FHSAC1-UNV-70S

INSTALLATION INSTRUCTIONS

LiFePO4 | Dimmable 100%-1%, 0% | BC | c UL us LISTED E477042 | RoHS COMPLIANT

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 120VAC to 277VAC is required for the yellow / black and white leads.
- IMPORTANT: A switched or un-switched AC power source of 120VAC to 277VAC is acceptable for the black lead only.
- This device is designed for use in fixtures listed for **dry and damp locations**.
- **CAUTION:** Make sure all electrical connections conform to the National Electrical Code and all applicable local regulations.
- **CAUTION:** Do not let power supply cords touch hot surfaces.
- **CAUTION:** Do not mount near gas or electric heaters.
- **CAUTION:** 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.
- **CAUTION:** Do not use this emergency driver for other than intended use.
- **CAUTION:** Battery is rechargeable LiFePO4 type and must be recycled or disposed of properly.
- **CAUTION:** Equipment should be mounted in locations and at heights where it will not readily be subjected to tampering by unauthorized personnel.
- **CAUTION:** Install in accordance with the national and local electrical code. Disconnect Power before servicing. Driver must be grounded. Service by qualified personnel only. De-energize before opening.
- **CAUTION:** RISK OF SHOCK - DISCONNECT EMERGENCY AND NORMAL INPUT POWER SOURCES BEFORE SERVICING.
- **ATTENTION:** RISQUE DE CHOC - COUPER L'ALIMENTATION NORMALE ET DE SECOURS AVANT DE PROCÉDER À L'ENTRETIEN.
- **CAUTION:** This equipment has not been investigated for use in an air-handling fixture, it is not suitable in a heated air outlet.
- **CAUTION:** For use with a metal enclosed wiring system.
- **CAUTION:** see instruction manual for installation, operating, and maintenance instructions or equivalent.
- **CAUTION:** Device has to be checked and re-activated to keep emergency function after installation. See WIRING DIAGRAMS.
- **CAUTION:** The voltage of LED load must be within the range of 11V to 55V, otherwise 90 minutes discharge time cannot be guaranteed.

ASSEMBLY and FIELD INSTALLATION WIRING:

- **WARNING:** AC power must be off before proceeding with assembly, installation or servicing of emergency driver. Additionally ensure that the battery is disconnected (Battery Switch set to OFF).

TESTING SYSTEM:

- **The emergency battery requires a minimum charge time of one (1) hour before testing the circuit. A minimum of twelve (12) hours is required for a full charge**
- **IMPORTANT:** In order to maintain proper operation and warranty coverage, the battery must be recharged once per year prior to installation.

RATED EMERGENCY OPERATION:

- 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 thirty (30) days to ensure the emergency driver functions properly by illuminating the LED light source. Conduct a ninety (90) minute discharge test one (1) time per year; LED light source should be illuminated for a minimum of ninety minutes (90).

BATTERY DISABLE PROCEDURE:

- **Unit must be powered within 6 months. To ship a fixture with the battery connected without draining the battery the procedure is:**

1. Driver is installed in a fixture.
2. Battery is switched to the “ON” position.
3. Fixture is powered and tested.
4. Fixture is un-powered, the unit enters EM mode.
5. Battery is switched to “OFF”, wait about 3 seconds then switch the battery back to the “ON” position.

Note:

Not recommended for installations where unit will be without power for more than 6 months.

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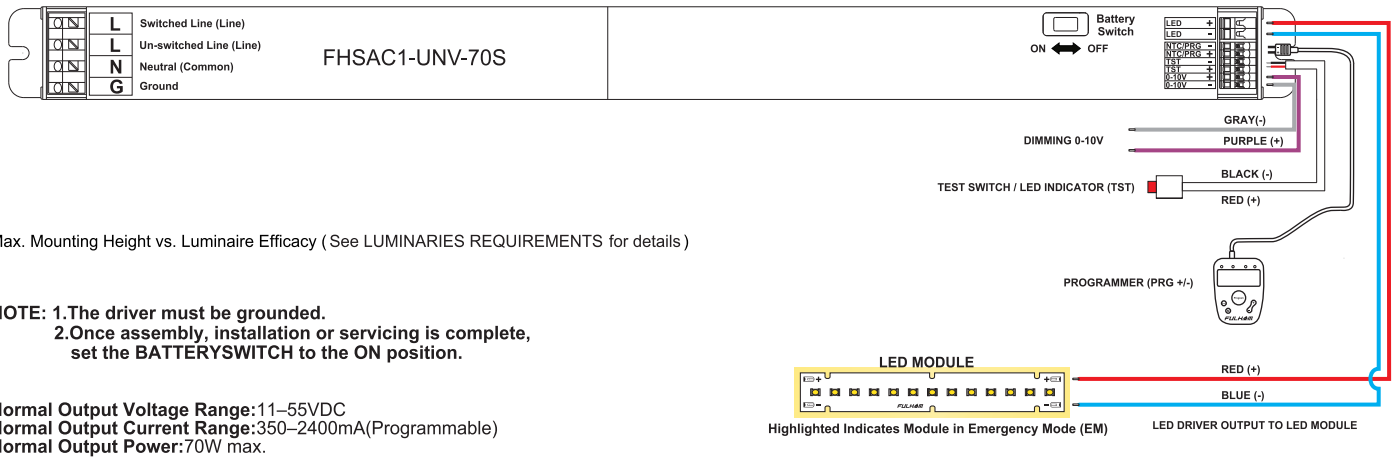
Factory Default Settings:
Normal Output Current: 350mA **EM Power:6W(0℃-50℃)** **Self-Diagnostics: Enable**

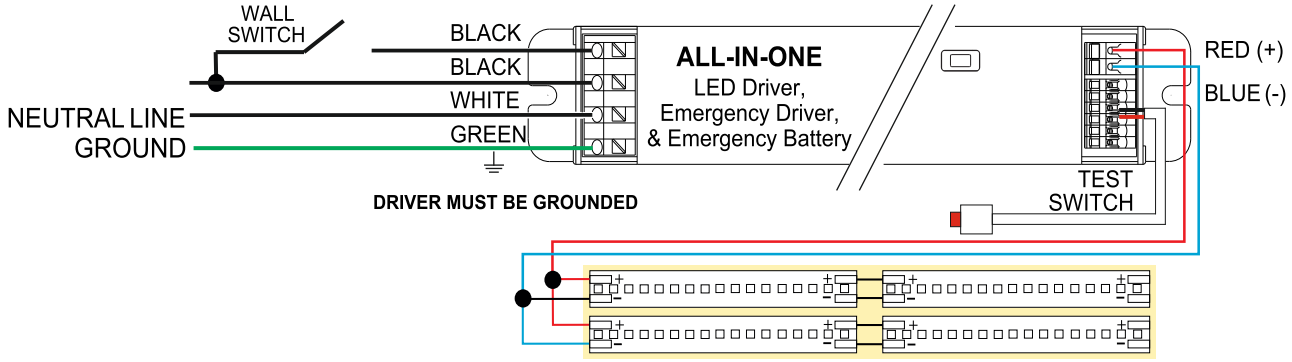
WIRING DIAGRAMS



Max. Mounting Height vs. Luminaire Efficacy (See LUMINARIES REQUIREMENTS for details)

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

Normal Output Voltage Range:11–55VDC
Normal Output Current Range:350–2400mA(Programmable)
Normal Output Power:70W max.



LUMINAIRES REQUIREMENTS

Other luminaire max. mounting height can be found as following:
1. Log onto the DesignLights Consortium website (www.designlights.org).
2. Click on “search the DLC Qualified Product List” button on the DLC homepage.
3. In the “search by keyword” text window, enter “luminaire name”and “part number”.
4. Click on “search” tab to open the “Qualified Products List”.
5. Determine per ”Reported Date” efficacy shown in lumens per watt-(lm/w).

Multiply lumens per watt by FHSAC1-UNV-70S-XXX rated output (example: lm/w x 6 watts).Refer to table below for the watage of the specific FHSAC1-UNV-70S-XXX model to be used in the luminaries. (lm/w) x (FHSAC1-UNV-70S-XXX)=minimum emergency lumens of fixture.

Model	Output Power
FHSAC1-UNV-70S	3W to 7W (Programmable)

Follow industry standards by utilizing available .ies files and Lighting design software for your dedicated emergency luminaires, with the above calculated emergency lumens, and validate your as-installed plans in accordance with the applicable life safety codes governing your project.
While the TMU150085ECxxxA series has been found compliant with the requirements or UL Standard 924, it is ultimately the responsibility of the Designer/Specifier to assure the as-installed system delivers code-compliant path of egress illumination in accordance with Federal, State or local municipal requirements.

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Guideline on calculating emergency illumination level

The purpose of this guideline is to identify the illumination level of the LED luminaire when used with Fulham's **FHAC1-UNV-70S** LED emergency driver. The path of egress illumination level during emergency operation is determined by types of luminaires, Luminaire Efficacy, Luminaire Mounting Height, Emergency Power and some other effects in real application.

Step 1: Select an LED Luminaire, and make sure the LED light source is electrically compatible with Fulham's LED emergency driver. Get the Light Distribution data (usually an .ies file) and Rated Efficacy data (lumen per watt) from luminaire supplier.

If the luminaire is DesignLights ConsortiumTM (DLC) compliant, you can also get the efficacy information from DLC website.
- Open DLC Qualified Product List(QPL) database search page: https://www.designlights.org/search/
- Searching keywords by model, brand name or manufacturer for the luminaire used.
- Find the “Efficacy” data listed on website or calculated by dividing “Light output” by “Wattage”, the efficacy value should be shown in lumen per watt (lm/W).

If the luminaire is ENERGY STAR compliant, you can also get the luminaire efficacy information from ENERGY STAR website.
- Open ENERGY STAR certified Light Fixtures database search page: https://www.energystar.gov/productfinder/product/certified-light-fixtures/results
- Searching keywords by model, brand name or manufacturer for the luminaire used.
- Find the “Energy Efficiency” data listed on website. If it is showed as “Measured at the Source”, please contact with luminaire supplier for additional light loss for this light source inside the fixture. The value should be shown in lumen per watt (lm/W).

Step 2: Determine the Emergency Power and calculate the Emergency Light Output.
FHSAC1-UNV-70S is programmable output; setting a proper Emergency Power is vital to achieve desired illumination. Emergency Light Output is equal to the Emergency Power multiply by luminaire efficacy. For example, if the luminaire is 120lm/W and in 3W emergency operation, the total Emergency Light Output is 120lm/W * 3W = 360lm.

Step 3: Use industry lighting design software to calculate the illumination level according to the luminaire layout in room, luminaire mounting height, the original .ies file and Emergency Light Output calculated above. If the illumination level cannot meet life safety codes, go back to Step2 to use a higher Emergency Power or go back to Step1 to select a higher efficacy luminaire or use more luminaires in the room.

Fulham's **FHSAC1-UNV-70S** LED emergency driver is compliant with UL 924 standard, according to UL test data, Table 1 and Table 2 below give basic indication to determine the min. Emergency Power and Luminaire Max. Mounting Height for 1 foot-candle illumination based on a single luminaire with typical Lambertian distribution.
It is the light designer/ construction contractor's responsibility to validate the real illumination level on site, to assure the emergency light illumination level is in accordance with the requirement of Federal, state and local municipal codes. It may diff to the theoretical calculation or simulation on computer.

Table 1. Min. EM Power for 1fc @ 10ft vs. Luminaire Efficacy

Luminaire Efficacy (lm/W)	Min. EM Power to achieve 1 fc @ 10ft Mounting Height
80	5.0 W

Table 2. Max. Mounting Height vs. Luminaire Efficacy

Luminaire Efficacy (lm/W)	Max. Mounting Height for 1fc		
	EM 3W	EM 5W	EM 7W
80	8.1 ft	10.1 ft	11.1 ft
100	8.9 ft	11.2 ft	12.4 ft
120	9.6 ft	12.1 ft	13.4 ft
140	10.3 ft	13.0 ft	14.5 ft
160	10.9 ft	13.9 ft	15.5 ft
180	11.5 ft	14.6 ft	16.7 ft
200	12.2 ft	15.3 ft	18.0 ft

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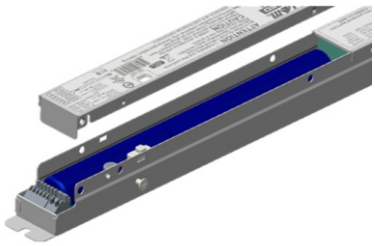
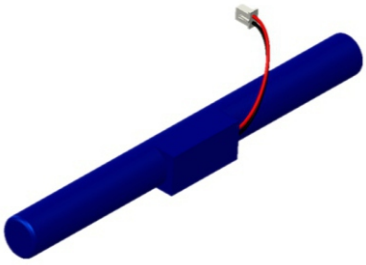
BATTERY REPLACEMENT/SERVICING INSTRUCTIONS

Warning: Disconnect power when servicing fixture.

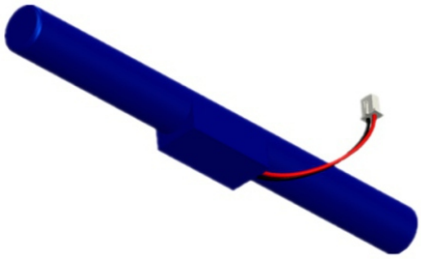
Unscrew the nut



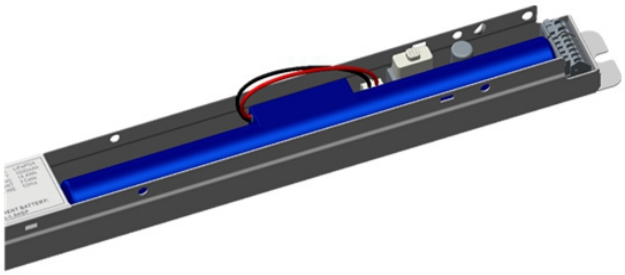
Remove battery cover and pull out wiring



Disconnect the connector



Take out a new battery



Re-connect the battery connector and place all wires back into the battery cover

Completed Assembly

SAVE THESE INSTRUCTIONS

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SELF-DIAGNOSTIC INSTRUCTIONS / OPERATION:

If the self-diagnostic feature is enabled:
The emergency LED driver will conduct a self-check for thirty(30)seconds every thirty(30)days; and a ninety(90) minutes self-check every 12 months. After every self-check the LED indicator light will indicate a status signal. Check indicator status chart above to diagnose the status signal.

If the self-diagnostic feature is disabled:
User must conduct a manual test every thirty (30) days to ensure the emergency LED light source illuminates as intended. A full discharge test shall be conducted once a year; the LED light source shall illuminate for a minimum of ninety (90) minutes.

***Self-Diagnostic feature is factory enabled**

TEST SWITCH INDICATOR STATUS:

LED Indicators Status	EM Driver Status / Mode
Solid Green	System OK / AC OK (Self-Diagnostic Enabled or Disabled)
Slow Flashing Red, 4s on / 1s off	Battery NOT detected, check battery switch or connection
Flashing Red, 1s on / 1s off	Battery Failure, replace battery
Flashing Green, 1s on / 1s off	Self-Diagnostic test underway
Fast Flashing Red, 0.1s on / 0.1s off	Abnormal driver performance, replace driver
Very Slow Flashing Red, 4s on / 4s off	Over temperature
None. Both LEDs OFF	Normal working in EM mode
Solid Red	No load or output over voltage protection triggered , Check LED connection
Slow Flashing Red, 0.5s on / 0.5s off	Charge circuit failure replace driver

TEST SWITCH OPERATIONS:

1. EM Test: Press and hold test button to enter EM mode for testing, in all normal AC powered situations including low power standby modes.
2. Manual Self-Diagnostic: quickly press the test button three times within three seconds to force the controller to enter a Self-Diagnostic cycle. To quit the self-diagnostic cycle after engaged press and hold the test button for ten seconds.
3. Enable/Disable Auto self-Diagnostic: Fast click 4 times within 3s a period when properly executed the indicator on the test button will display the appropriate color for the Enable/Disable status. A flashing of 2.5s ON/0.5s OFF means "Enabled", while a flashing of 0.5s ON/2.5s off means "Disabled". Once Enable/Disable is set the status color on the test button will remain the same throughout normal operation (refer to Indicator Status Table).
4. Self-Diagnostic Enable/Disable Status: Fast click 2 times within 2s to query the Self-Diagnostic Enabled/Disabled status. The indicator would blink for current status for 3 cycles. 2.5s ON/0.5s OFF stands for Enabled. 0.5s ON/2.5s OFF stands for Disabled.

FHSAC1-UNV-70S

LiFePO4

Dimmable

100%-1%, 0%

LISTED
E477042

RoHS COMPLIANT

Programming:

This driver can be programmed using the TPSB-100(E). Programming features include the following:

* Output Current - 350mA to 2400mA
* Dimming Curve (Enable/Disable Dim-to-Off)
* Minimum Dim Level
* LED NTC Thermal Protection
* Output EM power - 3W to 7W
* Enable / Disable Self-Diagnostic