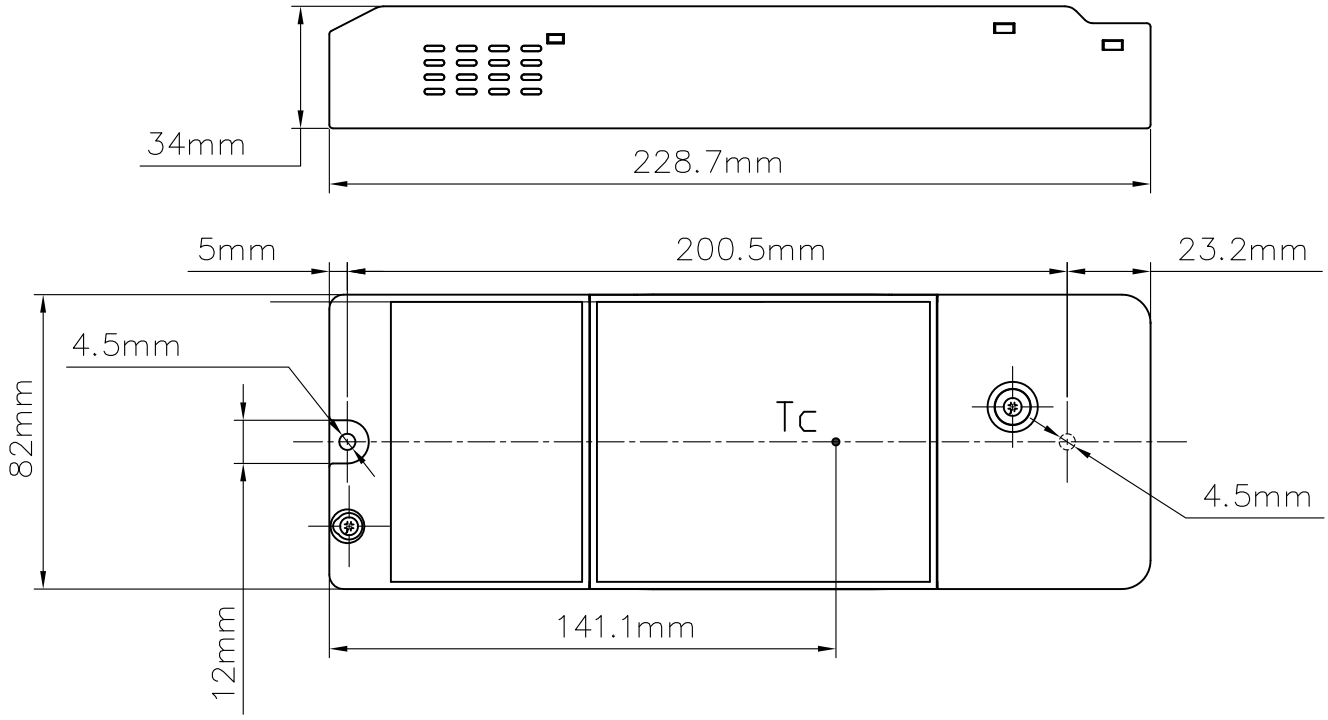
EL-T

General Specifications

Input Voltage	220-240VAC, 50/60Hz
Input Current	0.27A Max.
Input Power	58W
Power Factor	>0.9
THD	<20%
Standby Power	<0.5W
Output Type	SELV
Output Current	250-1400mA
Output Voltage Range	11-50VDC
Output Power	45W (1W to 6W @ Emergency)
Output runtime	Minimum 90min at 6W, Minimum 180 Minutes at 3W (Factory set for 3W / 180min)
Dimming Type	0-10V or Pulse DIM
Dimming Percentage	0%, 1%-100%
Number of Output Channels	1 Channel
RFI/EMI	EN55015
Ambient Operating Temperature Range	0°C To 40°C(32°F To 104F°)
Sound Rating	A
Input Surge Protection	Line-Neutral 2kV, Line & Neutral-Ground 2kV
Protections	Output Open Circuit Protection
	Overload Protection
	Short-Circuit Protection
	Battery Deep Discharge Protection
	Over Temprature Protection
Service Life	50,000 hours
Self-Diagnostic	Factory Enabled
Safety Standards	IEC/EN 61347-1, IEC/EN 61347-2-7,IEC/EN 61347-2-13, IEC/EN 50598-1
	IEC/EN 60598-2-22,IEC 62384,EN 62493,IEC / EN 62034
	EN 61547,EN 55015 , EN 61000-3-2 , EN 61000-3-3

Mechanical Data

Tolerance=±0.02"[0.5mm]



Fulham extends a limited warranty to the original purchaser or first user for a period of 5 years from the date of manufacture when properly installed and operated under normal conditions of use. For complete terms and conditions, please refer to the Warranty Center at www.fulham.com. Specifications subject to change without notice.

Important Safety Instructions

When using electrical equipment and this lighting device basic safety precaution should be followed at all times including but not limited to the following:

PLEASE READ CAREFULLY AND FOLLOW ALL INSTRUCTIONS FOR YOUR OWN SAFETY

Important: An un-switched AC power source of 220VAC to 240VAC is required.
Important: Double insulation used between the supply and battery circuit.
Important: Intermittent re-charging circuit.
Important: The recharging device remains safe after abnormal operating condition.

Caution: Do not let power supply cords touch hot surfaces.
Caution: Do not mount near gas or electric heaters.
Caution: Do not use outdoors.
Caution: Battery is rechargeable LiFePO4 type and must be recycled or disposed of properly.
Do not use this emergency driver with accessory equipment other than recommended by manufacturer; failure to follow this may cause an unsafe condition. Servicing should only be performed by qualified service personnel.

Do not use this emergency driver for other than intended use.
Equipment should be mounted in locations and at heights where it will not readily be subjected to tampering by unauthorized personnel.

Important: Indicator (LED light) illuminated indicates battery in charge mode when AC power is applied. It is recommended and required by applicable code to test emergency function to ensure proper operation of the system; push the test switch for thirty (30) seconds every 30 days to ensure the emergency driver is functioning as by illuminating the LED light source. Conduct a ninety minute (90) discharge test one time (1) per year; LED light source should be illuminated for a minimum of ninety minutes (90).

ASSEMBLY and FIELD INSTALLATION WIRING: WARNING: AC power must be off before proceeding with assembly or installation of emergency driver.

TESTING SYSTEM: The emergency battery requires a charge minimum of one (1) hour before testing the circuit. A full charge requires twelve (12) hours.

Fulham Head Quarters:
Fulham Co., Inc
12705 South Van Ness Ave.
Hawthorne, CA 90250
Local: (323) 779-2980, Fax: (323) 754-9060

Manufacturer:
North China
Fulham Electronic Co. Ltd.
No. 9 Xingchang Road, Nanshao Zhen Changping Science Park, Beijing, P.R. China

FHSAC1-230-45CE

INSTALLATION INSTRUCTIONS

Dimmable 0-10VDC Pulse DIM

RoHS COMPLIANT

SELV

EL-T

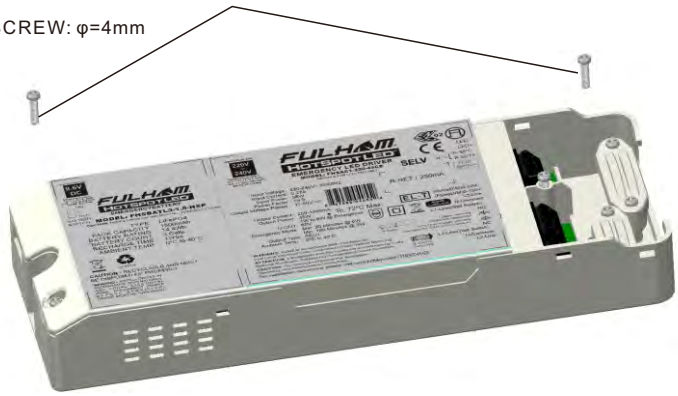
STEP 1: Remove the Screw

STEP 2: Remove the cover

STEP 3: Remove the Screws and strain covers

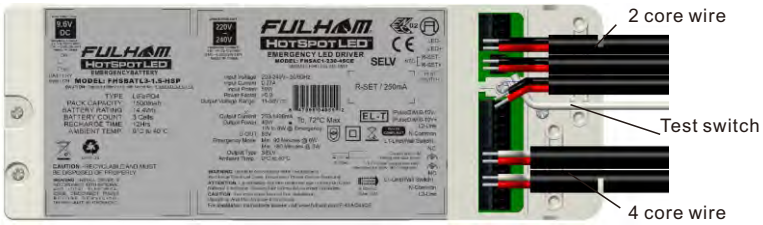
STEP 4: Mounting the LEDdriver

SCREW: φ=4mm



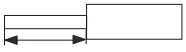
A Mounting the LED driver

STEP 1:Wiring according to actual needs.
Press the cord wires into the strain relief slots.



STEP 2: Put on the strain covers.
SCREW: φ=3mm

B Making the wire connections



NOTE:1.Copper wire only
0.75-1mm² copper wire only and wire rated for 300V, 90°C minimum.

Fulham extends a limited warranty to the original purchaser or first user for a period of 5 years from the date of manufacture when properly installed and operated under normal conditions of use. For complete terms and conditions, please refer to the Warranty Center at www.fulham.com.
Specifications subject to change without notice.

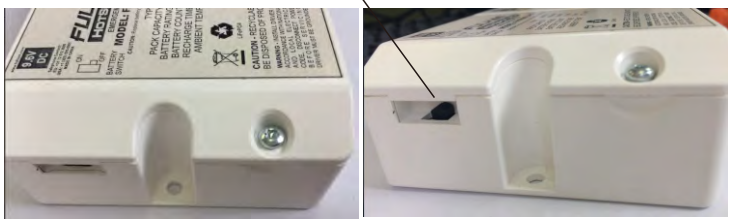
STEP 1: Close the cover

STEP 2: Mounting the screw

SCREW: φ=3mm

C Close the cover

STEP 1: Move battery switch to the "OFF" position.



STEP 2: Remove the screw

STEP 3: Remove the cover

D Replace battery

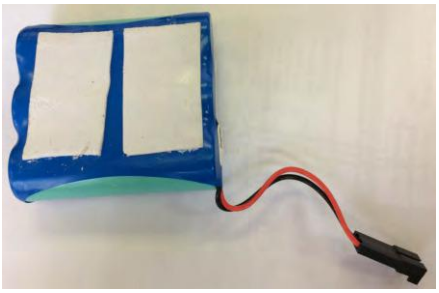
Fulham extends a limited warranty to the original purchaser or first user for a period of 5 years from the date of manufacture when properly installed and operated under normal conditions of use. For complete terms and conditions, please refer to the Warranty Center at www.fulham.com. Specifications subject to change without notice.

STEP 4: Remove the battery

Disconnect connector

Take out the battery

STEP 5: Install new battery



Put a double adhesive tape on the bottom of the battery
(Recommended model 3M:DT542800081)

Place the battery inside

Re-connect battery connectors

Make sure the wires are properly tucked inside compartment.

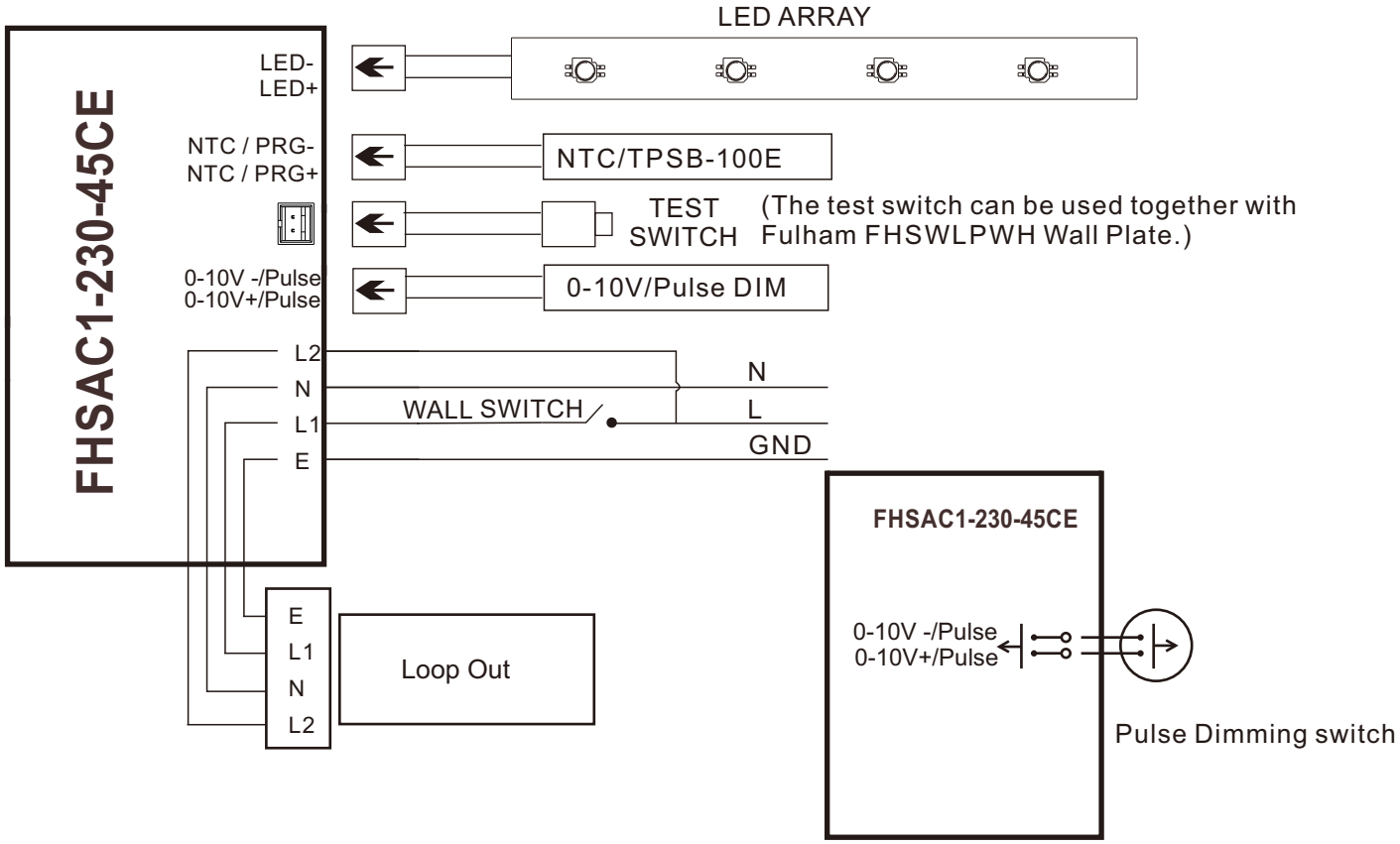
STEP 6: Close the cover

Close the cover

Mounting the screw

D Replace battery

Fulham extends a limited warranty to the original purchaser or first user for a period of 5 years from the date of manufacture when properly installed and operated under normal conditions of use. For complete terms and conditions, please refer to the Warranty Center at www.fulham.com. Specifications subject to change without notice.



Description: **The Fulham FHSWLPWH Wall Plate can be used when remote mounting the Lighted Push Button Test Switch (LPBTS) next to the fixture, on the wall or in any location within the maximum remote mounting distance (15 meters) of the Lighted Push Button Test Switch (LPBTS).**

Wall plate and screw color:
white with black lettering

Fulham extends a limited warranty to the original purchaser or first user for a period of 5 years from the date of manufacture when properly installed and operated under normal conditions of use. For complete terms and conditions, please refer to the Warranty Center at www.fulham.com. Specifications subject to change without notice.

Self-Diagnostic tests to insure the unit is properly functional . It will test the following parameters:
*Battery-Checks to insure battery is properly connected and has sufficient capacity for 180 minutes when set to 1-3W or 90 minutes when set to 4W-6W
*LED load-Insures LED load is connected properly and functional.
*Charging circuit-Insures unit charging circuit is functioning properly.

Any errors will be shown via the indicator light as per the table below:

LED indicators on TEST SW	System Status
Permanent green	System OK
Slow flashing green (1 sec on – 1 sec off)	Self-Diagnostic process underway
Flashing Red (4 sec on – 1 sec off)	Battery not connected, check BAT pack
Solid Red	Load failure, check EM LED load.
Slow flashing red (1 sec on – 1 sec off)	Battery failure, replace BAT pack.
Fast flashing red (0,5 sec on – 0,5 sec off)	Charge circuit error, replace EM Driver.
Both Green & Red off	EM Mode

TEST SWITCH OPERATIONS:

Emergency Test Mode
1. Press and Hold Test Button to test Emergency Mode.
   This can be done in all normal AC powered situations including dimmed to off and switched off.

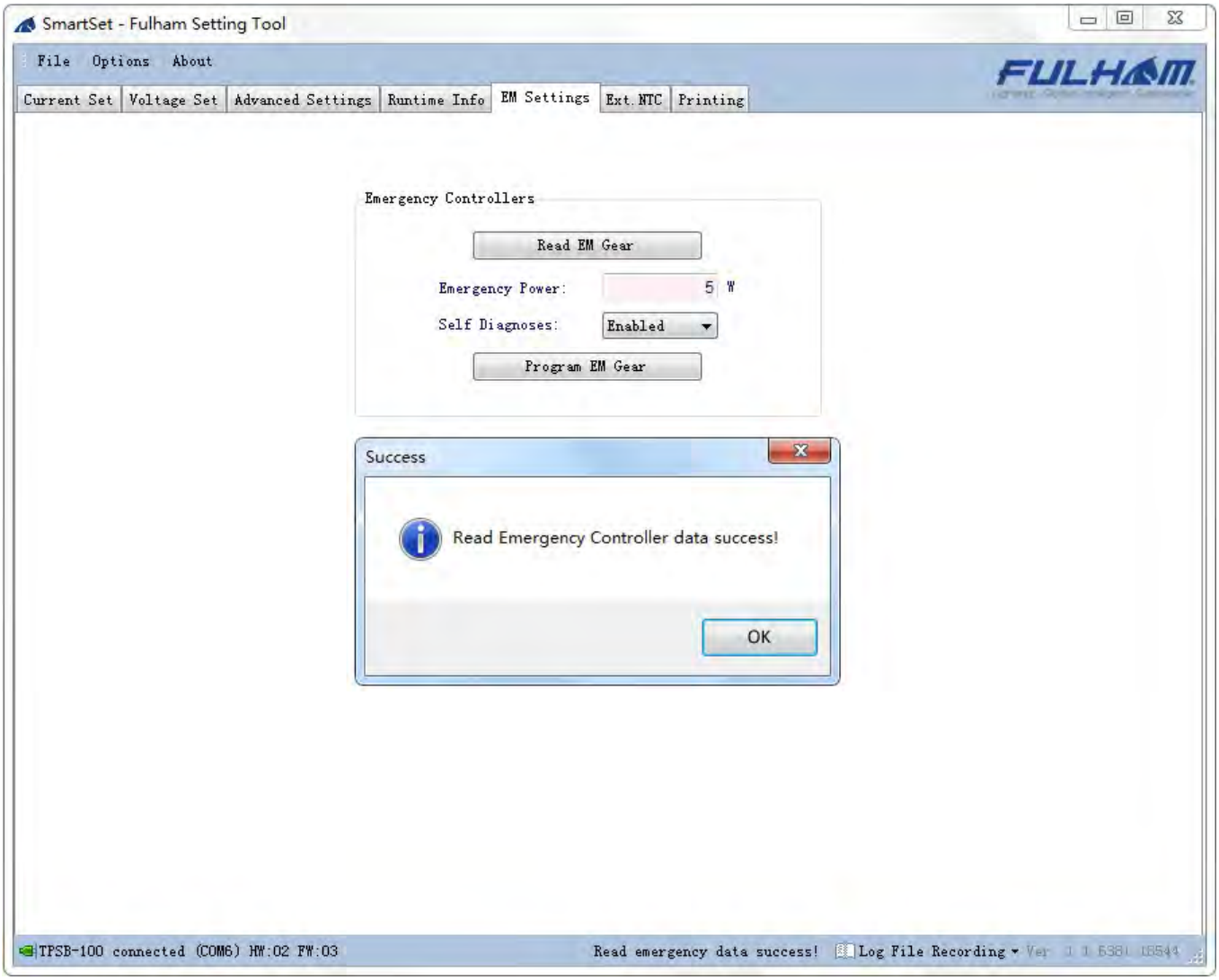
Manual Self-Diagnostic
1. Quickly Press Test Button 3 times within 3 seconds to manually activate Self-Diagnostic cycle. This will test the unit for 180 minutes when EM power set for 1W to 3W or for 90 minutes when EM power is set for 4W or 6W.
2. To Exit the Self-Diagnostic cycle, Press and Hold Test Button for 5 seconds

Enable / Disable Auto Self-Diagnostic
1. Press and Hold Test Button for 3 seconds
2. Release and Quickly Press Test Button 2 times
3. Press and Hold Test Button again for 3 seconds
4. Green Indicator on Test Button will flash for 5 seconds indicating the Enabled or Disabled Status：
   Short off / Long on = Enabled
   Long off / short on = Disabled

PROGRAMMING:

The following features can be programmed on this driver using the Fulham SmartSet TPSB-100E Handset:
* Output Current - 250mA to 1400mA
* Output EM power - 1W to 6W
* Enable / Disable Auto Self-Diagnostic Function
* Dimming :0-10V,0-10V Log,0-10V Custom or Pulse Dimming.
In order to configure the last 3 items, the TPSB-100E must be in FULL FEATURE mode.

The Output Current, EM Power, Dimming Profile and Auto Self-Diagnostic Status can also be configured by using the Fulham SmartSet PC software.



*For more detailed programming instructions please see our Programming Instructions and Design Guide found on our website.

Fulham
Setting Controller & Setting Tool

USER MANUAL
TPSB-100

Ver 1.0.4

Contents

1. Overview

The Setting Controller & Setting Tool Software is designed for configuring the parameters of Fulham LED drivers. The tool set is an easy to use smart system that consists of a USB Programming Setting Controller, and the Fulham Setting Tool which is a Windows based PC software. It is designed for various field applications of lighting systems. With the configuration tool, lighting solutions manufacturers are allowed to batch set power parameters with factory settings in mass production under the high efficiency 'Auto Program' mode. Also end users can tune the parameters of FULHAM LED drivers for their dedicated applications with this powerful Setting Controller.

1.1 Supported Power Driver Products List

√ T1M1UNV105P-40E
√ T1M1UNV105P-40F
√ T1M1UNV105P-60E
√ T1M1UNV105P-60F
√ T1A1UNV105P-40E
√ T1A1UNV105P-60E

Note: the list is continuously updated with new product types supported.

1.2 Setting Controller Hardware Parts & Connections

The setting controller:

The entire setting system hardware consists of a setting controller and other accessories:

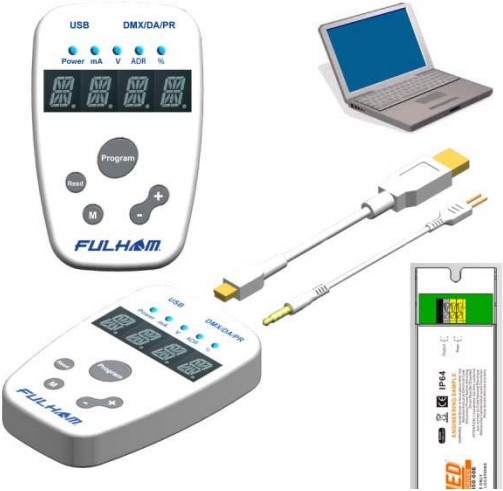
√ FULHAM Setting Controller TPSB-100

√ USB 2.0 Cable A-type to Mini B type

√ Programming Wire of 3.5mm head to 2-Pin header with 3.5mm pitch

√ Programming Wire of 3.5mm head to 2-Pin header with 5.0mm pitch

√ AC/DC power adapter 5v 1A for standalone operations.



The hardware configuration and connections:

a. Plug the USB cable into the setting controller, then connect the cable to a host PC or power adapter for standalone mode operation.

b. Connect the controller to the DUT (Device Under Test or the LED driver) by using the programming wire with the appropriate pitch. NOTE the POLARITY markings on the pin side of the programming wire correspond to the Polarity markings on the DUT.

c. The controller will automatically power up and be ready for use.

1.3 Host PC Hardware & Software Requirements

The minimum computer hardware required to install and run Setting Tool Software:

√ 1GHz CPU
√ 512MB RAM
√ USB Port 2.0/3.0
√ The Setting Tool Software supports the following Windows OS Family:

Windows XP SP2 and above (32 & 64 bit)
Windows Vista/Windows 7 (32 & 64 bit)
Windows 8 (32 & 64 bit)

The Setting Tool Software is a Windows PC application software from Fulham. This PC software can help our customers easily configure the LED drivers.

This software can be downloaded from FULHAM website.

2. Tool Software and Drivers Installation

2.1 Install the USB driver for the Setting Controller

Before installing the USB driver and the Tool Software, it is strongly recommended for users to check whether the host PC already has the FTDI USB bridge driver installed. This procedure is suggested to avoid any unforeseen conflicts with the operating system of the PC.
If the legacy version of the FTDI driver has been installed or any problems are encountered during the USB connection, the following FTDI Clean Utility can help users clean any previous driver installation safely.

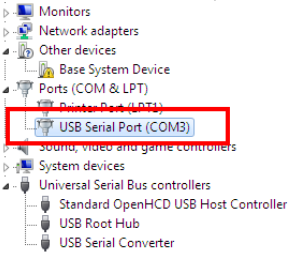
In most case Windows automatically locates and installs the driver for new found hardware. However, in case the OS does not automatically install, a manual installation of the USB driver is recommended using the following steps:

Step1: Find the USB driver setup executable file, then run with administration privileges.

For the FTDI FT230XS USB driver we recommend you to install with version 2.12.00 or higher. The latest FT230XS USB2COM bridge driver software can be downloaded from FTDI official website:
http://www.ftdichip.com/FTDrivers.htm

Step2: Proceed with the installation instructions and the driver will automatically choose the right Windows OS version to finish the installation.

Step3: After finishing the installation please confirm the driver information shown in the 'Control Panel/Installation and Uninstallation' section to confirm the successfully installation of USB driver.



2.2 Install the Tool Software on a PC

The Setting Tool Software is an easy to install freeware with a very simple installation procedure.

The setup file is in the installation package as following:

By running the "setup.exe" file, the installation guide will automatically install the PC Setting Tool Software on your computer while the user only needs to choose the installation directory. After setting up and restarting the PC, the software is ready to run. The installation package can be downloaded from the official website of Fulham Inc.

To prevent the possibility of encountering compatibility problems in the latest versions of Windows OS such as Windows7/8, it is preferred to start the program under compatible mode of Windows XP (Service Pack 2).

3. How to use the Setting Controller

3.1 SIMPLE MODE operation - I/V setting

The Setting Controller enters SIMPLE MODE operation automatically after powering up with a short BEEP sound indicating its valid hardware self-checks, and then the LED digits will display "**SIMP**"-"**ModE**". The user is able to use the normal Current or Voltage setting functions following the sequences below:

⊿ Press the "**M**" button to switch items between "Current(mA)" and "Voltage(V)" with "**ISET**"/"**VSET**" display indication.

⊿ Press the "**+**" or "**-**" button to adjust the shown decimal value about to set.

⊿ Press the "**Read**" button to read out current/voltage value in the driver and display. When reading DUT failed, the screen digits would show "**E-02**" or "**E-03**" error code. After a successful reading the Controller would beep and show "**R-I**"/"**R-V**" and the read out value in alternative cycling.

⊿ Press the "**Program**" button to program current setting value into the DUT. After successful writing the Controller would beep then show "**OK**" and the setting current value in alternative cycling. If the process failed, it would show "**E-02**" or "**E-03**" error code.

Note: Programming a 0 value current into the DUT makes its R-SET function enabled.

RECORD LIST Mode:

In any status of the SIMPLE MODE, press the "**M**" button for over 2 seconds long to enter the RECORD LIST mode. The Setting Controller will show "**SAVE**" or "**SAME**" after entering this mode. " **SAME**" means the current parameters have already been saved in the Record List before. It will then wait for the user to select whether to save or read the recorded setting parameters by pressing "**+**" or "**-**" button to cycle items. The user can handle different record sets by selecting "**OPEN**", "**DEL**" and "**BACK**" options or recall one single current value/record set group(in Full Mode) to current memory, in the end by pressing the "**M**" button when the " **EXIT**" shows to quit.

AUTO PROGRAM Mode:

In order to program the same type DUT efficiently in a high volume batch operation flow, the user can start an AUTO PROGRAM Mode by pressing and holding the "**Program**" button after all the parameter values have been properly set in the Setting Controller. When the Controller shows "**AUTO**", the user can press the "**Program**" button quickly 3 times to confirm entering the AUTO PROGRAM Mode or to cancel the operation.
The controller will show "**CHEK**" and keep the dot of the last digit bright all the time to indicate a valid AUTO PROGRAM Mode. In this mode, the operator can put down the Setting Controller and keep plugging in and removing the DUT by using a dedicated pin-head programming wire.
In this batch operating mode, if a driver programming process fails the Controller will indicate an "**E-03**" error and make a short beep sound. Otherwise it will show "**OK**" to indicate a successful programming process.
Finally, the user can press and hold the "**Program**" button again until "**MENU**" is displayed, next quickly press the "**Program**" button 3 times to quit this AUTO PROGRAM Mode.

3.2 FULL MODE operation - all features setting

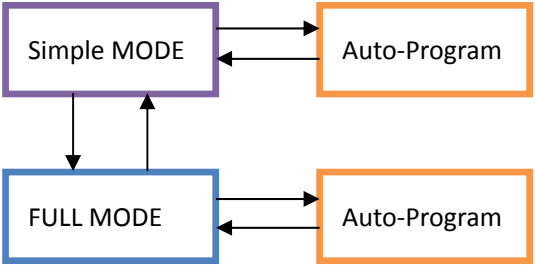
The Setting Controller will enter FULL MODE by pressing and holding both the "**M**" & "**-**" buttons down until "**FuLL**"-"**ModE**" is displayed while in the normal SIMPLE MODE operation. Next quickly press the "**Program**" button 3 times to make the Setting Controller enter the FULL MODE operation. After that, "**READ**" is shown to start getting full mode parameters value from the DUT or "**CHEK**" is shown if no DUT is connected.
After entering this mode, pressing the "**Read**" button on the Setting Controller will allow you to read out all the parameters of the DUT.

- Press the "**M**" button to cycle the display items of the parameters menu.
- Press the "**+**" or "**-**" button to adjust the shown value for the current item.
- Press the "**Read**" button to read out parameters, just like in the SIMPLE MODE operation.
- Press the "**Program**" button to program current set parameter values into the DUT while the Controller showing "**REDY**".

RECORD LIST Mode:
The same as SIMPLE MODE operation, while the cycle showing parameters are not Current Values but index numbers of the setting parameters.

AUTO PROGRAM Mode:
The same as SIMPLE MODE operation.

3.3 Operation Modes Alternating Diagram



3.4 Operation with Host PC

Besides the standalone operation, the Setting Controller can also work out in the field by operating with a host PC and the Setting Tool software. Before using the PC software, the hardware connecting set-up must be finished by means of a USB cable to link the Setting Controller with a windows OS PC or laptop.
For more information, please refer to the chapter 4: how to use the Setting Tool PC Software.

3.5 Setting Items

The setting items in the Setting Controller are also divided into SIMPLE MODE and FULL MODE groups and all the implemented function items can be found in the following table:

No.	ITEMS	MODE
1	√ Current: 0-6000 (mA), 0 for R-SET, actual range limited by DUT	SIMPLE
2	√ Voltage: 0-400 (v)	SIMPLE
3	√ CURV: DALI/LINE/LOG/CUST, to select the 3 different dimming curve types, or get custom curve from PC.	FULL
4	√ MinDim: Set a minimum dimming level of the output.	FULL

Note: the setting items may various to dedicated LED driver types which would have different functions.

3.6 Error Code Message

The message code shown on the LED digits demonstrates some error message and other operating status information for users to make proper decision:

→**E-01**: Connection & communication failed
→**E-02**: Read DUT parameter failed
→**E-03**: Write DUT parameter failed
→**E-04**: Save Rec. data failed
→**CHEK**: Check driver working status, or connection status
→**SAME**: Parameter already saved in Rec. Mode
→**REDY**: All setting parameters were finished and OK.
→**AUTO**: Ready to go to automatic program mode
→**MANU**: Ready to go to manual program mode

3.7 Beep Sound Message

The sound message from the beeper demonstrates working mode switching or an operation result:

→**Mode Switching**: on entering SIMPLE MODE, FULL MODE, short beep twice.
→**Operation Success**: on PROG or READ success, beep one time.
→**Operation Failed**: on PROG or READ failure, short beep 3 times.

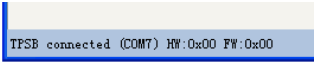
4. How to use the Setting Tool PC Software

Note: this Fulham Setting Tool software is under continuous developing so the following description may vary in details with actual dedicated version.

While the proper hardware connections have been set up according to the chapter 1.2 & 1.3, it is ready to run with the application FULHAM Setting Tool software on PC.

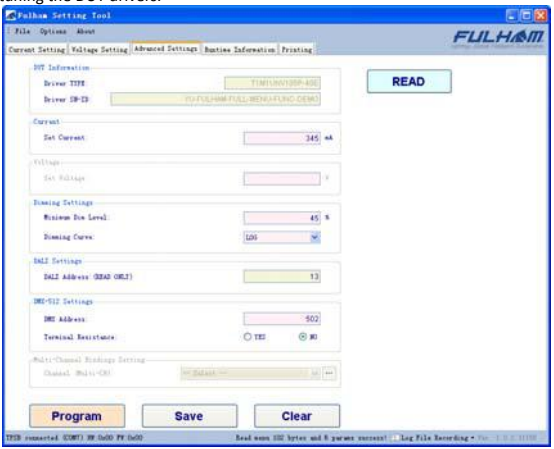
After launching the program, the user can find several functional tabs which can be alternatively selected. The CURRENT SETTING and VOLTAGE SETTING tabs are practical simple working modes to satisfy user's purpose by simply read or write V/I values directly. And even more, auto-program is supported.

If the communication has been successfully set up between the PC and the Setting Controller, an information tip will show up on the status panel indicating it is connected.



If this message doesn't show after setting up the USB connection, the user needs to check the USB cable connection between the Setting Controller and PC. The software can automatically recover the connection when the USB cable is disconnected and reconnected again.

The 3rd tab page shows the advanced parameter setting functions for fine tuning the DUT drivers.



Other Functions on the Setting Tool PC Software:

→**Runtime Information**: To read out the DUT total runtime, output time with loading, working time in different temperature zones and current PCB temperature, then to plot a diagram or a graph demonstrating temperature versus time data.

→**Printing**: Avery label printing for production line.

→**Custom Dimming Curve**: The user can plot and generate a customized dimming curve for the DUT.

→**Log Files:** Important data, time, operation mode and setting parameters information can be automatically saved in the local log file for data review and analysis later on.

→**Factory Settings:** The SNID and other default data values can be scanned and preset into the DUT in mass production line under super user mode.

→**Thermal OTP:** The OTP function is a reserved optional function for some driver types to fine tune the over temperature protection behaviors. This feature act as a output current fold-back function when driver is running overheat.

For more detailed information of PC software, please check the user manual PDF documentation in the Setting Tool software package or get the latest version online.

5. Terminology

DUT. Device Under Test or the LED driver

6. Revision History

Documentation revision history records:

Last Modified	Author	Date	Version
First initiated	TZ	2015-5-25	1.0.1
updated	TZ	2015-6-17	1.0.2
updated	TZ	2015-8-12	1.0.4

FULHAM LIGHTINGCONTROLS™

SPECIFICATION SHEET: TPSB-100

This Is An Original Product From Fulham Co., Inc

Description: This product is a tool for programming the parameters of LED drivers. Such as the Current, Voltage, DMX Address, Dimming Curve, LED Groups, Terminal Resistor, Lowest Dimming Percentage.

This Tool Box Will Operate The Following LED Drivers:

T1M1UNV105P-40E, T1M1UNV105P-40F, T1M1UNV105P-60E, T1M1UNV105P-60F.
T1A1UNV105P-40E, T1A1UNV105P-60E,

ELECTRICAL DATA

Input Characteristic		
Input Voltage	5V	MINI-USB
Input Voltage Range(%)	+.25/-.55	
Maximum Input Current(A)	200mA	
Setting Interface Supported		
0-10V	Yes	
DALI	Yes	
DMX	Yes	
Setting from PC	Yes	
Setting parameters	Current, Voltage, Address, Dimming Curve, LED Groups, Terminal Resistor, Lowest Dimming Percentage, SNID	
Reading parameters	Current, Voltage, Address, Dimming Curve, LED Groups, Lowest Dimming Percentage, Total Runtime, Driver Type, SNID	
Setting Port Characteristics		
Communication Bus Supported		
LED Driver Pogramming Comms.	Yes	
DALI	Yes	
DMX	Yes	
Communication Bus Power Output		
Max Current(A)	0.1	
Output Max Voltage(V)	13	
Communication Signal Rating		
LED Driver Pogramming/DMX		
Input High(V)	>8	
Input Low(V)	<1	
Output High(V)	>8	
Output Low(V)	<1	
DALI		
Input High(V)	>9 and <15	

SPECIFICATION SHEET: TPSB-100

This Is An Original Product From Fulham Co., Inc

Input Low(V)	<6 and >-6	
Output High(V)	>9	
Output Low(V)	<6	
Communication Baud Rate(bps)		
LED Driver Programming/DMX	19200	
DALI	1200	
Hot Plug	Yes	
No Load Open Voltage on Port	Max Voltage	13V
Operator Interface		
Display		
Led Digital Display	4 digits Blue LED Display	alphanumeric
Pilot Lamp	5 Blue LEDs	power,mA,V,ADR,%
Buttons		
Small Buttons	4pcs(M,+,-,Read)	to adjust parameter value,and read parameter of the current driver
Big Buttons	1pc(Program)	to program driver
Sound		
Buzzer	Yes	for notifications
Environmental Requirements		
Max. Ambient Temperature(ºc)	50	
Humidity(%)	5-95	
RoHS	Yes	
Maintainability and Reliability		
Product Life	50000Hrs	
Warranty	5	
Indicator Definition		
LED	Explaination	Example
Power:	Light on means power on	
mA:	Light on means setting current	maximum output current
V:	Light on means setting voltage	maximum output voltage
ADR:	Light on means setting address	DMX Address
%:	Light on means setting min-dim percentage	minimum percentage of the dimming current
BUTTON		
Program:	Manually programing/Optional of manually and automatically programming with long 1second pressing	
Read:	Read the parameters of the current driver	
M:	Setting the parameters/save the parameters with long pressing	
+/-:	Select the parameters list/ Setting the parameters	
JACK		
USB:	+5v Power Supply/PC Communication	
DMX/DA/PR:	connect to the dimming connectors of DMX, Dali or Driver Programming interface	

2015-1076-2 REV A

LED
LINECARD

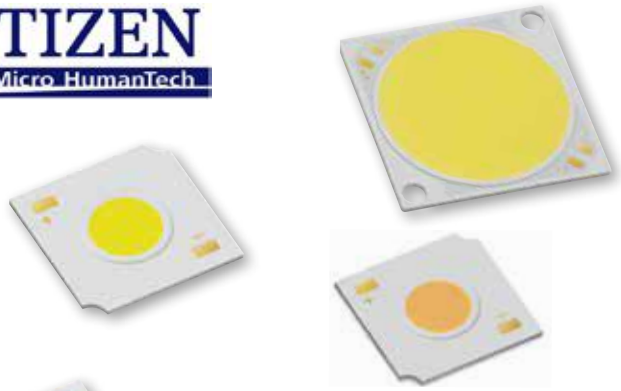
elincom

WE BELIEVE THAT ALL TECHNICAL DESIGNS CAN BE IMPROVED

COB & SMD POWER LED'S

- 0,06W ~ 550W
- 2700K ~ 6500K / Ra 70 ~ 97
- No binning necessary Mac Adam step 2 / 3
- Round light output image
- Extremely durable
- 230Vac COB
- Light modules
- Lighting COB white / amber / blue
- Horticulture COB white / red-blue

CITIZEN
Micro HumanTech



CITILED®
The Light Engine

LED DRIVERS:

- AC input and DC input
- 6W - 220W
- Constant voltage and contant current
- Programmable settings even with power off
- Emergency lighting led driver with integrated battery

FULHAM
Lighting... Global. Intelligent. Sustainable.

FULHAM
LUMO SERIES
Formerly Lumotech

ACCESSOIRIES

- Heatsinks
- Reflectores
- Lenses
- COB connectors
- Wire connectors
- Waterproof LED connectors
- PCB LED drivers
- Current limiters
- High bay housing

AAG Stucchi
fixing elements, COB connectors, heatsinks
www.aagstucchi.it

Amphenol LTW
Waterproof connectors, cable glands
www.amphenolltw.com

Block
Current limiters
www.block.eu

Citizen
High power LEDs, COB LEDs, optics
http://ce.citizen.co.jp/

Furukawa
High power heatsinks, heatpipes
www.furukawaelectric.com

Fullham
LED drivers
www.lumotech.com

Ledil
LED lenses, reflectors
www.ledil.com

Mechatronix
Heatsinks, high bay
www.megatronxs.com

PEAK
PCB LED drivers
www.peak-electronics.de

PTR
LED connectors
www.ptr-messtechnik.de

TE Connectivity
COB LED holders
www.te.com

VS Optoelectronic
Leds, leddisplays, backlights
www.vs-optoelectronic.com

elincom

Elincom electronics BV
Klaverbaan 101
2908 KD Capelle aan den IJssel, The Netherlands
T: +31-(0)10- 26 40 270 info@elincom.nl
F: +31-(0)10- 26 40 275 www.elincom.nl
Chamber of Commerce Rotterdam: 02330227