

Installation Instruction Manual

ILS-2600-0IR
ILS-3600-0IR

ILS-2600-0IR
White (L-865(L)) LED Lighting Systems

ILS-3600-0IR
Dual (L-865(L)/L-864(L)) LED Lighting
Systems

ILS-2600-CAT-IR
White (L-866(L)) LED Catenary Lighting
Systems

ILS-3600-CAT-IR
Dual (L-866(L)/L-885(L)) LED Catenary
Lighting Systems



PULSAR
(LED Series)

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Front Matter

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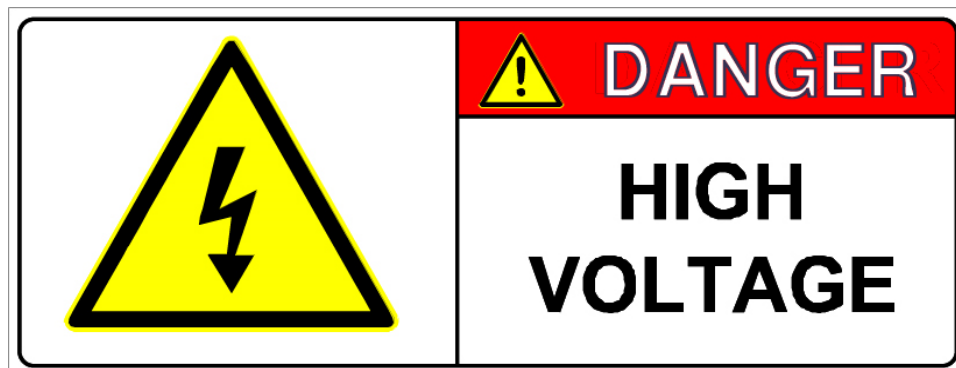
Safety Warning

This equipment uses lethal voltages which can cause serious injury and/or death. Do not attempt to service this equipment with line power applied. Only trained and qualified personnel should install, maintain or troubleshoot this equipment.

The LED lamps used in this equipment produce brilliant flashes of light and infrared (IR) radiation. Temporary or permanent eye damage may result from looking directly at the LED flash head while it is operating.

Disconnect power at the circuit breaker panel and wait at least 30 seconds before servicing. Do not rely on interlock switches for removing power. Energy storage capacitors can maintain high voltage long after power has been disconnected. Verify that all high voltage warning lights are completely off. Measure all high voltage sources (HV1, HV2) using a DC voltmeter to ensure that power is off and has been completely removed before servicing.

Do not wear any jewelry. Gold and silver are excellent conductors of electricity.



This equipment emits near infrared radiation. Avoid direct eye exposure.



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Introduction

Congratulations, and thank you for choosing an ITL PULSAR LED Series lighting system.

We trust that ITL's reputation for technical excellence, experience in product development, commitment to our customers and testing will ensure your complete satisfaction.

You have chosen one of the most technologically innovative LED lighting systems available on the market today. This product is the result of many years of engineering with extensive input from field service personnel.

This manual covers the

- ILS-3600 FAA type L-864(L)/865(L) dual LED lighting system with side lights FAA type L-810(L)
- ILS-2600 FAA type L-865(L) white LED lighting system
- ILS-3600-CAT FAA type L-885(L)/866(L) dual catenary LED lighting system
- ILS-2600-CAT FAA type L-866(L) white catenary LED lighting system

Please take the time to read and familiarize yourself with this manual. It contains the information necessary to install, test and troubleshoot the lighting system.

Product Description

The ILS-3600 is a medium intensity LED lighting system as defined by FAA Advisory Circular AC 150/5345-43 and Transport Canada's Canadian Aviation Regulations (CAR) 621. This lighting system meets or exceeds the specifications as defined in the advisory circular and CAR. For more information on those specifications please refer directly to the FAA website www.faa.gov/airports/resources/advisory_circulars.

The ILS-3600 is a complete dual white/red LED lighting system. This system produces 1 medium intensity white flash every 1.5 seconds (40 FPM) in Day Mode and a low intensity red flash every 3 seconds (20 FPM) in Night Mode. The night time red flash rate is selectable to 30FPM. See major component block diagram below.

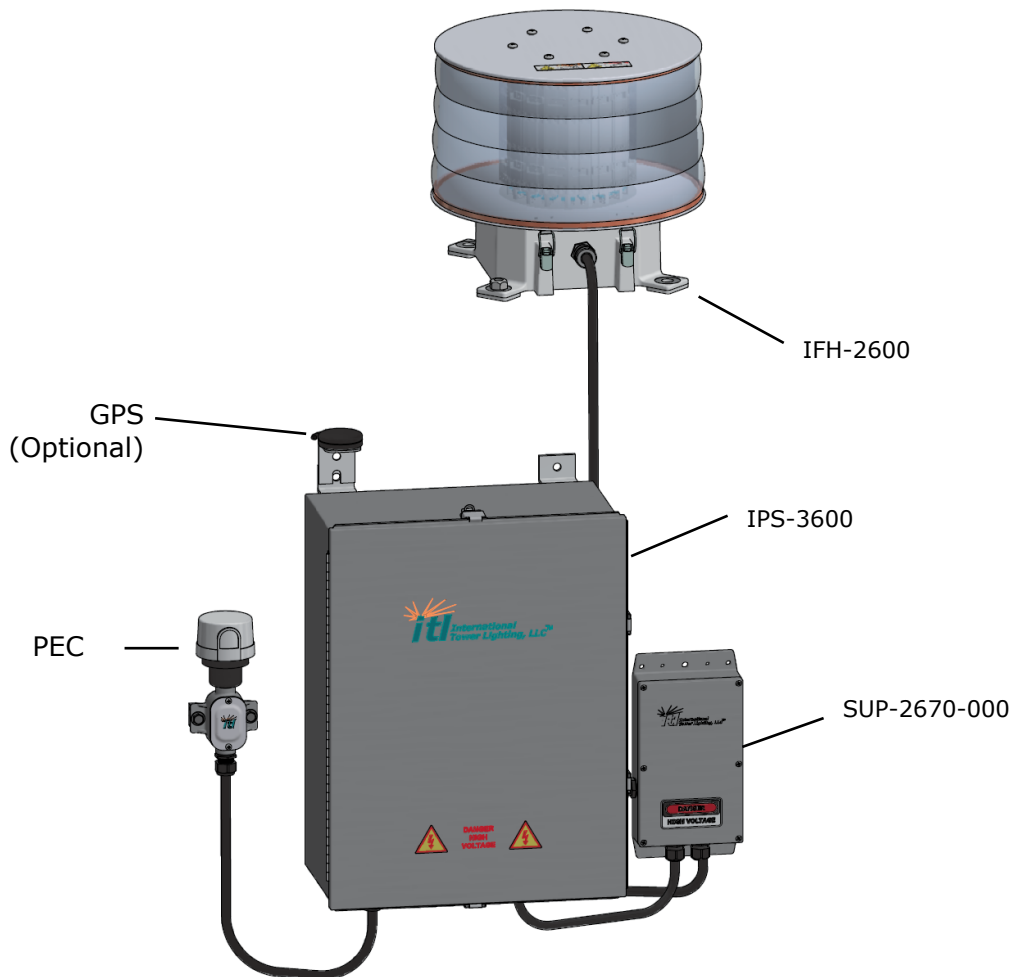


Figure 1: ILS-2600 White LED System

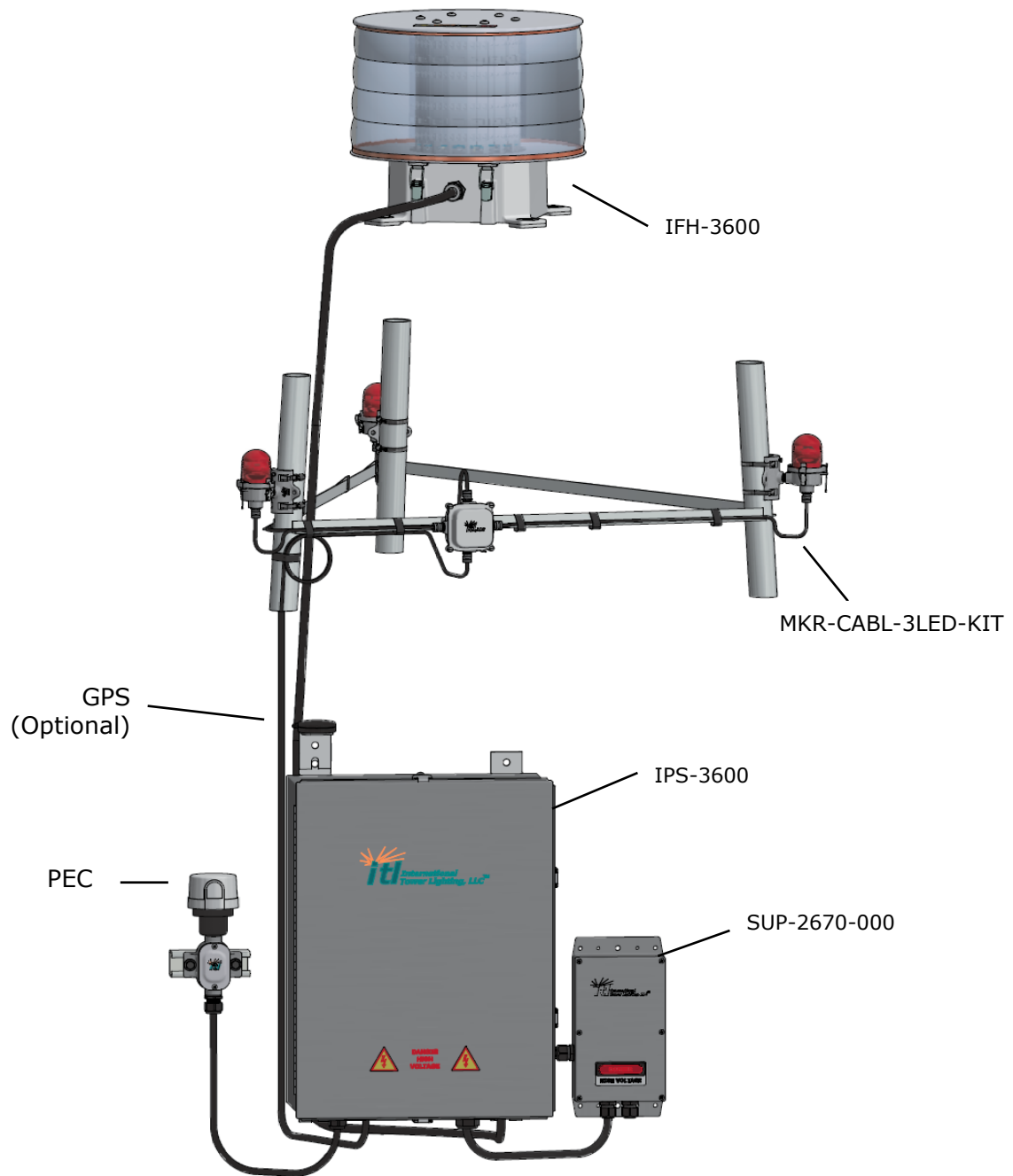


Figure 2: ILS-3600 Dual LED System

ILS-3600/2600 systems are available with options such as Infrared emitters which may provide increased conspicuity with night vision systems. Additionally, special configurations for use with catenary support structures that require special sequenced flashing are available. The table below shows all available models.

ITL Model	FAA Type	Description
ILS-3600-000	L-865(L)/L-864(L)	Dual White/Red System
ILS-2600-000	L-865(L)	White System
ILS-3600-0IR	L-865(L)/L-864(L)	Dual White/Red System with Infrared emitters
ILS-2600-0IR	L-865(L)	White System with Infrared emitters
ILS-3600-CAT	L-866(L)/L-885(L)	Dual White/Red Catenary System
ILS-2600-CAT	L-866(L)	White Catenary System
ILS-3600-CAT-IR	L-866(L)/L-885(L)	Dual White/Red Catenary with Infrared emitters
ILS-2600-CAT-IR	L-866(L)	White Catenary with Infrared emitters

Figure 3: ILS-3600/2600 Model Number Table

Catenary Applications

ILS-3600-CAT-0IR and ILS-2600-CAT-0IR Catenary LED Obstruction Lighting Systems are used for marking of catenary support structures such as transmission line river crossings. The lights flash in a middle-top-bottom sequence at 60FPM. Top-level lights mark the highest point of the catenary support structure. Mid-level lights mark the middle of the catenary and may be omitted if the distance from the top and bottom lights is less than 100ft. Bottom-level lights mark the bottom of the catenary. GPS flash synchronization is available to wirelessly synchronize the flashing of multiple structures. Multiple lights may be required at each level. Refer to FAA's Aeronautical Study of the structure for determination of required lighting system type and configuration. See FAA advisory circular 70/7460 Obstruction Lighting and Marking for detailed requirements.

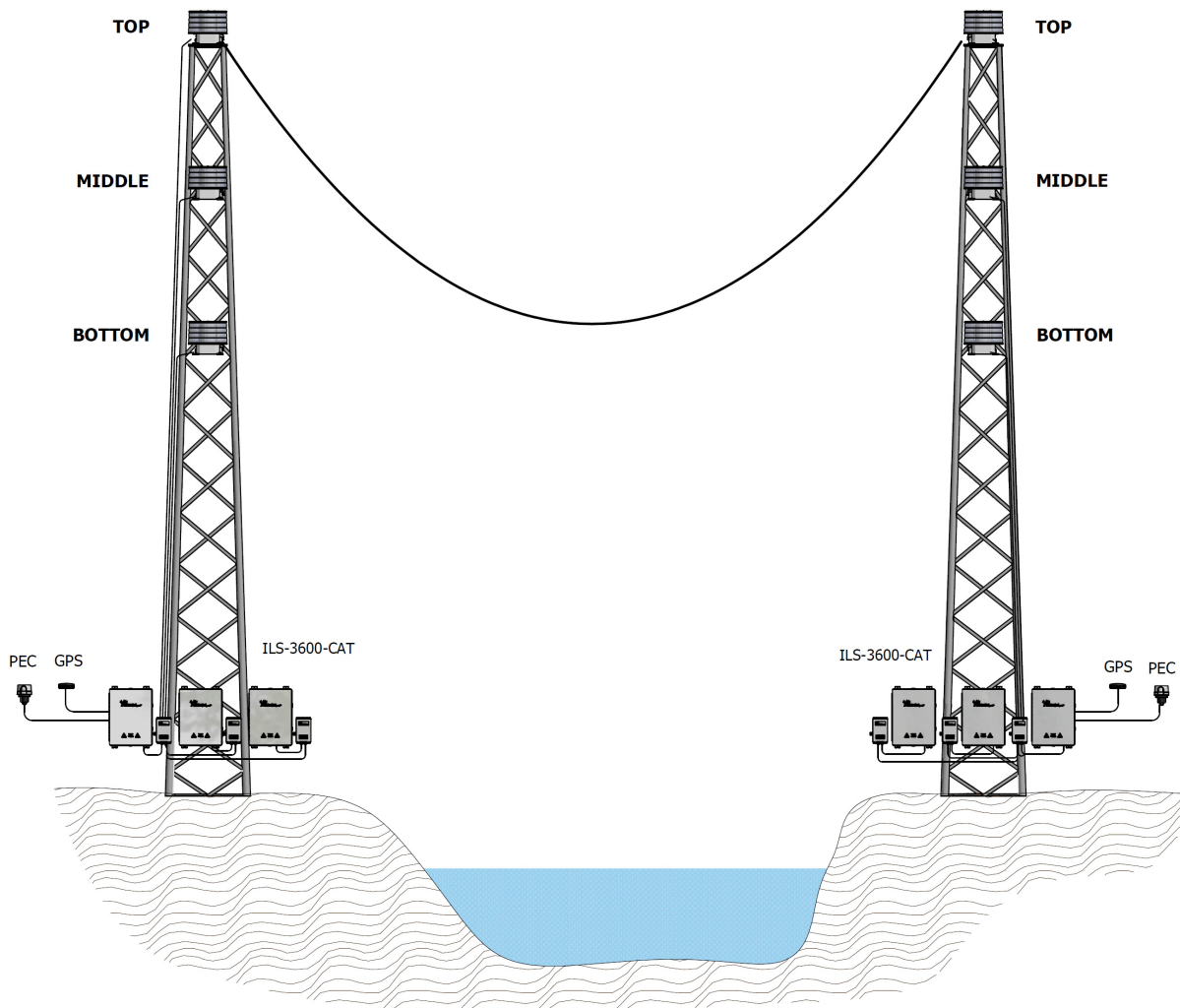


Figure 4: ILS-3600-CAT-0IR Typical Application—Transmission Line River Crossing

Theory of Operation

The ILS-3600/2600 series flash heads consist of strings of light emitting diodes (LEDs). Multiple strings of white LEDs are used for day mode and white night mode operation (L-865). ILS-3600 series flash heads also contain a single string of red LEDs used for red night mode operation (L-864). A string of infrared (IR) LEDs may optionally be used for increased conspicuity with night vision systems. An adjustable current source power supply is used to charge a capacitor bank to develop high voltage. The anode of each LED string is connected to the high voltage source. The LEDs strings are controlled individually by the trigger board using transistors on the FET board connected to the cathode ends of each LED string. The current through each LED string is monitored and controlled using a sense resistor and closed –loop feedback system. The figure below shows a simplified system diagram. The actual system contains multiple capacitor banks and power supplies as well as additional LED strings not shown.

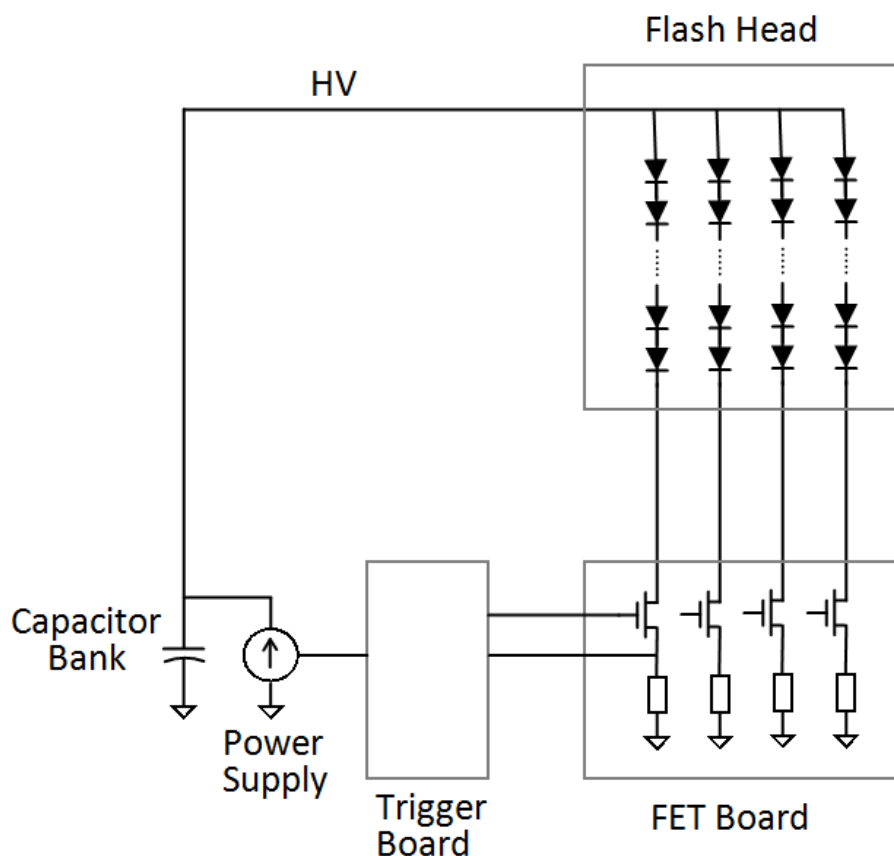


Figure 5: ILS-3600/2600 Simplified System Diagram

Specifications

The models listed below are verified by ETL to FAA Advisory Circular 150/5345-43 and Transport Canada CAR 621 as the FAA Types listed.

ILS-3600-0IR	L-865(L)/L-864(L)
ILS-2600-0IR	L-865(L)
ILS-3600-000	L-865(L)/L-864(L)
ILS-2600-000	L-865(L)
ILS-3600-CAT	L-866(L)/L-885(L)
ILS-2600-CAT	L-866(L)
ILS-3600-CAT-IR	L-866(L)/L-885(L)
ILS-2600-CAT-IR	L-866(L)

Environment

Temperature	-40°C to +55°C
Humidity	less than 95% relative humidity (non-condensing)

Light Output

Day Intensity	20,000 +/-25% effective candelas
Night Intensity	2,000 +/-25% effective candelas
Beam Pattern	360° horizontal, ≥3° vertical
Day Flash Rate	40 FPM Standard, 60 FPM Catenary
White Night Flash Rate	40 FPM Standard, 60 FPM Catenary
Red Night Flash Rate	20 or 30 FPM (selectable) Standard, 60 FPM Catenary
Side Lights	0 to 4 L-810(L) type LED (steady burning or flashing)

Mechanical

IFH-3600-0IR

Dimensions	Height: 14.7" (37.4cm)
	Diameter: 16" (40.7cm)
Weight	33 lbs (15Kg) max

IPS-3600 Power Supply

Dimensions	Height: 23.63" (60.02cm)
	Width: 16.57" (42cm)
	Depth: 9.76" (24.8cm)
Weight	40 lbs (18.1Kg) max

SUP-2670-000 Surge Suppressor

Dimensions	Height:	11.50" (29.2cm)
	Width:	6.91" (17.6cm)
	Depth:	2.20" (5.6cm)
Weight	2.0 lbs	(0.9Kg) max

Flash Head Cable

Rated Separation	0 to 800ft with AWG 18 wire
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Electrical
IPS-3600

Input Power	120VAC at 50/60Hz	
Power Consumption (Standard, Catenary)	Day:	95W, 135W
	White Night:	35W, 40W
	Red Night:	25W, 25W
	White/IR Night:	40W, 35W
	Red/IR Night :	50W, 50W
Peak VA (120VAC)	Catenary Day:	110VA
Peak VA (240VAC)	Catenary Day:	145VA

Installation

The following section describes how to install the LED lighting system. Also see installation instructions included with the lighting system.

Warning

- Connecting flash head wires incorrectly can cause damage to the flash head and/or power supply.
- Short circuiting flash head wires to the chassis, ground, or to any other electrical conductor while power is applied can cause damage to the flash head and/or power supply.
- Connecting or disconnecting flash head wires with power applied or before energy storage capacitors are completely discharged, can cause damage to the flash head and/or power supply.
- Operating this unit with any flash head wire disconnected can cause damage to the flash head and/or power supply.
- Damage caused by incorrect installation is not covered by the warranty.

Broadcast Tower Installations

Installations on AM, Hot AM and FM broadcast towers may require additional installation steps that are beyond the scope of this manual. Please request *ITL Broadcast Tower Recommended Practices* (DOC-AMFM-MNL.pdf) via the contacts listed at end of this manual.

Unpacking your LED Lighting System

Please examine the shipping containers and their content thoroughly upon receipt and report any potential shipping damage to the carrier.

Tools for Installation

The following tools are suggested for mounting of the ITL power supply and LED beacon.

- Digital multi-meter capable of reading 600VAC/DC (Fluke 177 or 179)
- Nut Drivers and Sockets
- #2 Phillips Screwdriver
- 5/16 Flat Head screwdriver
- 1/8 Flash Head screwdriver
- Crimp Tool
- Needle Nose Pliers

Quick Installation Guide

The quick start guide shows how to install the LED lighting system. The guide provides only basic instructions for more details, refer to this document.

- Remove packaging material from inside power supply and flash head.
- Mount the power supply cabinet. The enclosure must be mounted in the upright position. Pre-punched holes are provided in the bottom of the enclosure for all electrical connections. Do not drill, punch or pierce the enclosure top, sides or door as this will void the warranty.
- Using the mounting holes provided in the bottom of the cabinet ground the power supply cabinet to the site grounding system using an AWG 6 or larger copper conductor and a two-hole (5/8" centers) compression lug or via the internal ground lug provided on the panel.
- Mount the flash head using the hardware supplied. Ensure the metal flash head base makes electrical contact with the tower structure. Ground the flash head using the lug provided on the outside of the flash head base using an AWG6 or larger copper conductor.
- Install the SUP-2670-000 flash head cable surge suppressor at the base of tower near the Tower Ground Buss Bar. Connect the SUP-2670-000 suppressor ground wire to the Tower Ground Buss Bar.
- Install sidelights.
- Connect LED flash head cable from the power supply cabinet to the SUP-2670-000 following the procedure outlined in section *Flash Head Cable Termination* in this manual. The flash head cable shield drain wires must be grounded in the Flash Head, Power Supply and in the SUP-2670-000.
- Connect LED flash head cable from the flash head to the SUP-2670-000 following the procedure outlined in section *Flash Head Cable Termination* in this manual. The flash head cable shield drain wires must be grounded in the Flash Head, Power Supply and in the SUP-2670-000.
- Mount and wire the PEC using the procedure outlined in section *PEC Mounting and Wiring* in this manual.
- Attach primary power cable
- Apply power to unit (pull interlock switch)
- Assuming day time ambient light levels, allow a few minutes for the system to read the photocell and set the operating mode to Day mode.
- Verify that there are no alarms while operating in Day mode
- Verify that the flash head produces a bright white flash every 1.5s in day mode
- Cover PEC and verify that the system switches from Day to Night mode
- Verify that there are no alarms while operating in Night mode
- Verify that the flash head produces a red flash every 3s in Night mode for ILS3600 systems (dual) or a low intensity white flash every 1.5s for ILS-2600 systems (white).
- Uncover PEC and verify that the systems switches back to Day mode

- Toggle manual mode switch from Day to Night and observe that unit's operation follows switch (PEC Alarm LED will be lit when switch is not in auto mode)
- Move manual toggle switch back to 'Auto' position
- Generate LED and sidelight failure and observe subsequent alarming.
- Connect and test alarm monitoring and reporting equipment.
- Contact the tower owner or monitoring service responsible for FAA NOTAM management and verify that all alarm contacts are monitored and functioning properly.
- All fixtures, enclosures and junction boxes must be mounted in the upright position.

LED Flash Head Leveling

The flash head must be leveled properly for correct vertical beam spread. The diagram below details how use a compact “torpedo” level on two axes to ensure that the flash head is mounted level. Use shims as necessary to achieve level mounting of the flash head. Use galvanized steel or stainless steel shims for leveling. Do not compromise grounding of the flash head.

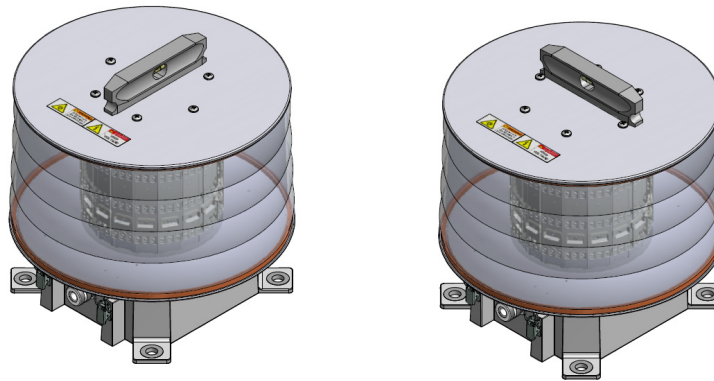
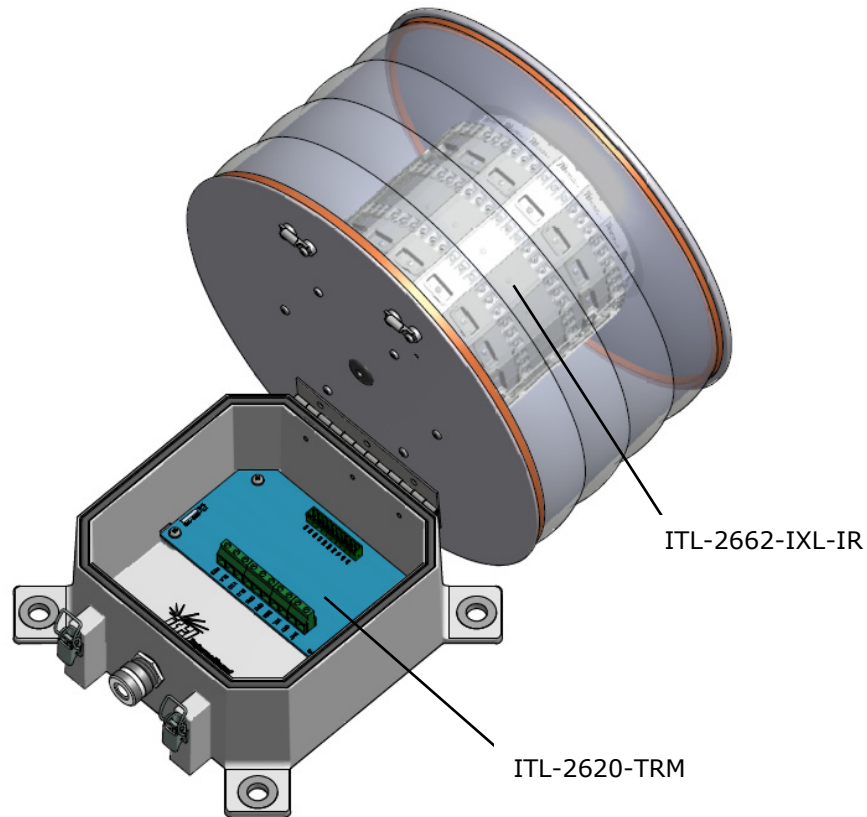


Figure 6: Flash Head Leveling – Axis 1 and Axis 2

Flash Head Cable Termination

Use only ITL flash head cable, part number CBL-TC18-10S, for connecting the flash head to the power supply. The flash head cable contains ten (10) color coded AWG18 conductors surrounded by a foil shield and a bare drain wire. Connect each color coded conductor to the corresponding terminal in the flash head. Secure all screw terminals firmly. When terminating the flash head cable in the power supply and in the flash head the drain wire must be grounded. Ground screws are provided in both the flash head and the power supply for grounding the drain wire. The length of the drain wire inside the power supply and flash head should be as short as possible.



QTY	PART NUMBER	DESCRIPTION
1	IFH-3600-0IR	DUAL LED FLASH HEAD
1	ITL-2620-TRM	TERMINAL BOARD
18	ITL-2662-IXL-IR	LED BOARD WITH INFRARED EMITTERS

Figure 7: IFH-3600-0IR Flash Head Parts

IFH-3600 Flash Head Mounting

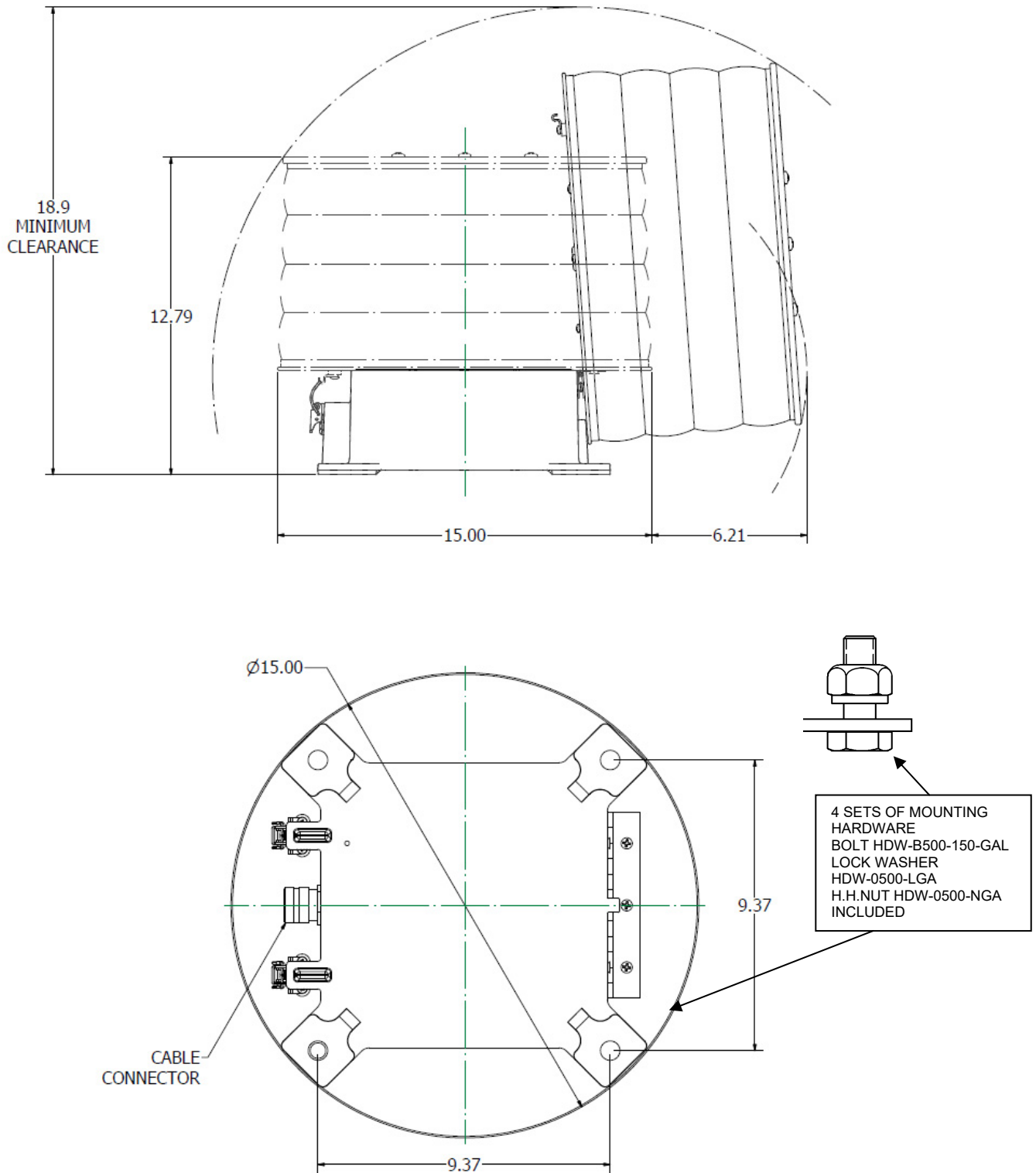


Figure 8: IFH-3600 Beacon Dimensions and Mounting Detail

Flash Head Cable Surge Suppressor

The Flash Head Cable Surge Suppressor, part number SUP-2670-000, should be mounted at the base of the tower near the Tower Ground Buss Bar when the flash head cable is not buried as shown in figure 10. Use ITL flash head cable, part number CBL-TC18-10S, to connect the IFH-3600 flash head to the SUP-2670-000. Use the terminal strip on the right side of the SUP-2670-000 labeled “LED FLASH HEAD”. Use ITL flash head cable to connect the IPS-3600 Power Supply to the SUP-2670-000. Use the terminal strip on the left side of the SUP-2670-000 labeled “POWER SUPPLY.” The shield drain wires for both cables should be terminated to the ground terminals labeled “SHIELD” in the bottom of the SUP-2670-000. The drain wires should be kept as short as possible as shown in figure 9.



Figure 9: SUP-2670-000 Flash Head Cable Suppressor

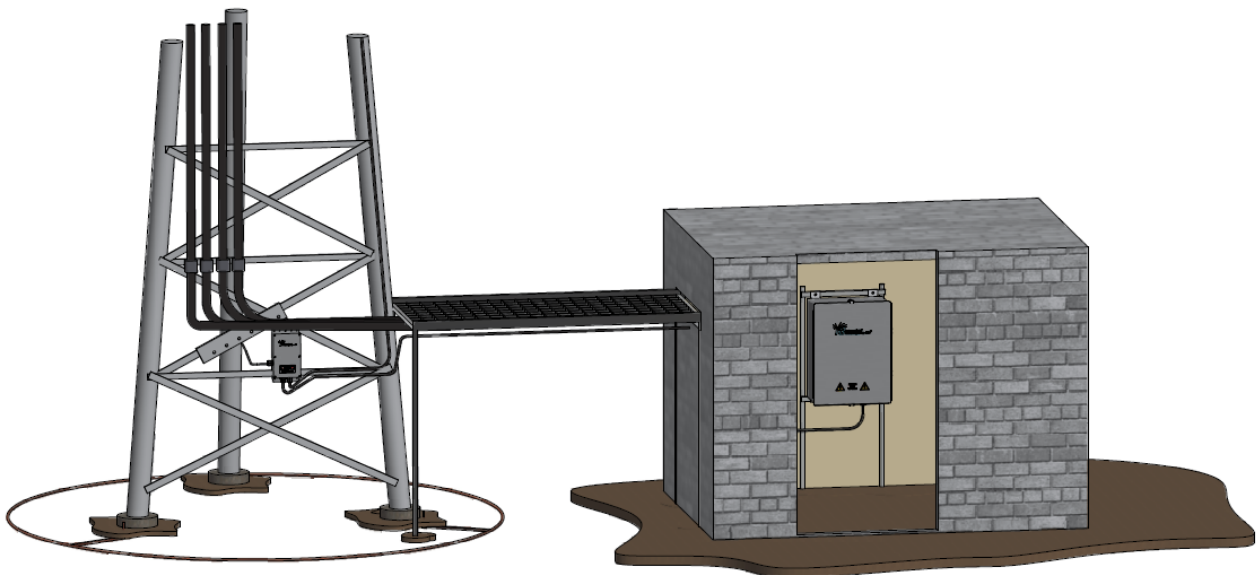


Figure 10: Above Ground Flash Head Cable Suppressor Installation

When the Flash Head Cable is buried as shown in figure 11, the Flash Head Cable Surge Suppressor, part number SUP-2670-000, should be mounted near the IPS-3600 Power Supply also as shown in figure 11. Use ITL flash head cable, part number CBL-TC18-10S, to connect the IFH-3600 flash head to the SUP-2670-000. Use the terminal strip on the right side of the SUP-2670-000 labeled “LED FLASH HEAD”. Use ITL flash head cable to connect the IPS-3600 Power Supply to the SUP-2670-000. Use the terminal strip on the left side of the SUP-2670-000 labeled “POWER SUPPLY.” The shield drain wires for both cables should be terminated to the ground terminals labeled “SHIELD” in the bottom of the SUP-2670-000. The drain wires should be kept as short as possible as shown in figure 9.

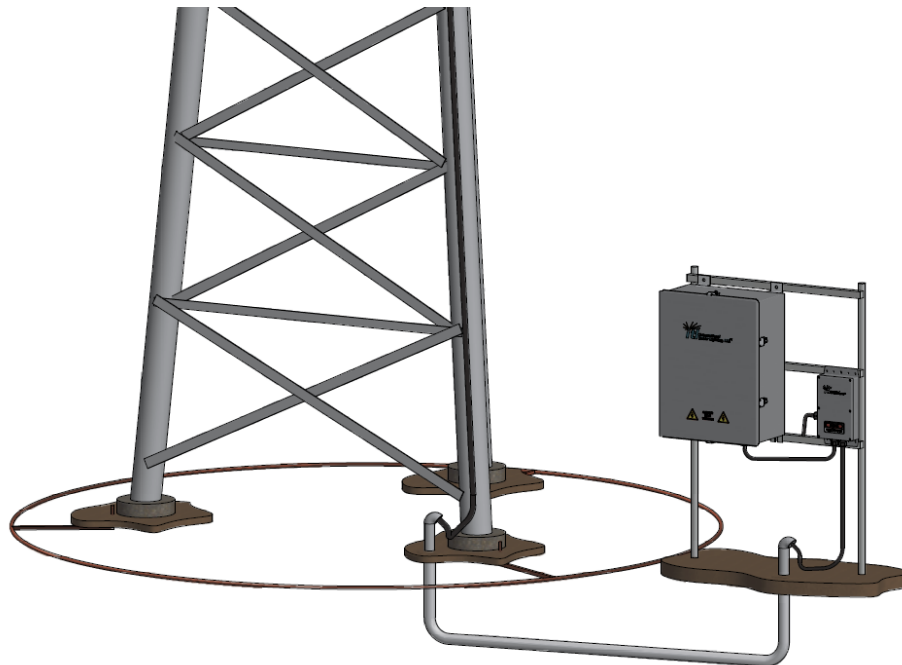
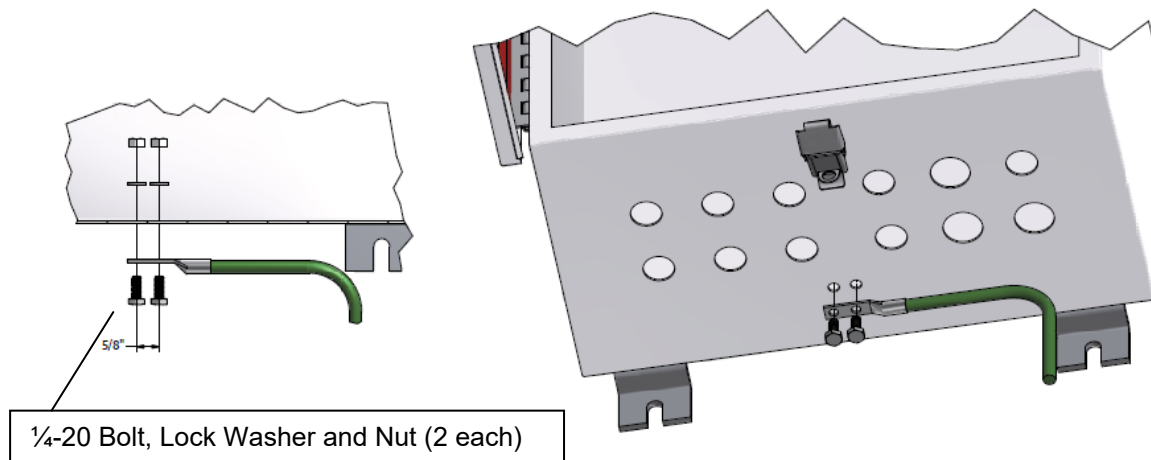


Figure 11: Buried Flash Head Cable Suppressor Installation

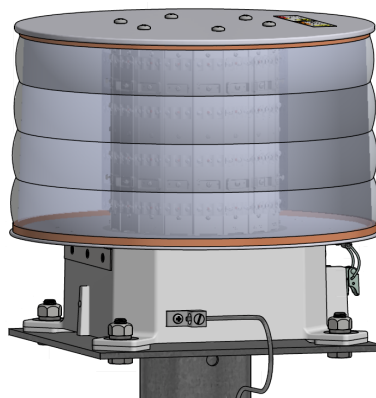
Power Supply Grounding

The power supply enclosure must be bonded to the site ground bus via a low impedance electrical connection. Mounting holes are provided on the bottom center of the enclosure for attachment of a two-hole (5/8" centers) compression lug for bonding to earth ground. AWG 6 copper conductor or larger should be used.



Flash Head Grounding

Flash head grounding is supplied by the flash head mounting hardware. If sufficient ground cannot be provided by the mounting hardware a lug is provided on the flash head base for grounding as shown below. AWG 6 copper conductor or larger should be used.



IPS-3600 Power Supply Mounting

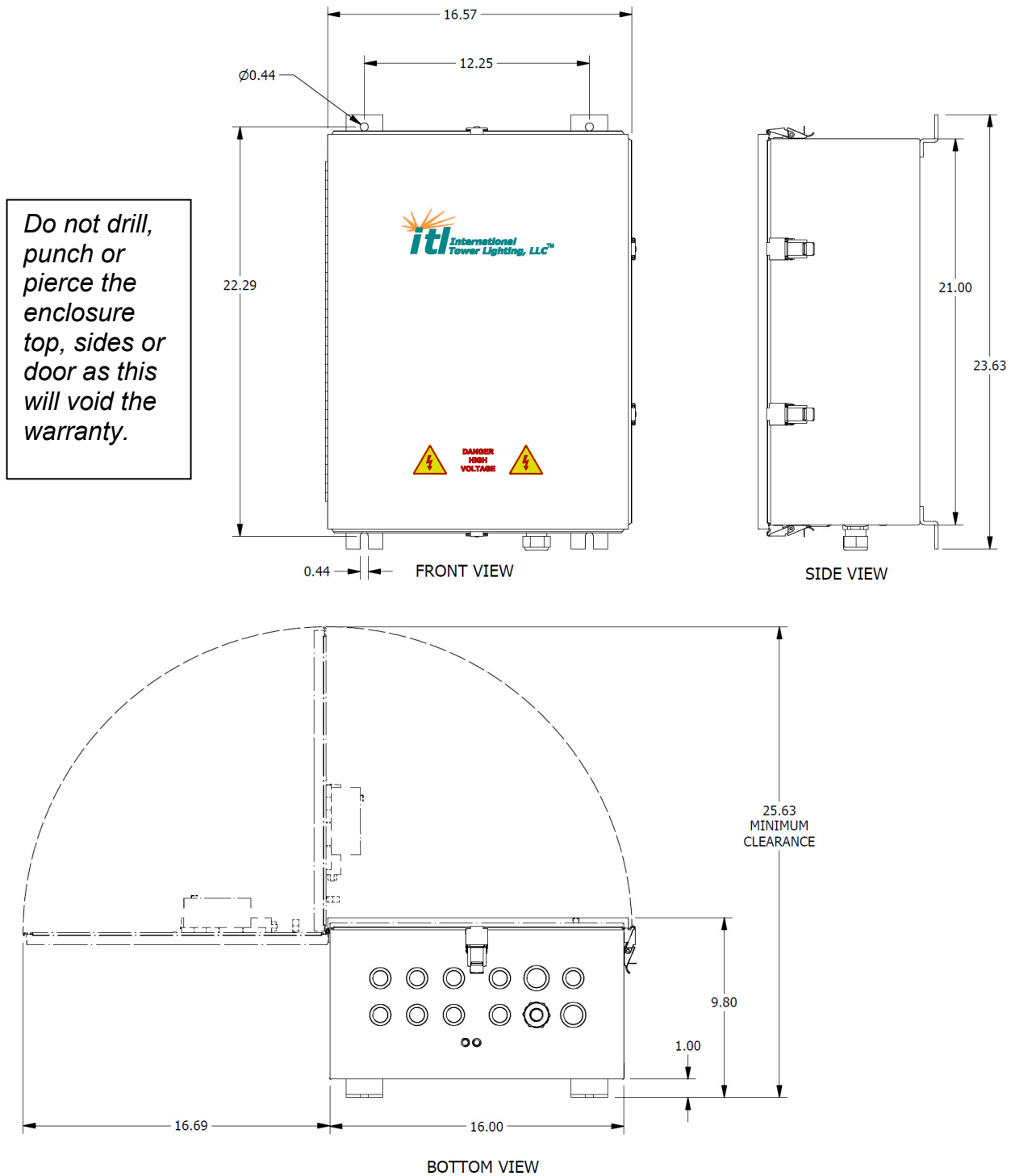


Figure 12: IPS-3600 Power Supply Dimensions and Mounting Details

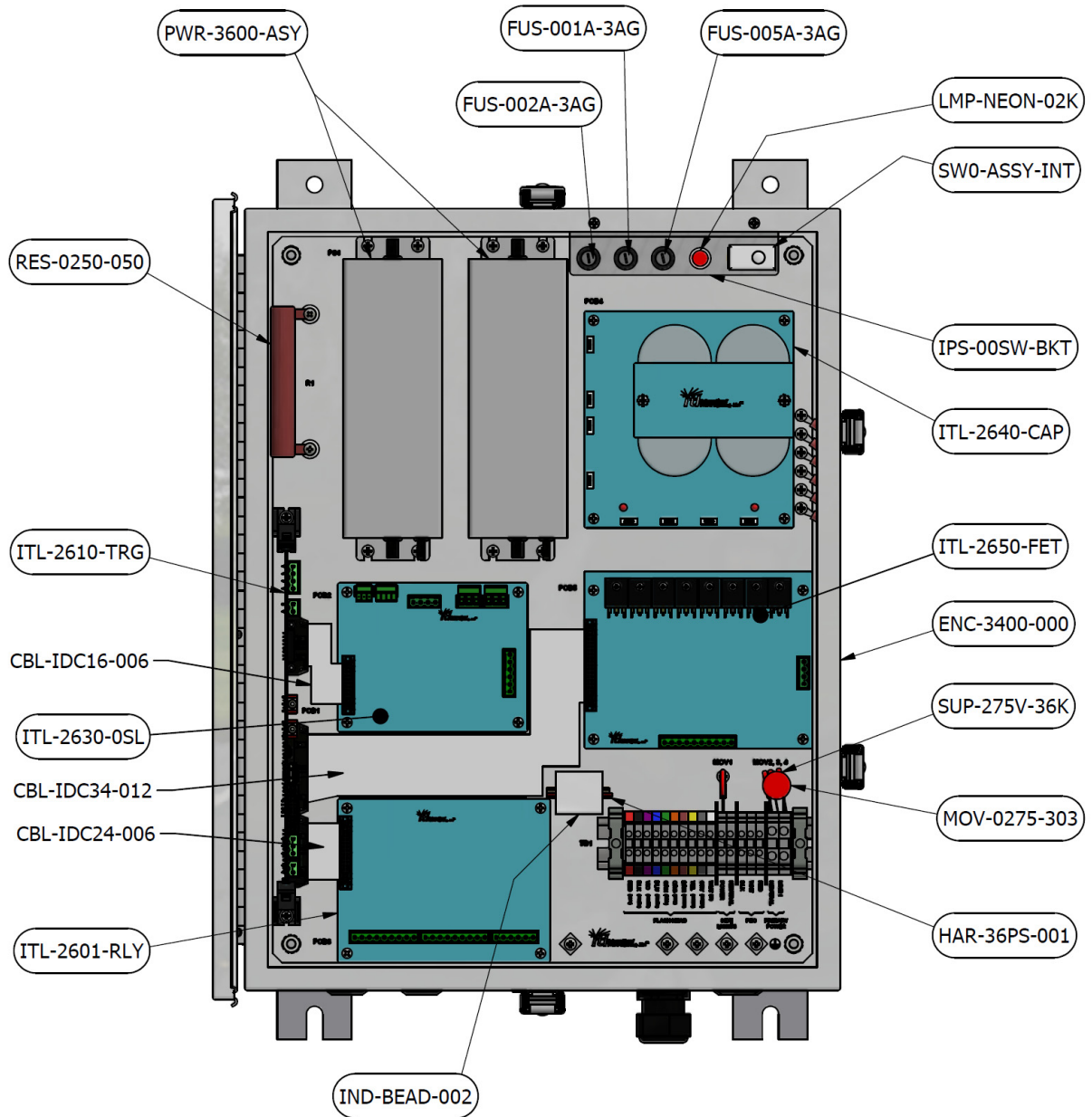


Figure 13: IPS-3600 Power Supply Overall Component Layout

QTY	PART NUMBER	DESCRIPTION
1	ENC-3400-000	NEMA 4X ENCLOSURE
1	ITL-2601-RLY	ALARM RELAY BOARD
1	ITL-2610-TRG	TRIGGER BOARD
1	ITL-2630-0SL	SIDE LIGHT BOARD
1	ITL-2640-CAP	CAPACITOR BOARD
1	ITL-2650-FET	FET BOARD
2	PWR-3600-ASY	POWER SUPPLY, INCL. TERMINAL PLUGS
1	SW0-ASSY-INT	INTERLOCK SWITCH
1	LMP-NEON-02K	NEON LAMP, RED, 120V
1	FUS-001A-3AG	FUSE 1A, 3AG, SLO-BLO
1	FUS-002A-3AG	FUSE 2A, 3AG, SLO-BLO
1	FUS-005A-3AG	FUSE 5A, 3AG, SLO-BLO
1	IPS-00SW-BKT	SWITCH, FUSE AND PILOT LIGHT BRACKET
1	RES-0250-050	RESISTOR
1	IND-BEAD-002	FERRITE BEAD
4	SUP-275V-36K	MOV SURGE SUPPRESSOR WITH RING LUG
1	MOV-0275-303	MOV SURGE SUPPRESSOR

Figure 14: IPS-3600 Power Supply Parts List Table

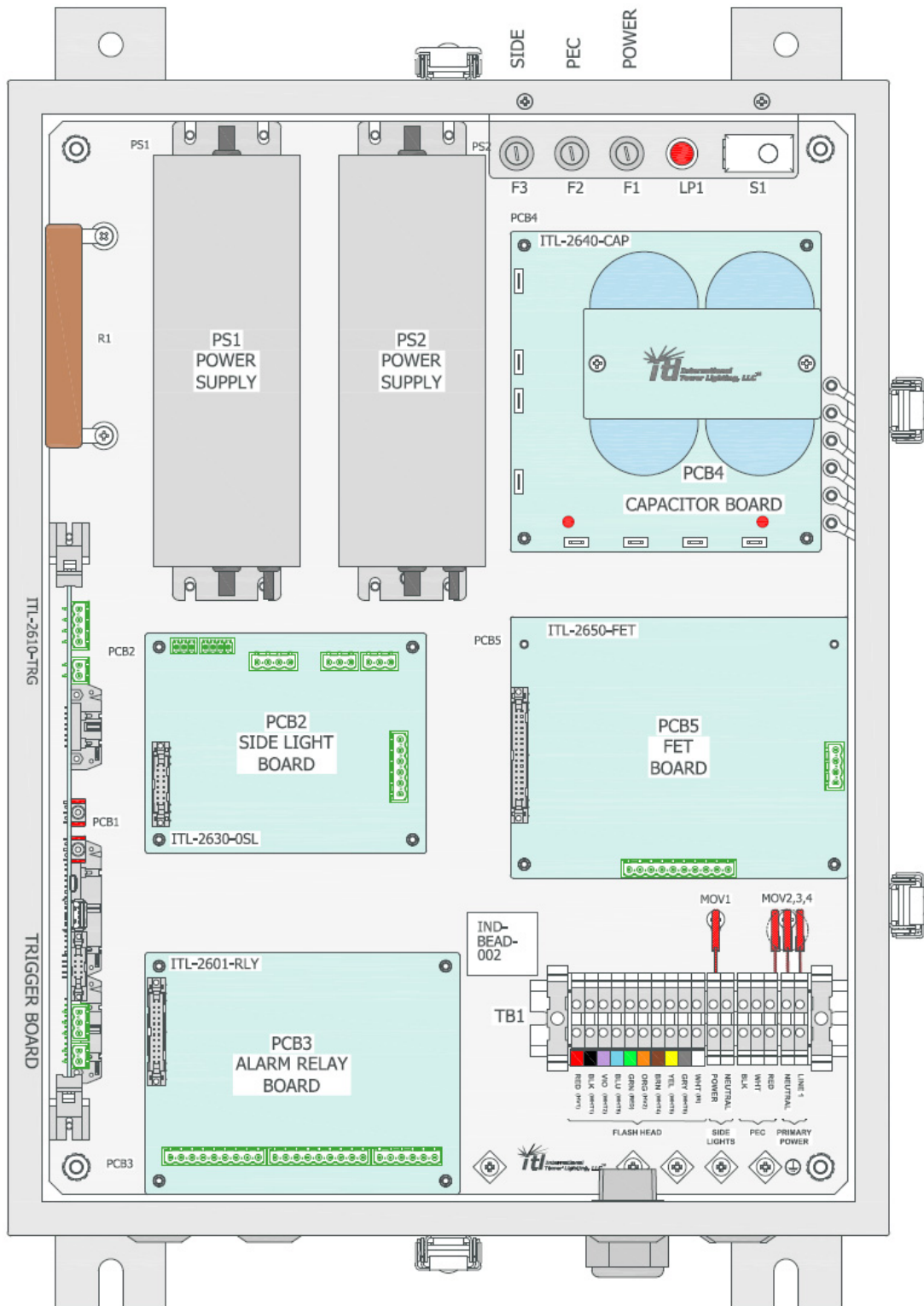


Figure 15: IPS-3600 Power Supply Panel Component Locator

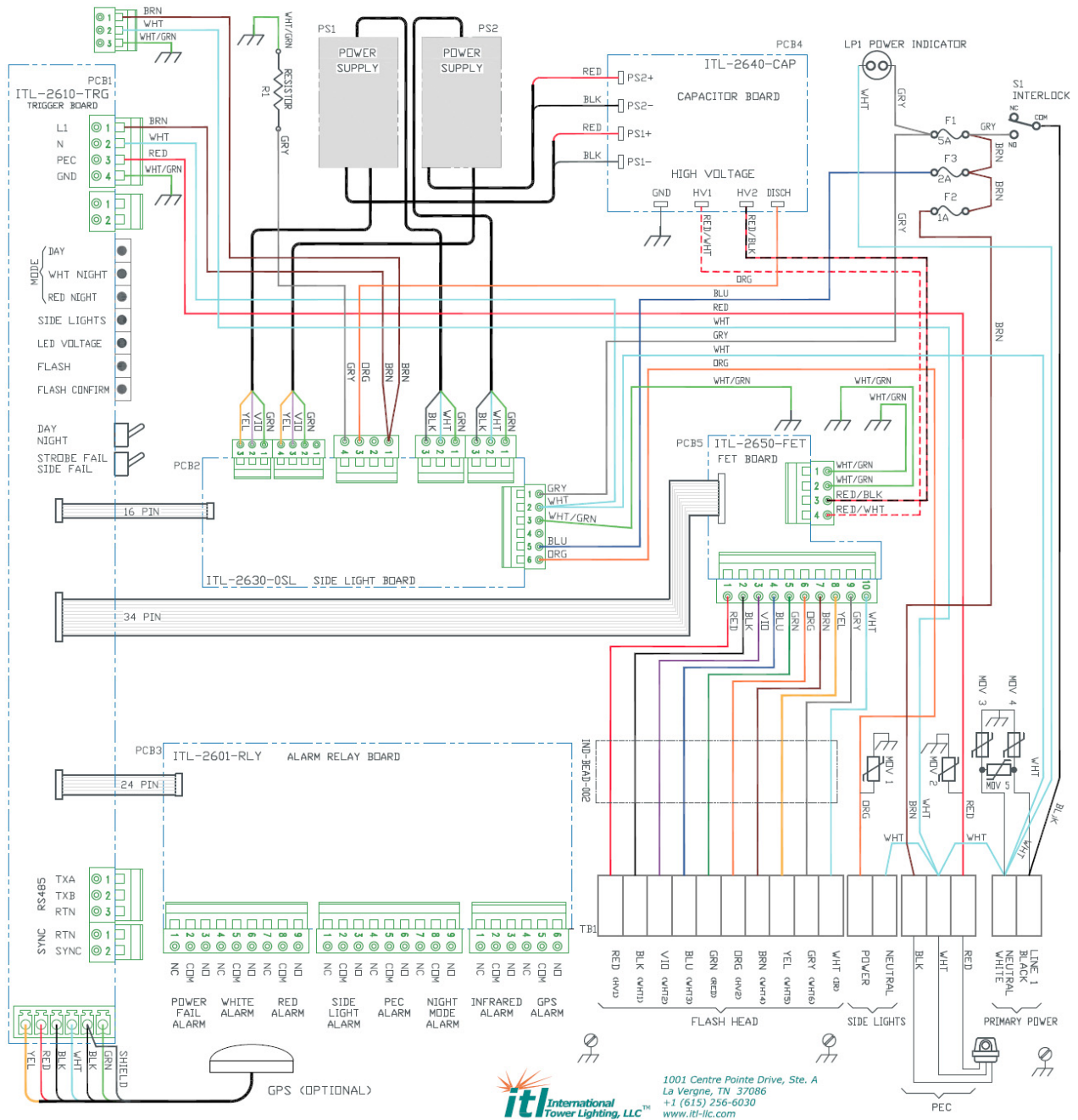


Figure 16: IPS-3600 Power Supply Wiring Diagram

ILS-3600-0IR Standard Quick Information Diagram



DANGER HIGH VOLTAGE



- ONLY AUTHORIZED AND TRAINED PERSONNEL SHOULD SERVICE THIS EQUIPMENT.
- DISCONNECT POWER FROM THIS EQUIPMENT AND ALLOW ENERGY STORAGE CAPACITORS TO DISCHARGE BEFORE SERVICING.
- ALWAYS VERIFY THAT ENERGY STORAGE CAPACITORS ARE DISCHARGED BEFORE SERVICING.



WARNING!



- CONNECTING FLASH HEAD WIRES INCORRECTLY CAN CAUSE DAMAGE TO THE FLASH HEAD AND/OR POWER SUPPLY.
- SHORT CIRCUITING FLASH HEAD WIRES TO THE CHASSIS, GROUND, OR TO ANY OTHER ELECTRICAL CONDUCTOR WHILE POWER IS APPLIED CAN CAUSE DAMAGE TO THE FLASH HEAD AND/OR POWER SUPPLY.
- CONNECTING OR DISCONNECTING FLASH HEAD WIRES WITH POWER APPLIED OR BEFORE ENERGY STORAGE CAPACITORS ARE COMPLETELY DISCHARGED CAN CAUSE DAMAGE TO THE FLASH HEAD AND/OR POWER SUPPLY.
- OPERATING THIS UNIT WITH ANY FLASH HEAD WIRE(S) DISCONNECTED CAN CAUSE DAMAGE TO THE FLASH HEAD AND/OR POWER SUPPLY.
- DAMAGE CAUSED BY INCORRECT INSTALLATION IS NOT COVERED BY THE WARRANTY.

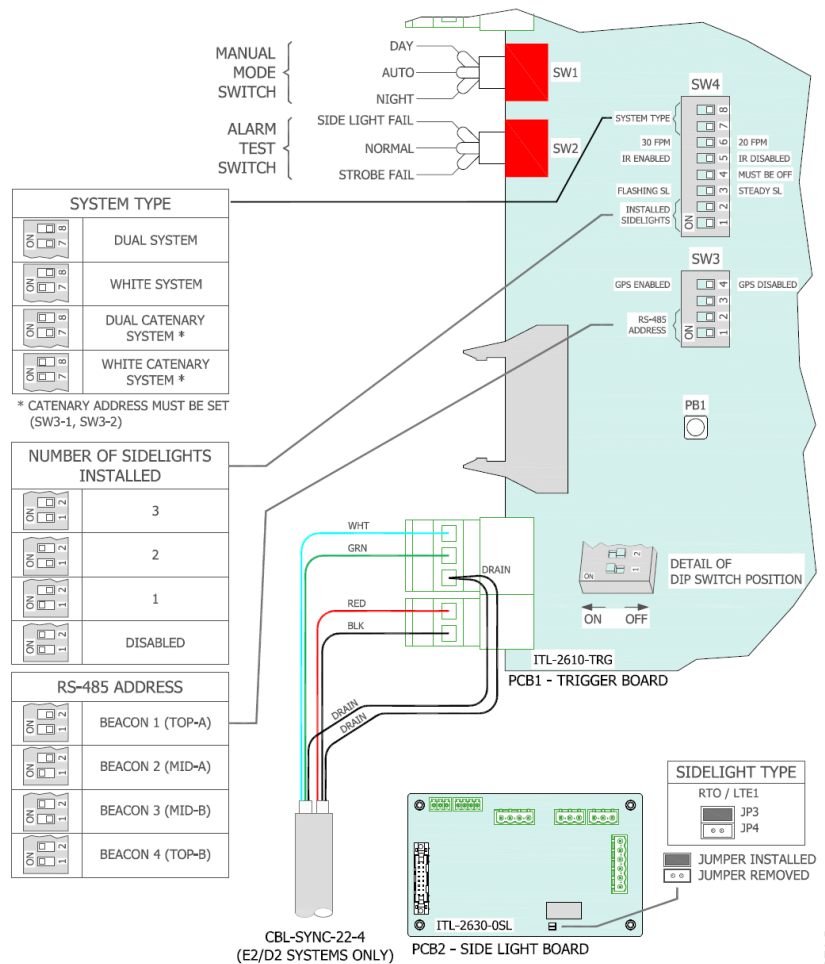


Figure 17: IPS-3600 Configuration Quick Info Guide

ILS-3600-CAT-IR Catenary Quick Information Diagram



DANGER HIGH VOLTAGE



- ONLY AUTHORIZED AND TRAINED PERSONNEL SHOULD SERVICE THIS EQUIPMENT.
- DISCONNECT POWER FROM THIS EQUIPMENT AND ALLOW ENERGY STORAGE CAPACITORS TO DISCHARGE BEFORE SERVICING.
- ALWAYS VERIFY THAT ENERGY STORAGE CAPACITORS ARE DISCHARGED BEFORE SERVICING.



WARNING!



- CONNECTING FLASH HEAD WIRES INCORRECTLY CAN CAUSE DAMAGE TO THE FLASH HEAD AND/OR POWER SUPPLY.
- SHORT CIRCUITING FLASH HEAD WIRES TO THE CHASSIS, GROUND, OR TO ANY OTHER ELECTRICAL CONDUCTOR WHILE POWER IS APPLIED CAN CAUSE DAMAGE TO THE FLASH HEAD AND/OR POWER SUPPLY.
- CONNECTING OR DISCONNECTING FLASH HEAD WIRES WITH POWER APPLIED OR BEFORE ENERGY STORAGE CAPACITORS ARE COMPLETELY DISCHARGED CAN CAUSE DAMAGE TO THE FLASH HEAD AND/OR POWER SUPPLY.
- OPERATING THIS UNIT WITH ANY FLASH HEAD WIRE(S) DISCONNECTED CAN CAUSE DAMAGE TO THE FLASH HEAD AND/OR POWER SUPPLY.
- DAMAGE CAUSED BY INCORRECT INSTALLATION IS NOT COVERED BY THE WARRANTY.

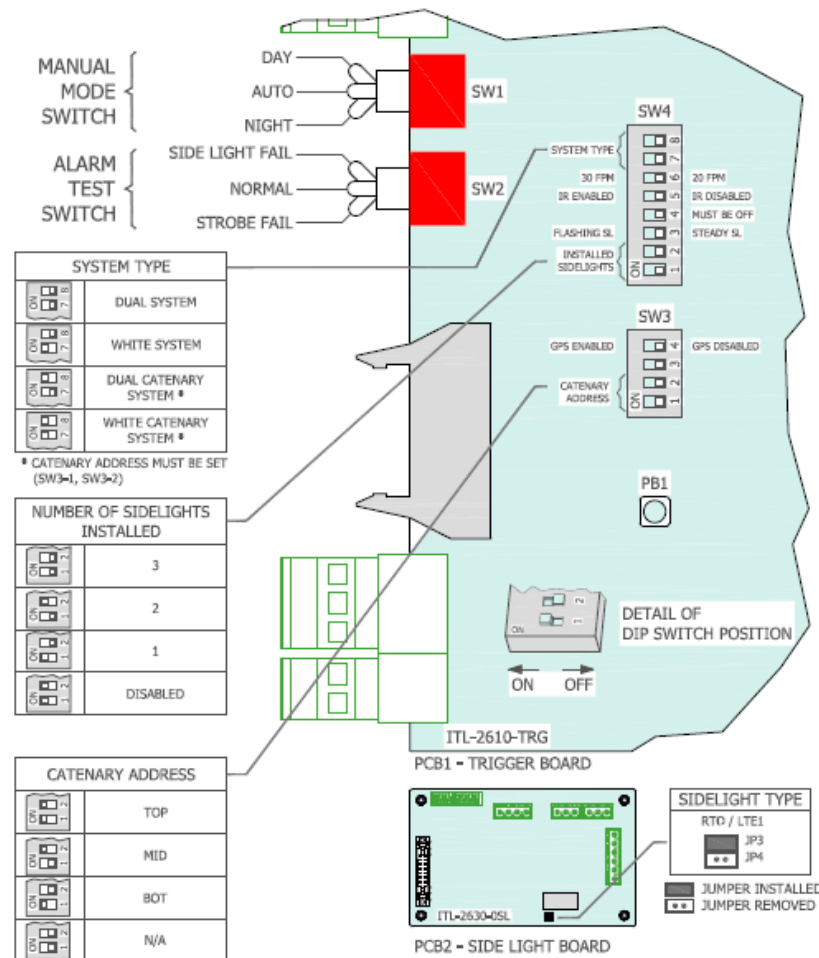


Figure 18: IPS-3600-CAT Configuration Quick Info Guide

SUP-2670-000 Flash Head Cable Surge Suppressor Mounting

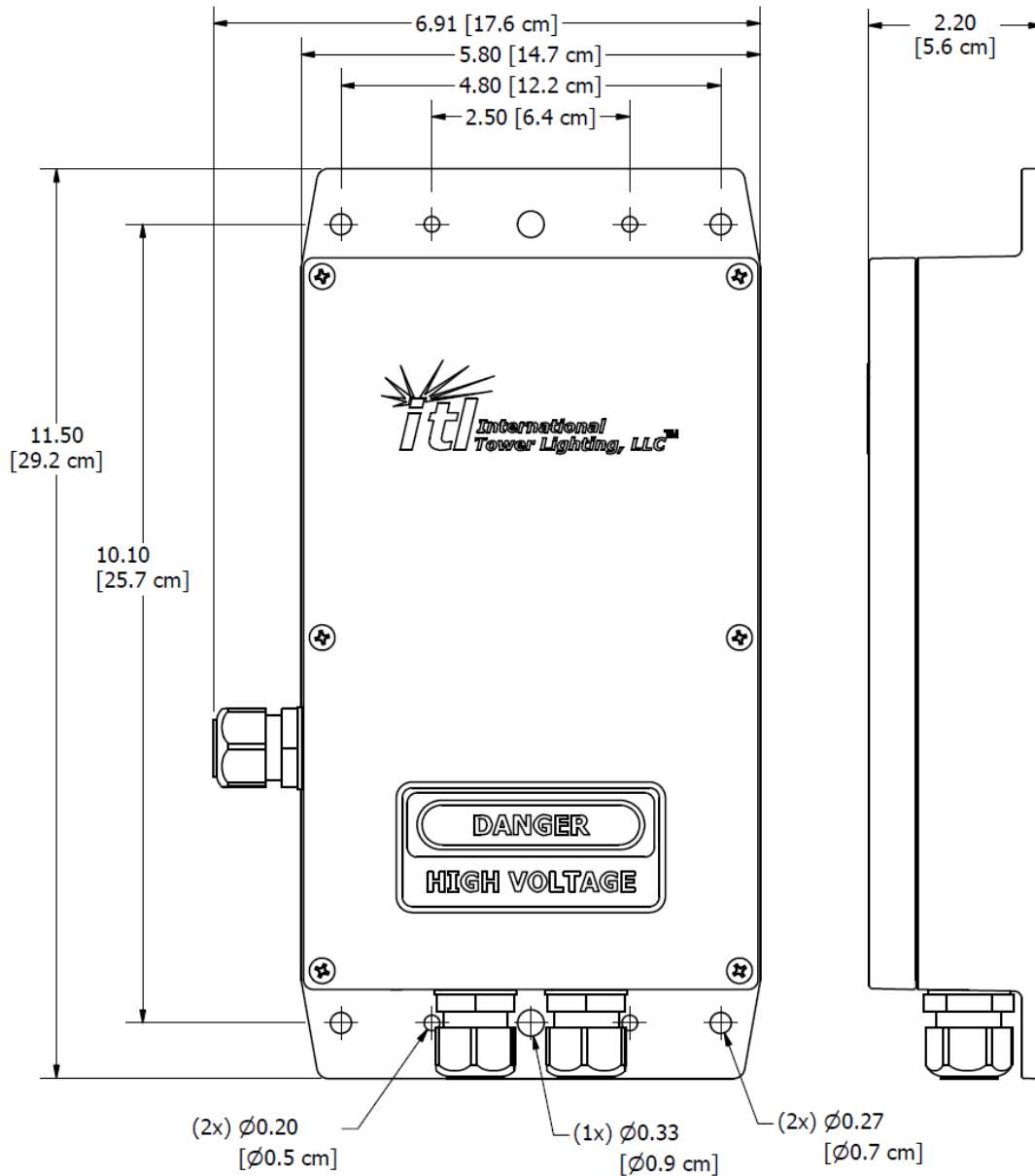


Figure 19: SUP-2670-000 Surge Suppressor Dimensions and Mounting Details

PEC Mounting and Wiring

ILS-3600/2600 systems utilize a voltage type photoelectric cell, ITL part number PEC-NITE-120. A PEC kit, part number PEC-EKIT-120-25, containing all parts necessary for mounting and wiring the photoelectric cell as shown in the diagrams that follow.

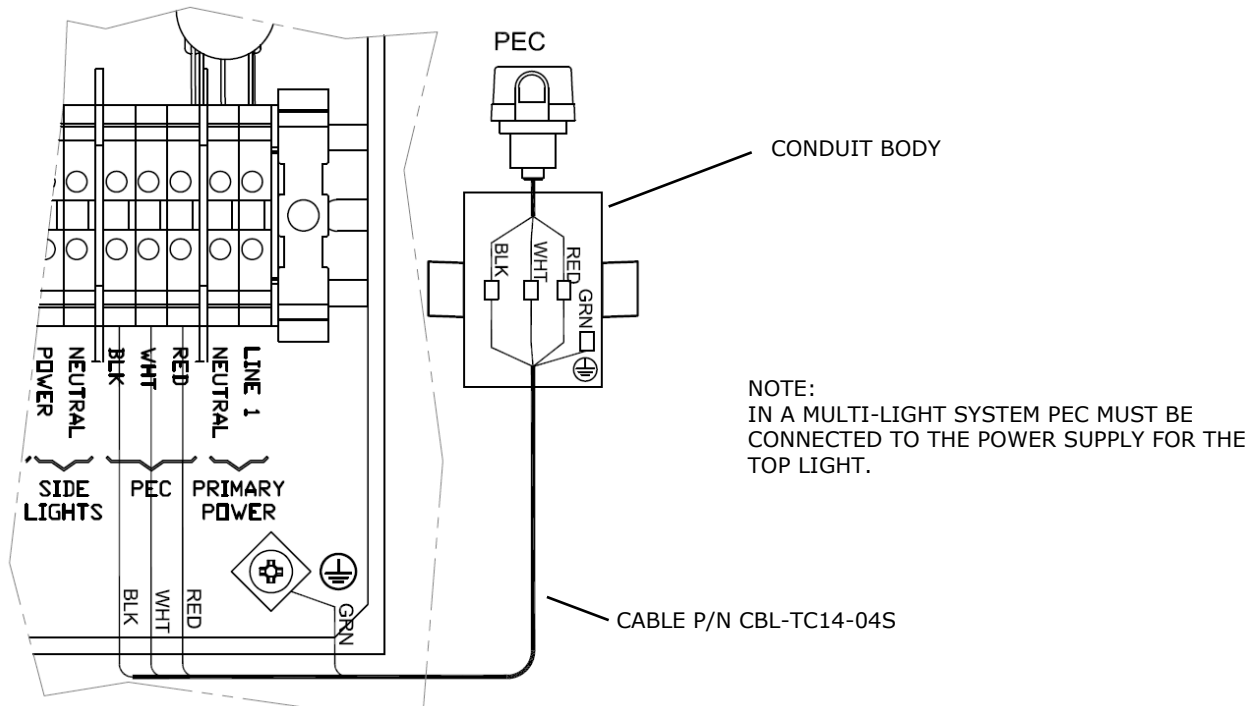


Figure 20: PEC Wiring Diagram

QTY	PART NUMBER	DESCRIPTION
1	HDW-COND-BDY-SM	CONDUIT BODY, STRUT MOUNT, ½" NPT, INCL. CORD CONNECTOR & MOUNTING HARDWARE
1	HDW-CDCN-500-NYL-BLK	CORD CONNECTOR ½" NPT, CBL. DIA. 0.39"-0.55"
1	HDW-ORNG-075	O-RING I.D. 0.75"
25ft	CBL-TC14-04S	TRAY CABLE 600V 14AWG 4 CONDUCTOR
1	PEC-NITE-120-ND	PHOTOELECTRIC CELL (PEC)
1	PEC-SOCK-000	SOCKET FOR PHOTOELECTRIC CELL

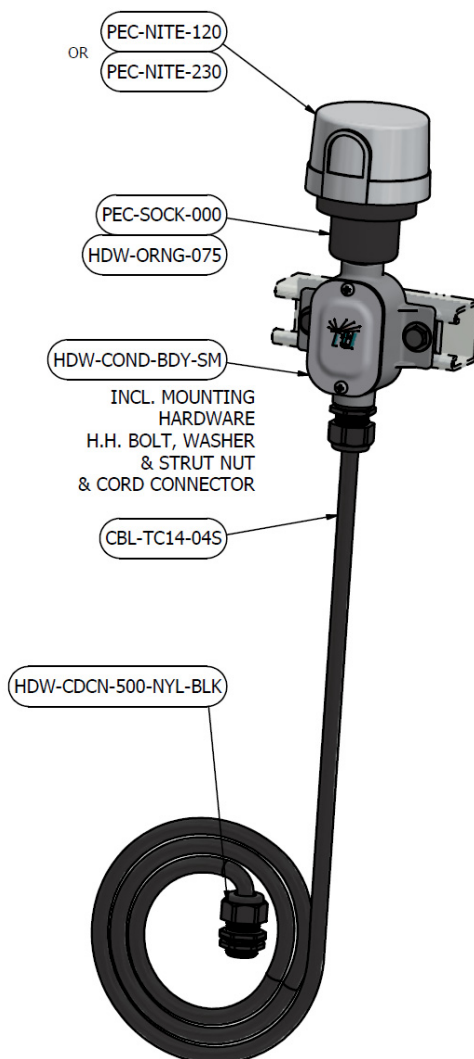


Figure 21: PEC-EKIT-120-25 KIT Assembly

GPS Mounting and Wiring

In wind farm, catenary and other applications where multiple lighting systems spread across a large area are required to flash in sync a GPS may be used. A GPS kit (ITL P/N ANT-018X-GPS-KIT) is available that includes the GPS and mounting hardware. For multi-light systems only the master system (the unit with the photocell connected) must have a GPS installed. The GPS kit comes with a connector for attachment to P9 on the PCB1, the ITL-2610-TRG Trigger Board as shown below. For best performance the GPS should be mounted so as to have an unobstructed view of the sky.

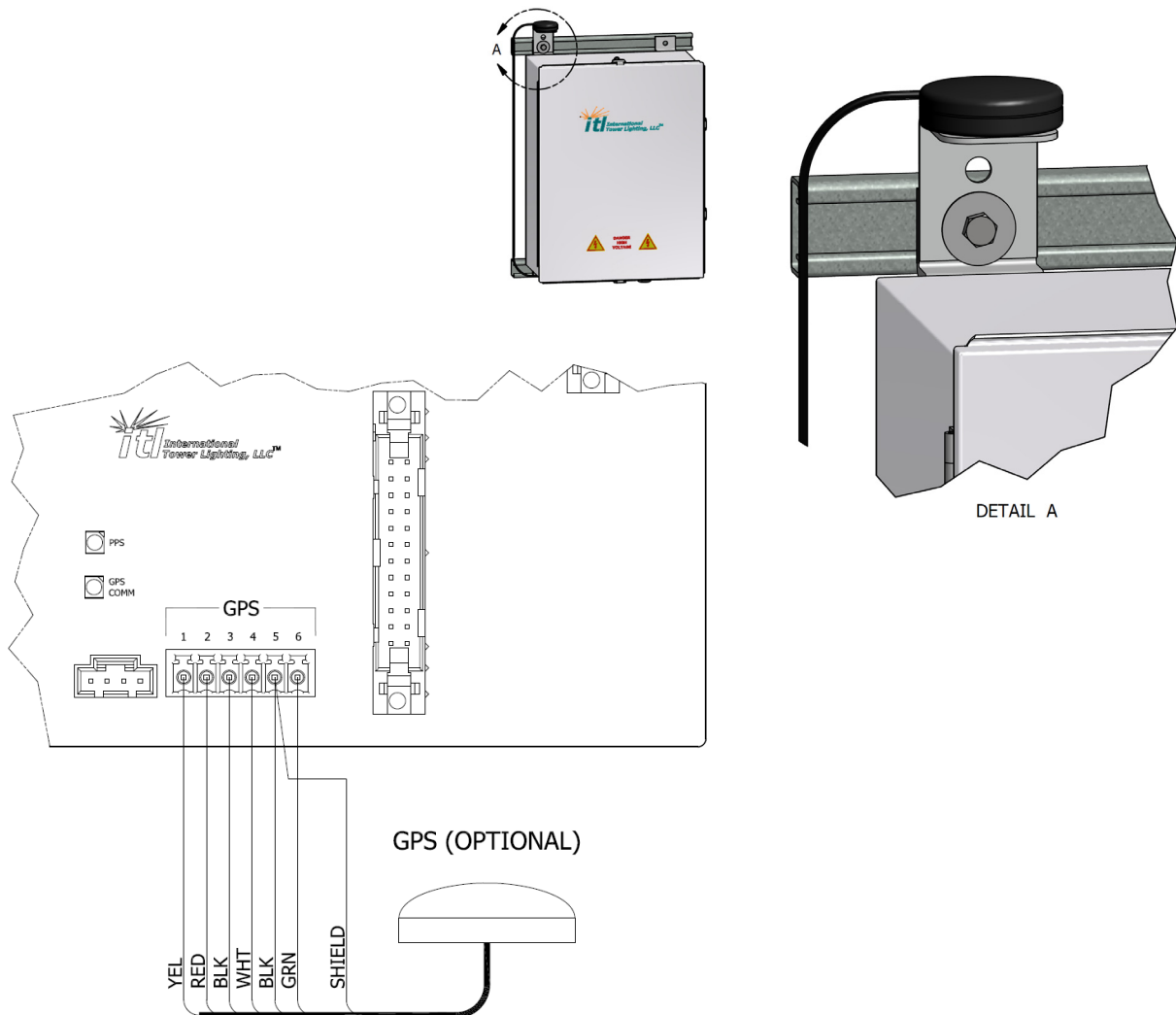


Figure 22: GPS Installation and Wiring

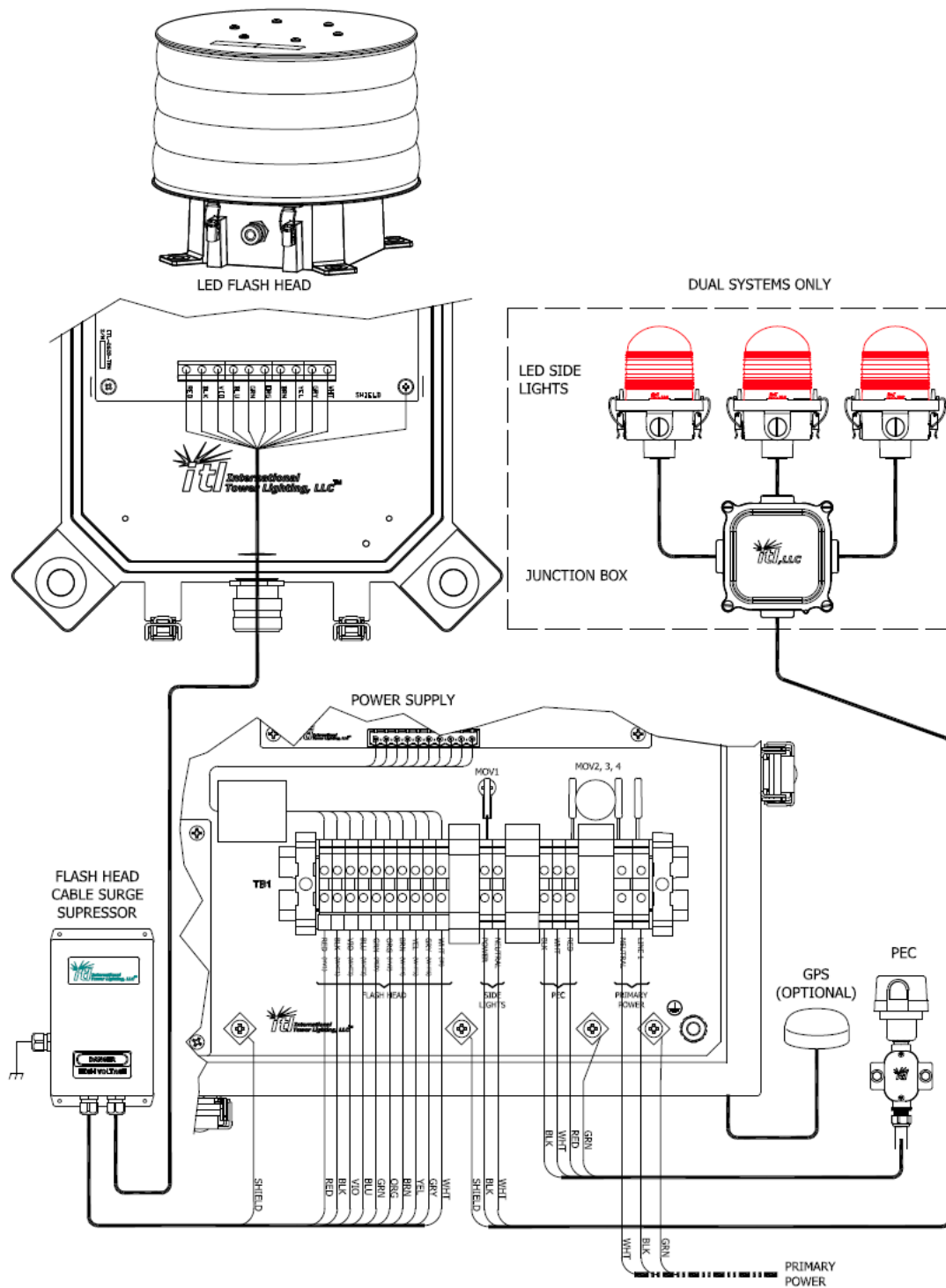


Figure 23: ILS-2600, ILS-3600 Installation Wiring Diagram

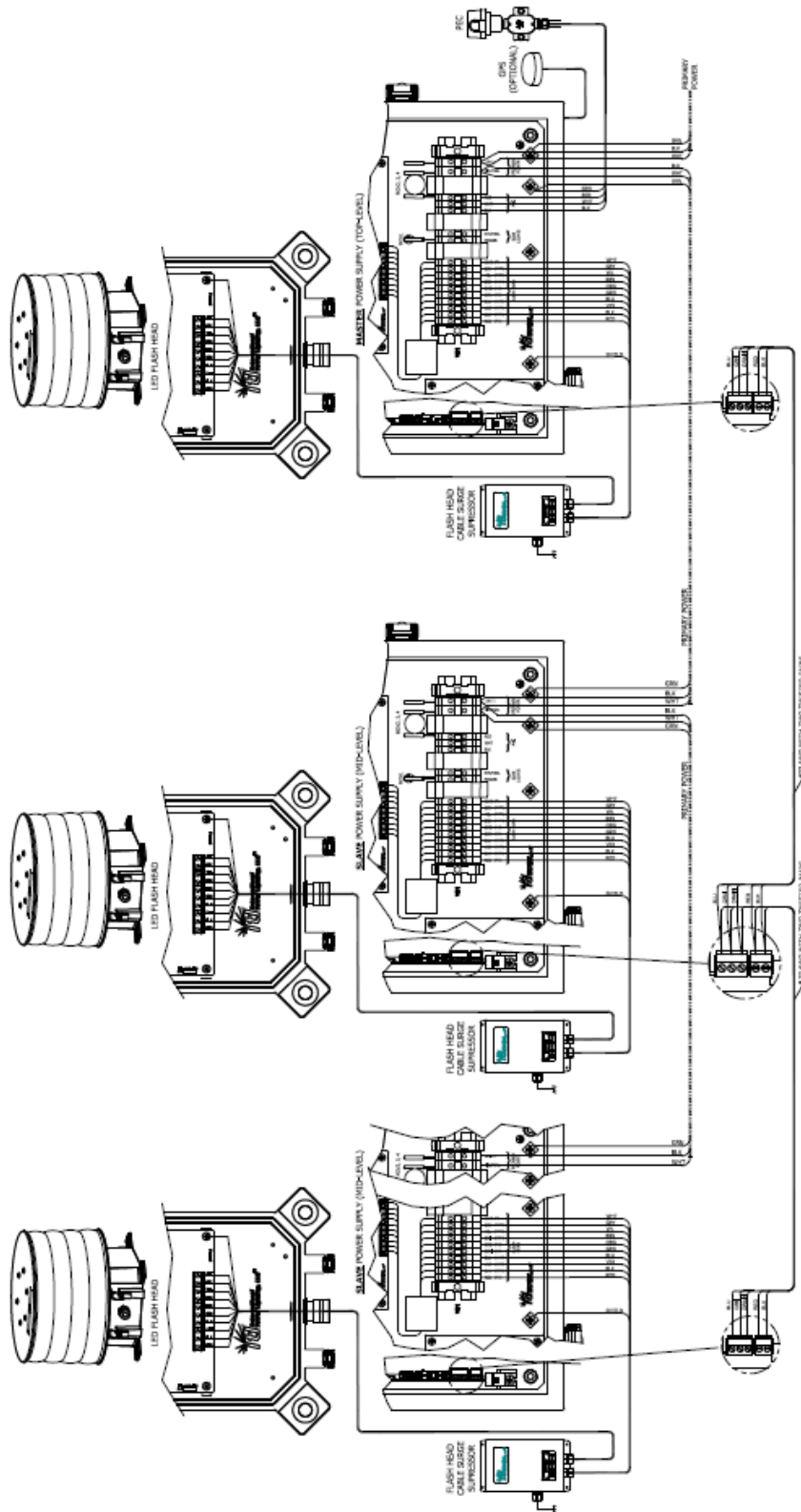


Figure 24: ILS-2600, ILS-3600 Multi-Light System Installation w/Sync

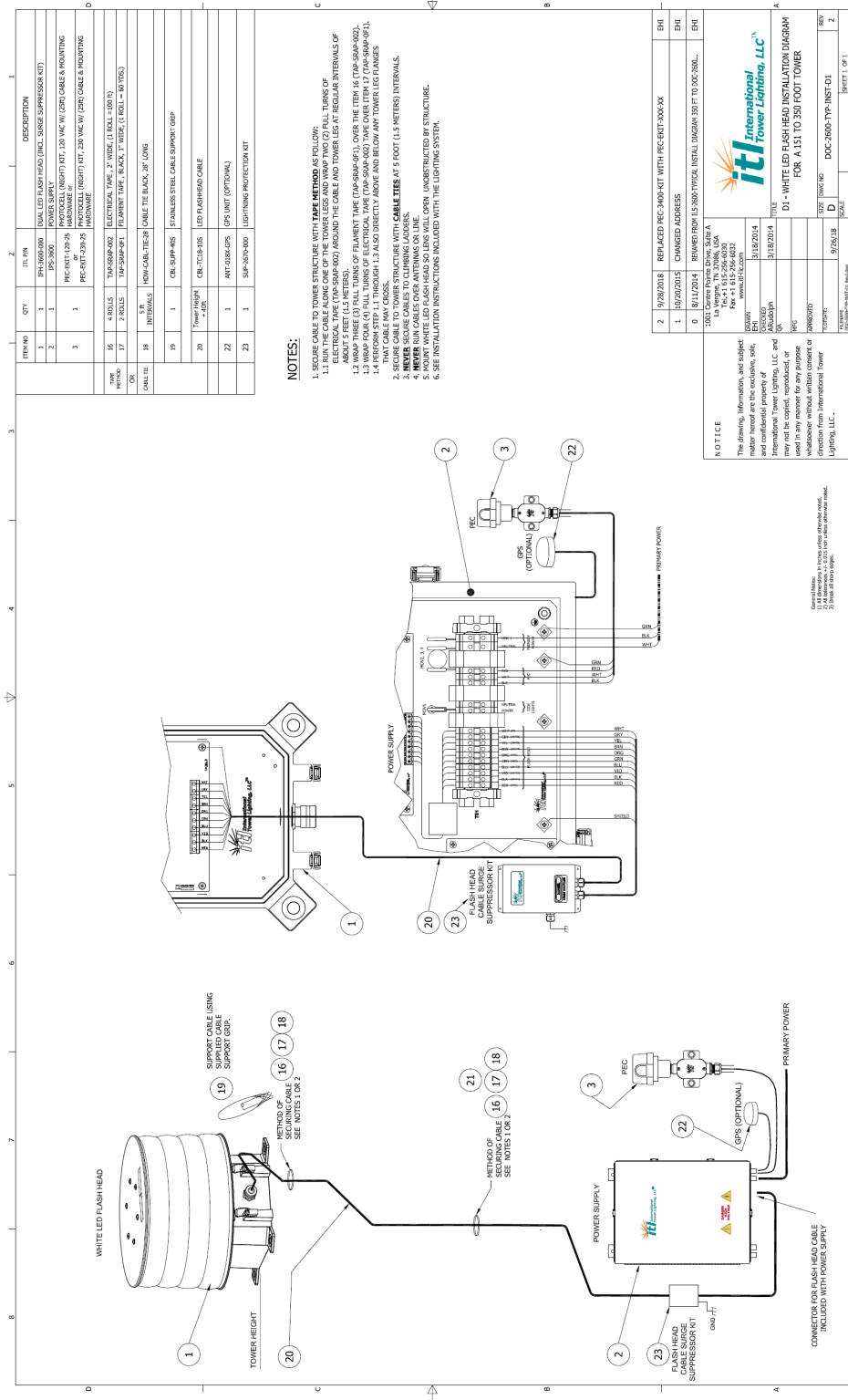


Figure 25: ILS-2600 Single System Typical Installation Diagram – 350'

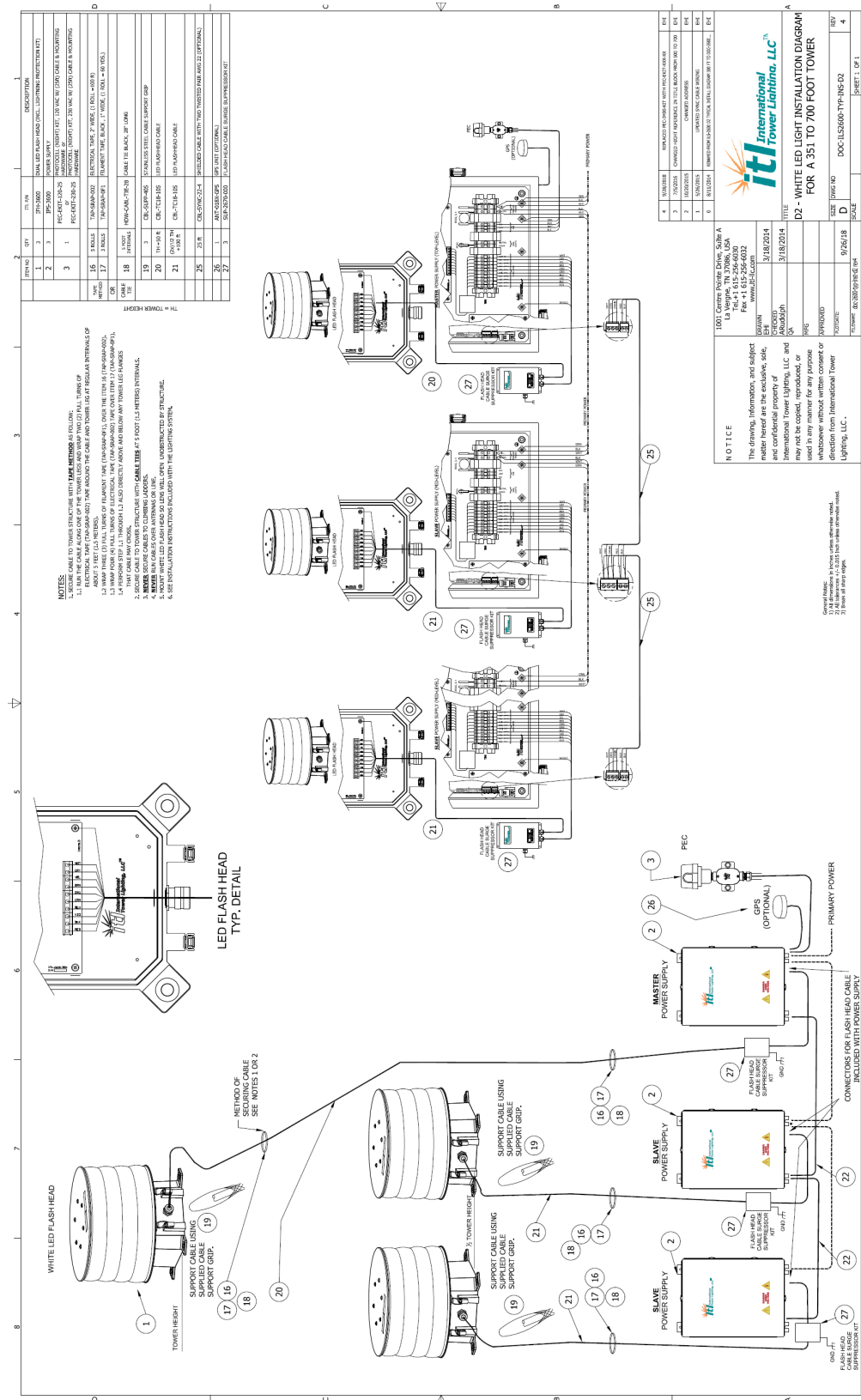


Figure 26: ILS-2600 Triple System Typical Installation Diagram – 700'

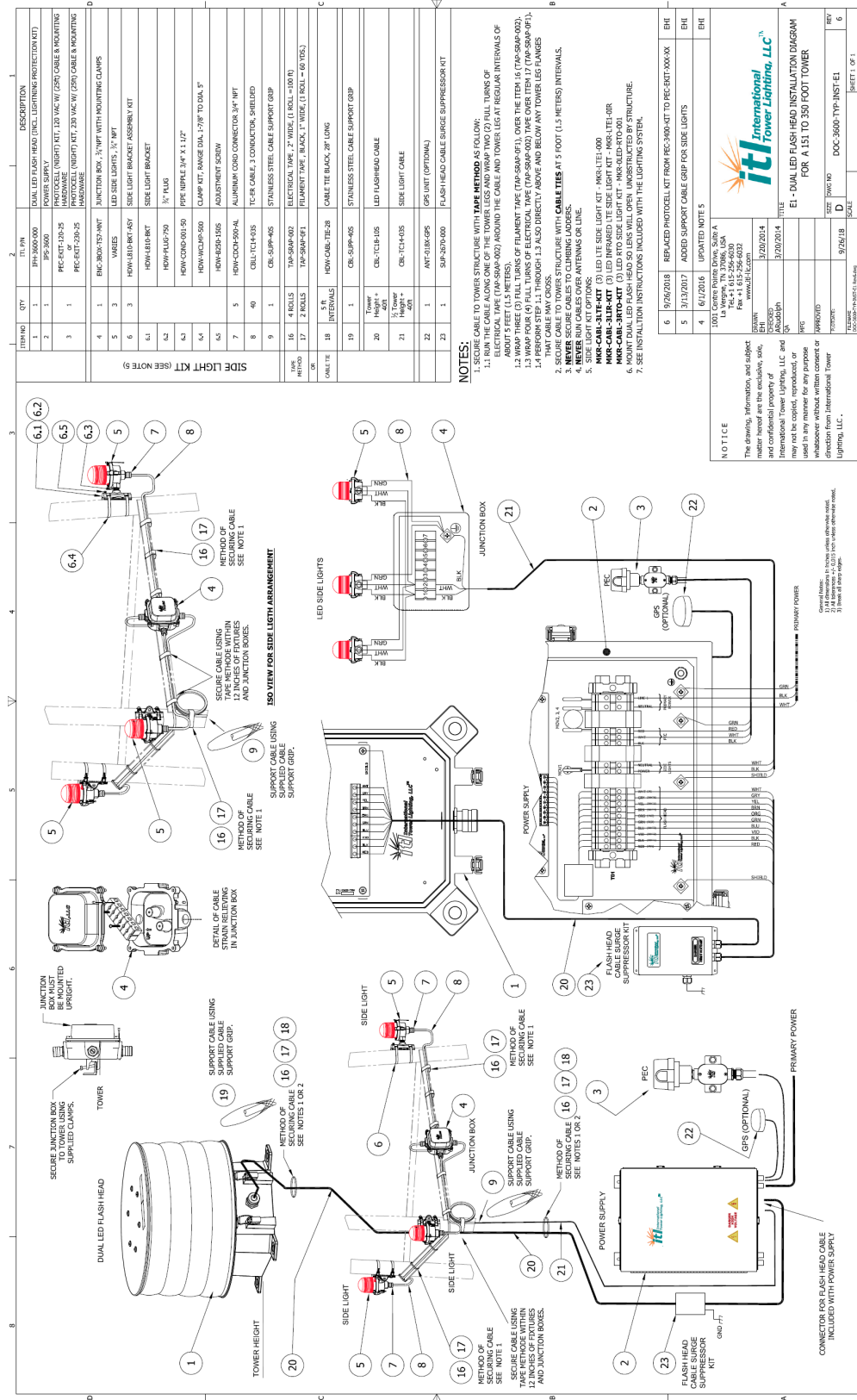


Figure 27: ILS-3600 Single System Typical Installation Diagram – 350'

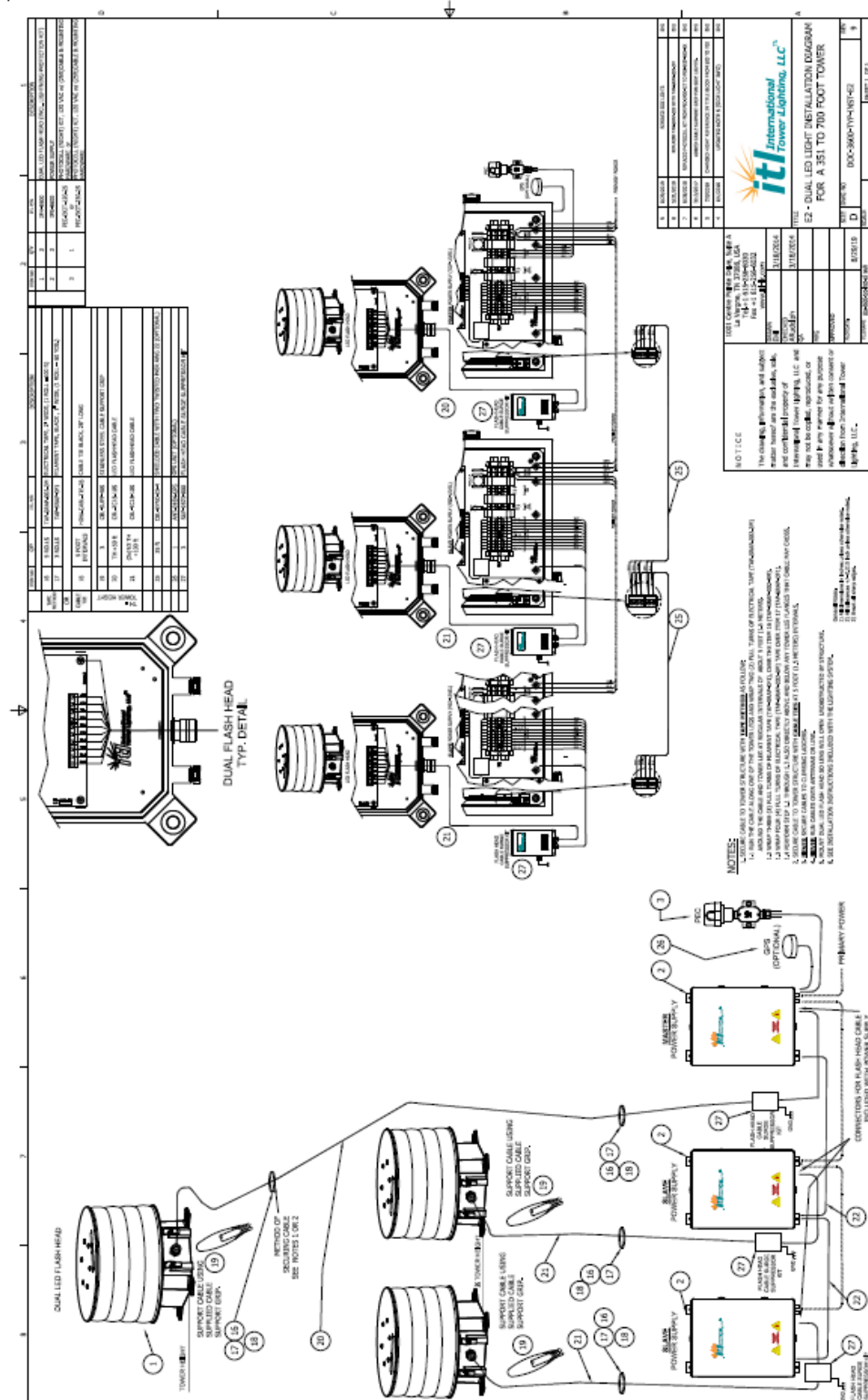


Figure 28: ILS-3600 Triple System Typical Installation Diagram – 700'

Circuit Boards

The following section describes all of circuit boards.

ITL-2610-TRG Trigger Board

The ITL-2610-TRG is the power supply's main board. This microprocessor-controlled circuit board controls and monitors all functions relating to the lighting system.

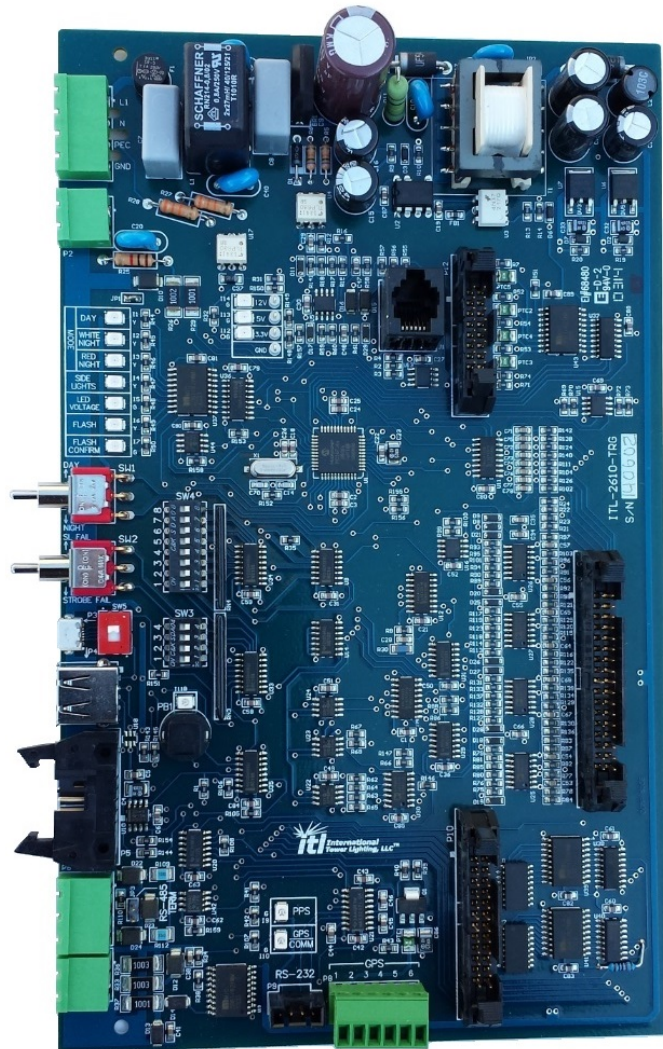


Figure 29: ITL-2610-TRG Trigger Board

A. LEDs

An array of LEDs on the ITL-2610-TRG board provides visual feedback relating to the system's mode of operation, and functional status.

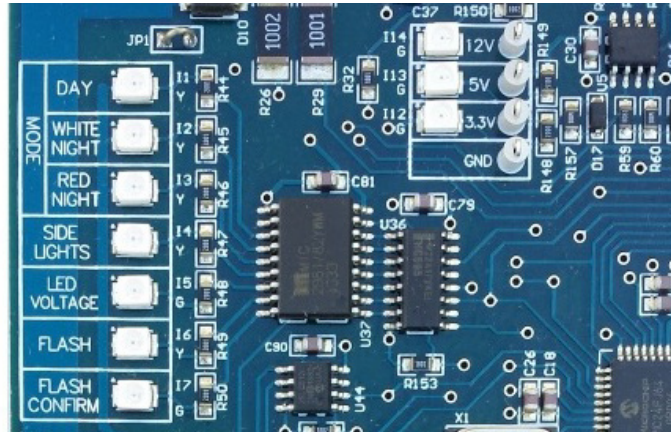


Figure 30: ITL-2610-TRG LED Location Detail

LED	Color	Function
DAY MODE	Green	ON if board is operating in Day Mode. BLINKING if manual override mode.
WHITE NIGHT	Green	ON if board is operating in White Night Mode. BLINKING if manual override mode.
RED NIGHT	Green	ON if board is operating in Red Night Mode. BLINKING if manual override mode.
SIDE LIGHTS	Yellow	ON when side lights are turned on. OFF when side lights are turned off.
LED VOLTAGE	Green	ON indicates HV1 and HV2 are at correct levels. BLINKING indicates HV1 or HV2 is too high. OFF indicates HV1 or HV2 is too low.
FLASH	Yellow	ON indicates a flash is in progress.
FLASH CONFIRM	Green	Blinks once after each flash to indicate correct flash energy was measured.
12V	Green	12 Volt Power Supply
5V	Green	5 Volt Power Supply
3.3V	Green	3.3 Volt Power Supply

Figure 31: ITL-2610-TRG LEDs Table

B. Switches

Several switches located on the ITL-2610-TRG board allow for manual override of operating mode, testing of alarm functions, and setup of the system configuration.

Toggle switch SW1 controls manual mode override. There is an eight (8) hour limit on manual override after which the switch will be ignored and automatic mode change via the photocell will resume. Toggle switch SW2 allows for strobe and side light failure test. SW2 is spring loaded and must be manually held in position for more than three flash cycles for the failure to be registered.

DIP Switches SW3 and SW4 control the system configuration. The system type, number of side lights and other configuration options can be set using these switches. See the diagram that follows for details.

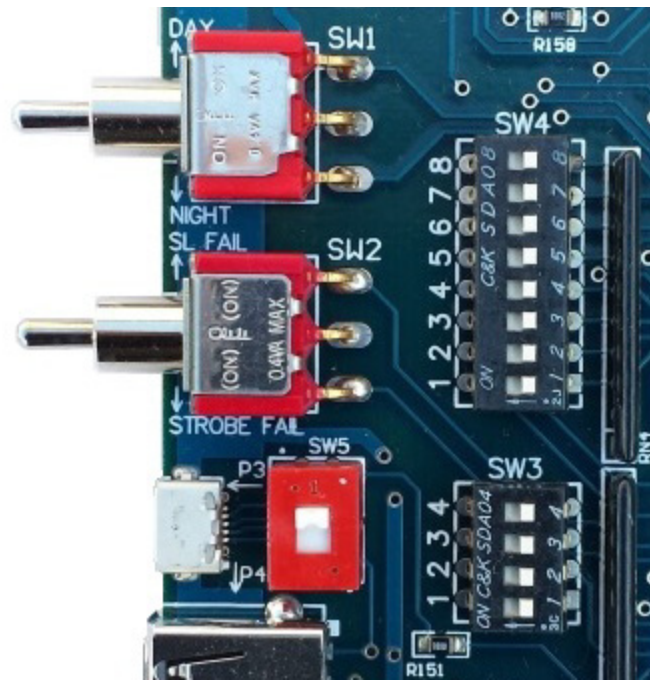
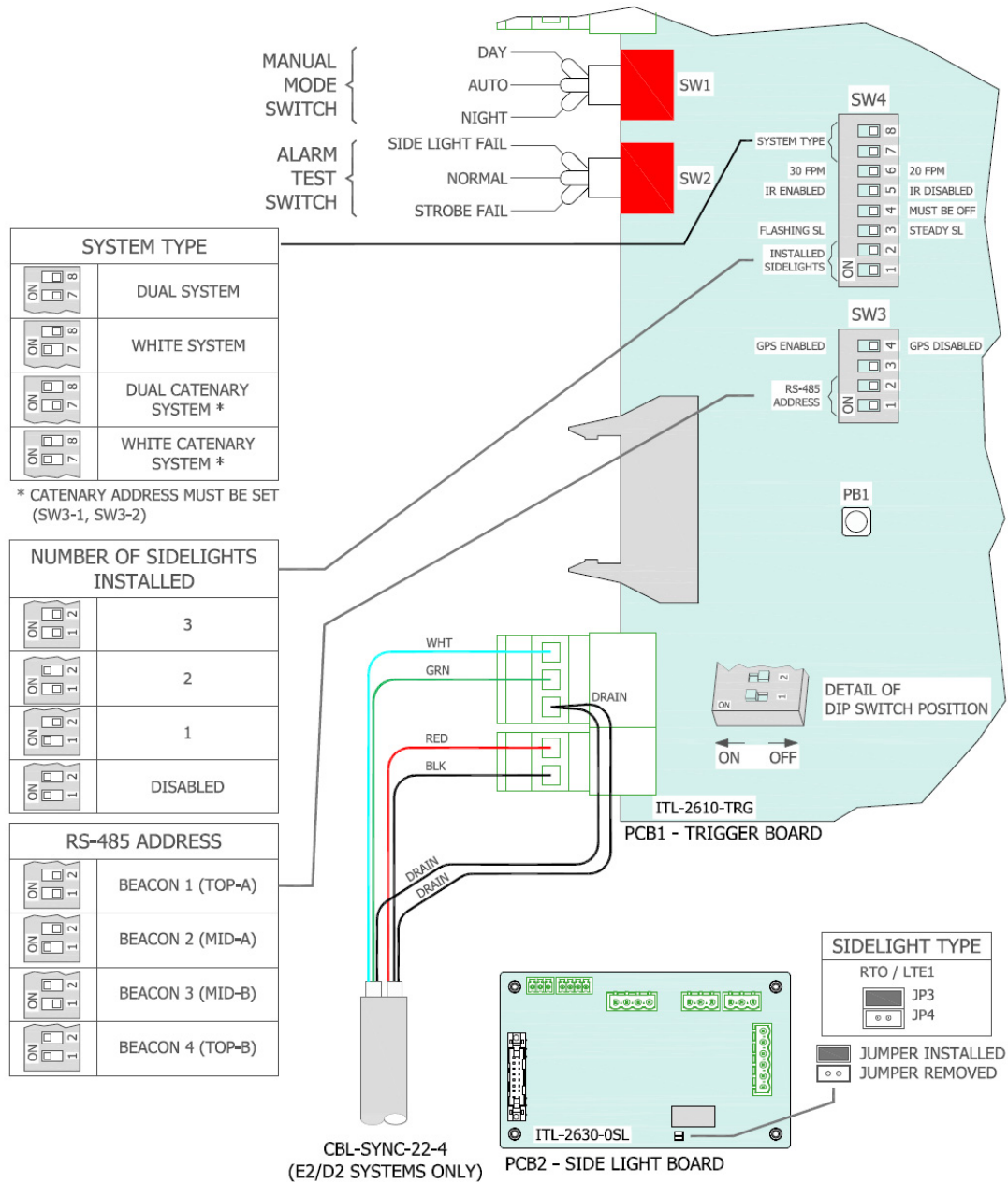


Figure 32: ITL-2610-TRG Switches

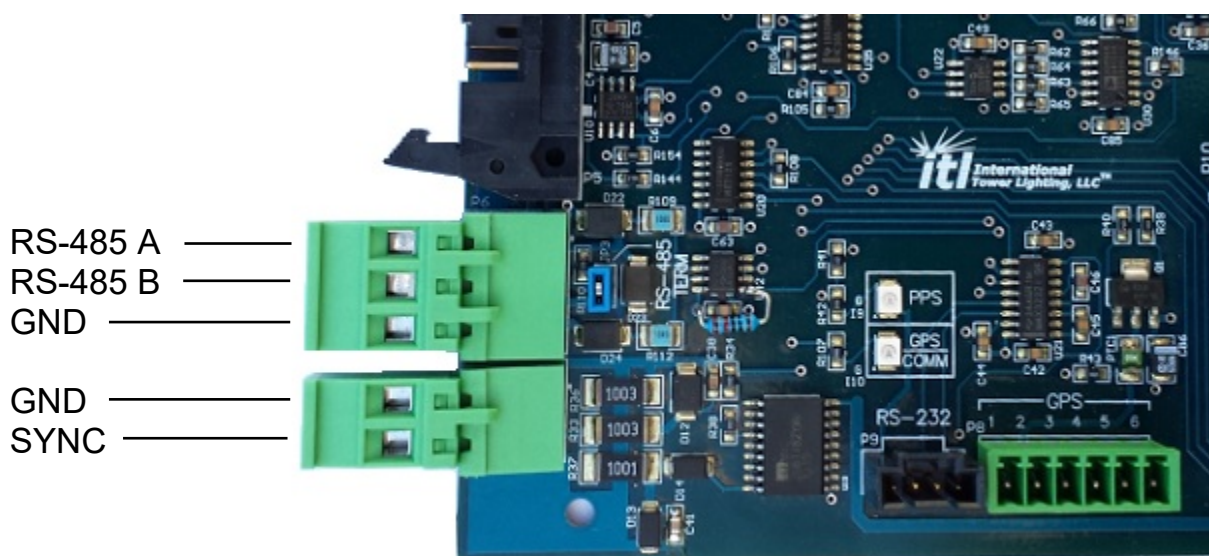


REV. 5

Figure 33: ITL-2610-TRG Switch Settings

C. Sync, RS-485 and RS-232 Connections

ILS-3600/2600 systems can be combined with other ILS-3600/2600 systems to form an E2 and D2 type lighting system for towers greater than 350 feet AGL. Additionally, catenary lighting systems can utilize up to 5 lights on a single catenary support structure. Flash synchronization and mode change are achieved by connecting together the Sync Terminals (P7) in daisy-chain fashion. This connection should be made with a twisted pair shielded cable, ITL part number CBL-SYNC-18-2 (one twisted pair). RS-485 communication connections are available on connector P6. ITL cable part number CBL-SYNC-18-4 (two twisted pairs) should be used when both sync and RS-485 communication are utilized.



RS-232 Communications is available on connector P9. ITL cable part number CBL-4755-000 should be used for this connection.

Figure 34: ITL-3600 Sync and RS-485 Connectors

ITL-2640-CAP Capacitor Board.

The ITL-2640-CAP board contains the two capacitor banks used for supplying power to the LED flash head. Bank 1 consists of the two large blue capacitors on the left side of the board and Bank 2 the two capacitors on the right side of the board. Indicator LEDs on this board labeled “HV1” and “HV2” are lit when the capacitor banks are charged.

Warning! Capacitors can maintain high voltage long after power has been removed from the equipment. Before servicing this equipment:

- Disconnect power at the circuit breaker panel.
- Wait at least 30 seconds.
- Verify that all high voltage warning lights (HV1, HV2, and Main Power Lamp) are completely off.
- Measure HV1 and HV2 (terminals pictured below) using a DC voltmeter and verify that the voltage is less than 10VDC.



Figure 35: ITL-2640-CAP Capacitor Board

ITL-2650-FET Driver Board.

The ITL-2650-FET driver board contains the drive transistors that control the LEDs in the flash head. A separate transistor is used to for each string of LEDs in the flash head. A green indicator LED on this board lights when the associate drive transistor is on.

LED	Color	Function
WHT1	Green	White LED String 1 status (ON/OFF)
WHT2	Green	White LED String 2 status (ON/OFF)
WHT3	Green	White LED String 3 status (ON/OFF)
RED	Green	Red LED String status (ON/OFF)
WHT4	Green	White LED String 4 status (ON/OFF)
WHT5	Green	White LED String 5 status (ON/OFF)
WHT6	Green	White LED String 6 status (ON/OFF)
IR	Green	Infrared (IR) LED String status (ON/OFF)

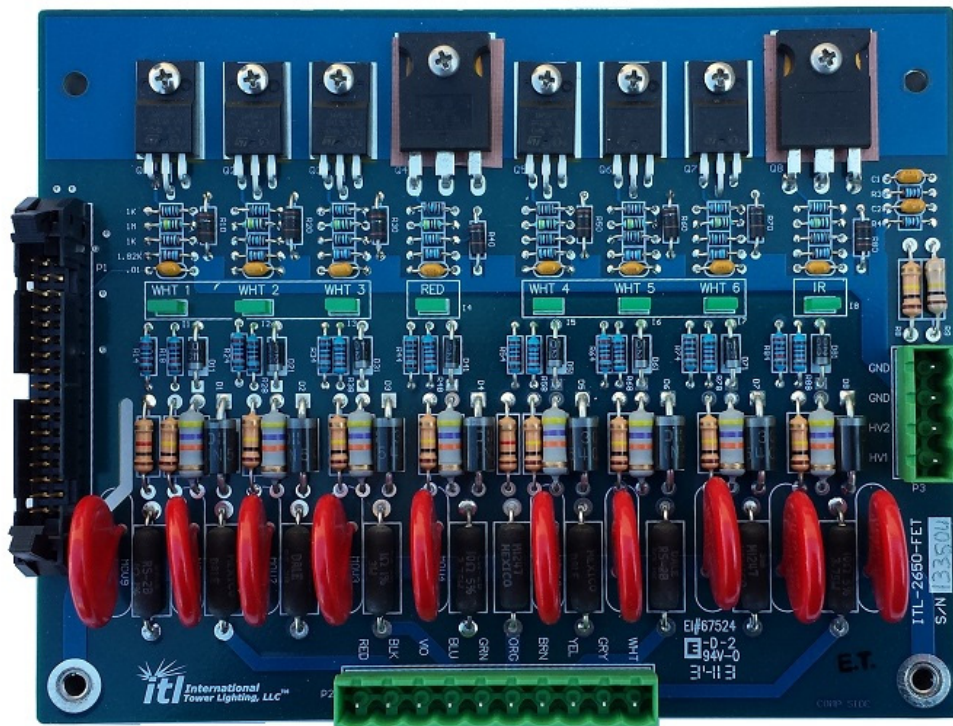


Figure 36: ITL-2650-FET Driver Board

ITL-2630-0SL Side Light Board.

The Side Light Board contains control and monitoring circuitry for the side lights as well as circuitry to control the two Power Supplies, PS1 and PS2 and the high voltage discharge relay. Indicator LEDs are provided to indicate the status (ON/OFF) of the power supplies and for Side Light Confirm.

LED	Color	Function
PS1	Yellow	ON indicates Power Supply 1 (PS1) is on.
PS2	Yellow	ON indicates Power Supply 2 (PS2) is on.
SIDE LIGHT CONFIRM	Green	ON indicates the correct number of side lights are operating.

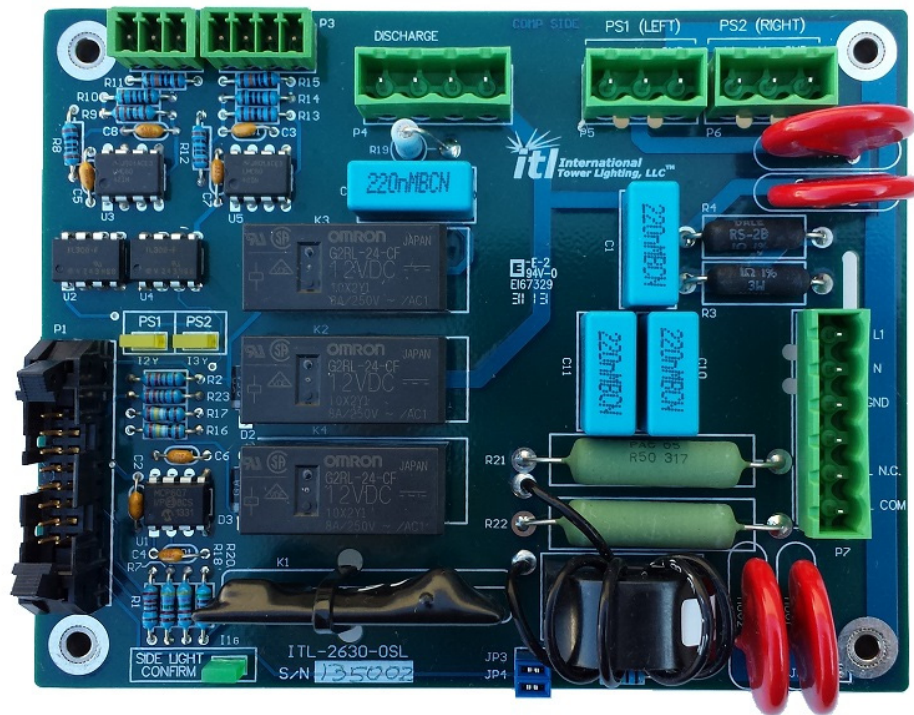


Figure 37: ITL-2630-0SL Side Light Board

ITL-2601-RLY Alarm Relay Board.

The Alarm Relay Board (PCB3) provides Form-C dry contacts for indication of alarm conditions as well as the operating mode (day/night) of the system. Each relay, except the Power Fail alarm relay, has a corresponding LED indicating the state of the relay. In the alarm state a relay is de-energized and the corresponding red LED is lit. The green Night Mode LED is lit when the unit is operating in night mode.

LED	Color	Function
WHITE ALARM	Red	ON indicates a White Alarm condition in Day Mode or White Night Mode.
RED ALARM	Red	ON indicates an alarm condition has occurred in Red Night Mode.
SIDE LIGHT ALARM	Red	ON indicates a Sidelight Alarm.
PEC ALARM	Red	ON in manual override mode or if the PEC fails to transition during a 24 hour time period.
NIGHT MODE	Green	ON in night mode OFF in day mode
IR ALARM	Red	ON indicates an Infrared Alarm condition during night mode operation
GPS ALARM	Red	ON indicates a GPS synchronization failure.

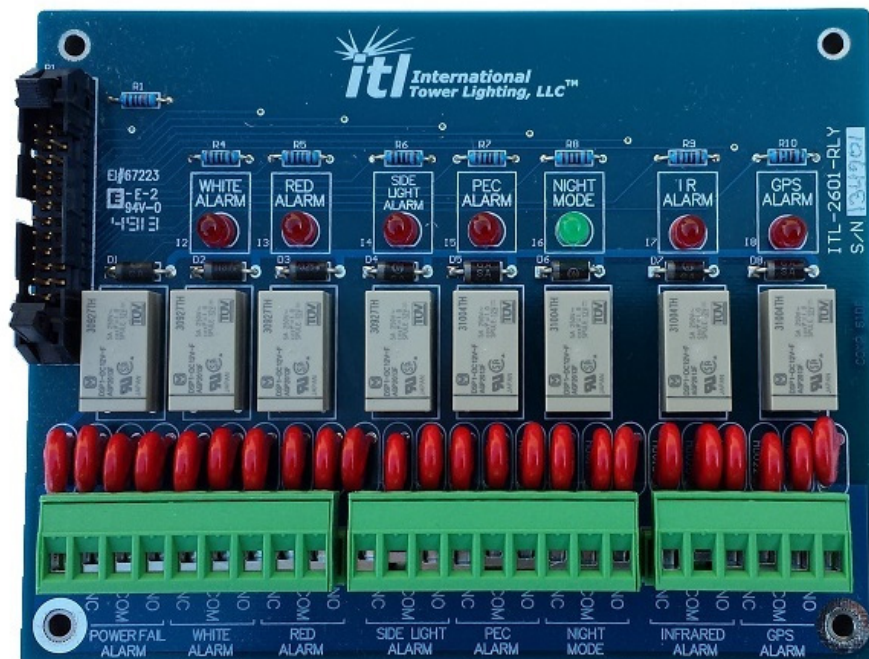


Figure 38: ITL-2601-RLY Alarm Relay Board

Maintenance / Trouble-Shooting



Please read section *Safety Warning* in this manual before servicing this equipment.

The trouble-shooting section is divided into two parts and explains how to trouble shoot the LED lighting systems. The first section contains helpful background information while the second section contains a flowchart with specific trouble shooting guidelines. If you are familiar with this or similar lighting systems you may want to proceed directly to the section *Troubleshooting Flowchart*.

Recommended Tools

The following is a list of recommended electrical equipment for troubleshooting the LED lighting systems.

- Digital multi-meter capable of reading 600VAC/DC and capacitance (Fluke 177 or 179)
- Clamp-on type AC Current Meter (Fluke 322 or equivalent)
- #2 Phillips Screwdriver
- 5/16 Flat Head screwdriver
- Crimp Tool
- Needle Nose Pliers

Maintenance

The maintenance outlined below should be performed at least once annually.

- Verify that the fixture is functional in all operating modes with no indication of an alarm condition on alarm indicator lights, alarm dry contacts, or digital monitoring interfaces.

- Verify that the photoelectric control operates the system in the correction operating mode (day/night), light color (white/red) and intensity (day/night intensity) when exposed to light and dark ambient lighting conditions.
- Inspect the fixture for any type of obstruction that could block light output at any point along the 360 degree horizontal output of the fixture. Note that multiple fixtures may be used to achieve 360 degree coverage.
- Inspect lenses and transparent covers for damage.
- Clean the fixture lens or transparent cover using a mild detergent and soft nonabrasive cloth.
- Inspect all electrical wiring connections for corrosion, arcing, damage, insulation degradation or loosening of the connection. Correct, replace or secure as needed.
- Inspect all interconnecting cables and power supply cables and conduits for damage.
- Verify the all cables are fastened securely at appropriate intervals to prevent damage.
- Inspect all electrical components for evidence of damage caused by lightning or power line induced electrical surges. Replace any components showing evidence of damage.
- Inspect fixtures and enclosures for water infiltration and insect infiltration. Replace any damaged gaskets or seals. Install plugs to close any unused conduit ports that may allow insect infiltration.
- Verify that all breathers and drain holes are clear of blockages.

Spare Parts & Replacement Parts

For parts regarding the ILS lighting systems please see the following sections and tables

- *IFH-3600 Dual LED Flash Head Parts List Table, Page 19*
- *IPS-3600 Power Supply Parts List Table, Page 26*
- *PEC Assembly Parts List Table, Page 32*

Troubleshooting

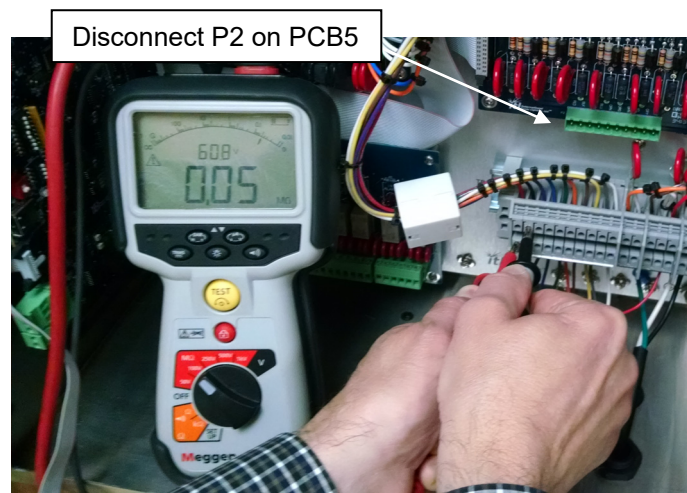
An Insulation Tester such as the Megger MIT410 can be used to measure the voltage of each LED string in the Flash Head without climbing the tower.

Insulation Testers can produce dangerous high voltage levels. Be sure to read, understand and follow your Insulation Tester instructions and warnings regarding high voltage.

Disconnect power from the ILS-3600/2600 at the circuit breaker panel. Wait at least 30 seconds then verify that the HV1 and HV2 indicator LEDs on the ITL-2640-CAP board (PCB4) are completely off.

Disconnect the LED Flash Head from the power supply by unplugging P2 on the ITL-2650-FET board (PCB5) as shown.

Set the Insulation Tester range to 100V. Do not use voltage settings greater than 100V as this may damage the Flash Head. To minimize component stress activate the insulation tester only after connection of the test leads to the terminals. Deactivate the insulation tester before disconnecting the test leads.



Test each LED string using the instructions in the table below. Verify that the measured LED string voltage is close to that indicated in the table.

Note that each LED string in the Flash Head will light dimly when tested. The Infrared (IR) string will not be visible.

RED HV1 LED Strings			ORG HV2 LED Strings		
Connect Red Tester Lead to Flash Head Cable RED wire. Connect Black Tester Lead to Flash Head Cable wire below.			Connect Red Tester Lead to Flash Head Cable ORG wire. Connect Black Tester Lead to Flash Head Cable wire below.		
White 1 LED String	BLK	60V*	White 4 LED String	BRN	60V*
White 2 LED String	VIO	60V*	White 5 LED String	YEL	60V*
White 3 LED String	BLU	60V*	White 6 LED String	GRY	60V*
Red LED String	GRN	60V*	Infrared (IR) String	WHT	42V*
*Voltages are approximate and may vary several volts higher or lower than shown. Voltage measurements above 100V indicate an open LED string or flash head cable wire. Very low voltages indicate a short circuit in the flash head cable or in the Flash Head.					

Technical Support and Contact Info

Contact Info

For information on the ITL LED lighting systems' basic functions, refer to this manual and the accompanying drawings. For additional help with the installation or operation of any ITL products, please contact ITL, LLC at one of the following below.

Web and Internet Sites

Corporate home page: <http://www.itl-llc.com>



Customer Support Technicians

8:00 AM - 5:00 PM Central Time

US and Canada call: +1-615-256-6030

Toll Free: +1-866-624-8309

Email: support@itl-llc.com

RMA

Please contact ITL, LLC before returning equipment for repair and obtain a Return Material Authorization (RMA) number.

Revision	Description of Change	Date	Preparer / Approval
0	Update power supply wiring diagram.	3/31/2014	Prepared By: Elke Hinson Approved By: Andy Rudolph
1	Added power supply grounding details	8/7/2014	Prepared By: Elke Hinson Approved By: Andy Rudolph
2	Added installation note "All fixtures, enclosures and junction boxes ...", Added maintenance outline.	8/29/2014	Prepared By: Elke Hinson Approved By: Andy Rudolph
3	Updated power consumption specification.	2/9/2015	Prepared By: Elke Hinson Approved By: Andy Rudolph
4	Added catenary typical system diagram. Updated Wiring Diagram, Info Cards & Installation Diagrams.	4/24/2015	Prepared By: Elke Hinson Approved By: Andy Rudolph
5	Updated Installation Diagrams. Changed reference from MKR-3400-3LED-KIT to MKR-3CABL-3LED-KIT. Changed power supply p/n from PWR-2600-700 to PWR-3600-ASY. Updated minimum Clearance of Beacon. Updated ITL-2610-TRG Switch Settings.	11/3/2015	Prepared By: Elke Hinson Approved By: Andy Rudolph
6+7	ITL-2610-TRG corrected switch setting (SW3) for RS-485 Address on Beacon 2 & Beacon3. Corrected labeling of the fuses in component layout.	7/25/2016	Prepared By: Elke Hinson Approved By: Andy Rudolph
8	Updated cover sheet & Flash Head Parts.	10/27/2016	Prepared By: Elke Hinson Approved By: Andy Rudolph
9	Added outline dimensions for Surge Suppressor SUP-2670-000	11/30/20016	Prepared By: Elke Hinson Approved By: Andy Rudolph
10	Corrected marker alarm LED description (pg.47).	12/19/2016	Prepared By: Elke Hinson Approved By: Andy Rudolph
11	Added infrared disclaimer.	5/11/2017	Prepared By: Elke Hinson Approved By: Andy Rudolph
12	Corrected title in figure 20 from PEC to GPS. Updated power specifications for 43H	8/4/2017	Prepared By: Elke Hinson/ Ryan Gregory Approved By: Andy Rudolph
13	Updated Suppressor Outline Dimensions. Updated warranty from two years to five years. Added information for Flash Head Cable Suppressor Installation (pg21+22).	12/11/2017	Prepared By: Elke Hinson/ Ryan Gregory Approved By: Andy Rudolph
14	Replaced PEC-3400-KIT with PEC-EKIT-120-25.	9/26/2018	Prepared By: Elke Hinson Approved By: Andy Rudolph
15	Corrected GPS wiring Figure 16 (pg28) and Figure 21 (pg33).	12/17/2018	Prepared By: Elke Hinson Approved By: Ryan Gregory
16	Added catenary configuration quick info card.	8/13/2019	Prepared By: Elke Hinson Approved By: Ryan Gregory
17	Updated Figure 24 & 28, removed side lights. Added note "do not drill, punch or pierce the enclosure ..." in Quick Installation Guide.	10/11/2019	Prepared By: Elke Hinson Approved By: Ryan Gregory
18	Added Broadcast Tower Installations information.	12/19/2019	Prepared By: Elke Hinson Approved By: Andy Rudolph
19	Replaced PEC-NITE-120 with PEC-NITE-120-ND	1/15/2021	Prepared By: Elke Hinson Approved By: Andy Rudolph
20	Added Info for Transport Canada. (pg. 9 & 14)	3/4/2021	Prepared By: Elke Hinson Approved By: Josh Crown
21	Added Flash Head Grounding info	6/3/2021	Prepared By: Elke Hinson Approved By: Andy Rudolph
22	Added peak VA	6/7/2021	Prepared By: Ryan Gregory Approved By: Andy Rudolph
23	Updated Flash Head Grounding info.	6/17/2021	Prepared By: Josh Crown Approved By: Andy Rudolph
24	Updated Title. Added "Pulsar LED Series".	9/15/2021	Prepared By: Elke Hinson Approved By: Josh Crown

Reference

Glossary

Capacitor

A component that stores electrical charge. Capacitance is measured in Farads. Used to store energy to be discharged into the flash tube.

Choke / Inductor

A device consisting of a coil of wire. An inductor opposes the flow of AC and variations in the flow of DC current. Used to protect flash tube.

Fuse

A protective device for electric circuits containing a wire designed to melt and open the circuit under abnormally high electric loads. Used for incoming power, sidelights and PEC.

MOV

Metal Oxide Varistor. A device used to protect sensitive components from voltage transients. Used throughout the equipment.

Relay

An electrically controlled mechanical device that opens and closes electrical contacts when a voltage (or current) is applied to a coil. A relay provides isolation of control signals from switched signals. Used to switch from day to night mode, discharge capacitors, control transformer and provide alarm contacts.

Resistor

An electronic component that opposes the flow of electrical current. Resistance is measured in Ohms. Used in night circuit.

Terminal Block

An insulating base with binding posts to make connections where sets of terminals are mounted. Use to connect flash head cable, power, sidelights and PEC.

Transformer

A device used to increase or decrease electricity's voltage and current. Used to step-up incoming voltage to 1000VAC before rectification.

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